

# BIOLOGY NEWS

DEPARTMENT OF BIOLOGICAL SCIENCES

FALL 2023

Dear friends,

How can we make our department better in the aftermath of a global pandemic, in waves of economic woes and amid some doubt about the value of higher education? I would like to report two series of activities we have been carrying out in the department to address the questions.



For one, we hope to tap into the wisdom of our alumni. We have been trying to engage with alumni of the department and connect them with current students. As a department with a long history and many graduates, we are lucky to have alumni in all walks of life and at different career stages. Collectively they have much broader views on how experiences at UToledo have facilitated their success in a professional environment. We fully believe they also have constructive suggestions that people in academia might have overlooked. In addition, our alumni who are now parents and grandparents must have perspectives that young people in their twenties might not have developed yet. Last year, at my invitation, Dr. James Hatfield and Dr. Douglas Geiger contributed “Words of Wisdom” to our current students ([utoledo.edu/nsm/bio/alumni/words-of-wisdom.html](http://utoledo.edu/nsm/bio/alumni/words-of-wisdom.html)). Reading their recollections of the department and their success after graduation was really inspiring for me. Please do not hesitate to contact us if you have any thoughts you would like to share with current students or faculty and staff.

Along the line of alumni engagement, we were thrilled to welcome Dr. James Hatfield back to visit the department in mid-September. Dr. and Mrs. Hatfield had nice chats with Lucas Flanagan and Jenna Maruskin, two current recipients of the “Dr. James Hatfield Scholarship”, heard recent research achievements from several faculty members, and visited the Instrumentation Center (housing a half million super-resolution microscope among other precious “toys”). We look forward to seeing them next year and

sincerely extend our welcome to other alumni too. You can also find stories and updates of many other alumni inside this issue, of which I particularly call your attention to the story of our alumna, famous forensic scientist and Greek Police Major General Dr. Penelope Miniati. I also want to thank the following friends and alumni who have contributed to our Department Merit Scholarship Fund and Department Progress Fund in 2023: Arthur Chan, Douglas Geiger, Caryn Vandersluis, Stephen Goldman, Steven Warrington, Thomas Moxley, Arthur Ozolin, Dina Ambrose, Matthew Butz, Roger Trinkner, Amy Biros and Fidelity Charitable Gift Fund. Current faculty, Drs. Sally Harmych, Rafael Garcia-Mata, Tomer Avidor-Reiss, Silvia Goicoechea, John Plenefisch, Deborah Vestal and I, have also contributed to these funds so we can continue to offer department sponsored scholarships.

The second series of activities centers on improving the undergraduate learning experiences. The Department Undergraduate Affairs Committee Chair Dr. John Gray and I started monthly meetings with our current undergraduate students this semester. We have heard great suggestions and already acted on some of them! For example, we are going to routinely notify all undergraduate students of the scientific seminars held in the department and welcome their attendance! Additionally, a quality education is impossible without talented and caring faculty members. We welcomed Dr. Wei Niu to join the department as tenure-track assistant professor this fall (see inside story). Dr. Niu’s expertise in engineering patient stem cells into organoids to understand developmental defects in the nervous system will greatly benefit our Neuroscience majors. We also congratulate Dr. Scott Crawley on his tenure and promotion! Dr. Crawley is a great scientist and wonderful teacher who also guides the TriBeta Honors society. In addition, we continue to match “peer mentors” — selected sophomore and junior students — with first-year students in their NSM1000 orientation course and throughout their first year, so students can quickly learn about the resources on campus, complete the transition into college life faster, and find

friendship, support and belonging from the very beginning.

We also want our students to be aware of more options for career paths instead of fixating on a few tracks with fierce competition. Our Medical Lab Sciences major has nearly 100% job placement; and our new Director for this major, Lisa Jordan, has already started working to make the MLS program even better (see inside story)! In August we finalized an agreement with SENS Research Foundation, based in California, for a joint Ph.D. training program (see News inside) and hosted a visit from SRF CEO Lisa Fabiny-Kiser and SRF Director of Academic Affairs and UToledo alumna Dr. Emily Fishman. Dr. Fishman came back in October to speak about more internship opportunities at SRF and encouraged current UToledo students to apply. Noting that at least half of our students need work to subsidize their tuition and living costs; an internship using their biology expertise will be much more valuable for them. If any alumni, parents or friends have additional internship opportunities that can help our current students, please do let us know.

As a first-generation college student myself (my Dad got his degree after me!), I believe that education means opportunity even though it does not guarantee more money nor more happiness. Some specific information we teach our students will become outdated eventually, but the skills we learn can last much longer, and as a steppingstone into rewarding careers, a college and graduate education is even harder to replace. Any thoughts to further improve our educational and research mission in the department are welcome!

Wishing you and your families a wonderful holiday season!



Song-Tao Liu

Professor and Chair,  
 Department of Biological Sciences, UToledo  
[song-tao.liu@utoledo.edu](mailto:song-tao.liu@utoledo.edu)

## IN THE NEWS ...

### Biology Graduate Takes Bold Steps Through Sophisticated Microscope

Before starting her freshman year at The University of Toledo, Abigail Royfman took a chance to jump-start a competitive edge on her college career.

She contacted Dr. Tomer Avidor-Reiss, professor of biological sciences at UToledo and a groundbreaking scientist in the field of male infertility, asking for a research position in his laboratory.

"I knew it was going to be a big change going from high school to college, so I wanted to pursue research early on to better orient myself. Despite having no research experience, I decided to put myself out there," Royfman said. "I've found that it's better to put yourself out there and ask for something. The worst that can happen is someone says no, and I believe rejection is an insignificant consequence when considering you may receive the opportunity of a lifetime."

Avidor-Reiss said yes.

After graduating from Sylvania Southview High School and two months before the start of her first year at UToledo in the College of Natural Sciences and Mathematics and the Jesup Scott Honors College, Royfman spent her summer on campus finding her research footing.

That bold initiative paid off. In her nearly four years of working as an undergraduate researcher in Avidor-Reiss' lab, the biology major and chemistry minor gained access to research equipment typically reserved for graduate students, postdocs and research professors.

Set to graduate Saturday, Dec. 17, with a bachelor's degree in biology, Royfman will next go to medical school at UToledo after taking a semester off.

"Abigail is an outstanding and exceptionally strong student," Avidor-Reiss said. "Since the beginning, she has shown phenomenal dedication. Her research contributes to the understanding of unexplained male infertility. In a short time, she learned to do immunofluorescent experiments on bovines and independently use the STORM super-resolution microscopy."

Super-resolution fluorescence microscopy is a new technology that shattered the limits of optical resolution and allows for the unprecedented imaging of proteins. This technology's developers received a Nobel

prize a few years ago for its development.

"Abigail was probably one of the few first-year students in the world who used this highly sophisticated microscope," Avidor-Reiss said. "She is such a strong undergrad student that I asked her to lead the writing as first author of a chapter that explains the method of how to perform structural and functional analysis of sperm centrioles using STORM."

A centriole is a critical structure in sperm that plays a vital role in fertilization.

The paper with Royfman as first author is currently under review for publication in a Springer book. She also co-authored a [published paper in 2021 in Nature Communications](#) about the laboratory's discovery that, contrary to popular belief, the sperm centriole moves.

"I'm honored to have received the opportunity to train on and use the microscope," Royfman said. "It was terrifying at first to operate such advanced and expensive technology. I was even scared to click on or adjust anything outside of my training. Its high resolution is what's unique about this microscope and has given us new insight on the sperm centrioles."

She quickly overcame her fear of pushing buttons and gained comfort using and troubleshooting STORM to examine the subcellular structure of sperm.

"It was really cool to disprove a common scientific assumption," Royfman said. "There is indeed movement in the sperm centriole — causing head twitching or head kinking — which is something we didn't see before. I'm very grateful to have contributed to the discovery and published paper. I worked under Dr. Sushil Khanal, who was a graduate student at the time and is now a postdoctoral fellow in California. He provided me the guidance and training that has allowed me to function independently and extend upon this discovery for my final two semesters in the laboratory."

Royfman said she chose UToledo because it keeps her close to home and her strong support system.

Plus, she was drawn to the BACC2MD program, UToledo's early medical school pathway program offered to high-metric high school students, providing them the opportunity for an early interview with

the UToledo College of Medicine and Life Sciences M.D. program following their sophomore year at UToledo.

"Getting an early interview and early acceptance to medical school has taken a lot of stress off my shoulders," Royfman said. "For my career, I'm

looking at a surgical specialty because I like working with my hands, as required by my hobbies of pottery and painting. Although, I'm open to any specialty that piques my interest in medical school."

She is following in her sister's footsteps.

"My sister is a trailblazer," Royfman said. "Rachel, who is three years older than me and graduated high school a year early, is graduating from medical school at UToledo this year. I owe a lot of who I am to her today. She has forged the way for me and has always been there for me."

Aside from her busy class and research schedule, during her time as an undergraduate Royfman volunteered at American Red Cross blood drives and participated in painting projects with memory care patients at a local nursing home.

As she prepares to cross the stage and achieve her academic degree, Royfman said she is grateful for Avidor-Reiss, who saw something special in a high school senior four years ago and welcomed a rookie into his laboratory.

"I'm thankful that he believed in me, especially as I wasn't even in college yet," Royfman said. "It has been an invaluable experience to be part of a collaborative, supportive environment that encouraged me to continue in the face of difficulties and pushed me to reach my fullest potential. I would not be the student I am today without his mentorship."

*By Christine Billau, UToledoNews, December 2022, used with permission*



## UToledo Partners With SENS Research Foundation for Innovative Research Opportunity

The University of Toledo College of Natural Sciences and Mathematics is partnering with the SENS Research Foundation to launch an innovative program that will provide doctoral students studying biological sciences the opportunity to perform extended research in the field of anti-aging as they work toward their degree.

The California-based research institute will take on one UToledo doctoral student in each of the next five years. Students will be stationed at SENS' headquarters, with the foundation covering their tuition, paying a stipend and working with them to develop their research skills as they complete their UToledo coursework remotely.

"We are thrilled to create this partnership with the SENS Research Foundation," said Dr. Marc Seigar, dean of the College of Natural Sciences and Mathematics. "Anti-aging is a burgeoning area of research, and SENS has expertise in the field beyond what we currently have at UToledo. The students who participate in this are going to be doing cutting-edge research that will benefit them academically and professionally. This is just the kind of public-private partnership that can be incredibly beneficial for our

doctoral students. We are looking forward to all we will accomplish as a team."

SENS' research is focused on finding new regenerative therapies that can remove, repair, replace, or render harmless the cellular and molecular damage that accumulates over time.

The partnership was made possible in part through the work of Dr. Lilli Fishman, the SENS Research Foundation's director of academic affairs and a UToledo alumna. Fishman will serve as a mentor to the UToledo doctoral students alongside SENS scientists.

"What I really value is this partnership opens the window of opportunity for our students. There is a huge biotech industry outside our region, and this new partnership helps to illustrate the possibilities within that sector to our students," said Dr. Song-Tao Liu, professor and chair of the Department of Biological



*Pictured (L-R): Dr. Scott Molitor, interim vice provost for Academic Affairs; Dr. Song-Tao Liu, Department of Biological Sciences chair and professor; Dr. Emily Lillian Fishman, SENS Research Foundation director of Academic Affairs; Lisa Fabiny-Kiser, SENS Research Foundation CEO; and Dr. Marc Seigar, dean of the College of Natural Sciences and Mathematics.*

Sciences. "This is the first step of what we hope will be a larger partnership between UToledo and the SENS Research Foundation."

As part of the collaboration, UToledo and the SENS Research Foundation also are exploring opportunities to engage the University's new undergraduate neuroscience major with SENS research.

[UToledoNews, August 2023, used with permission](#)

## Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS)

Dr. Silvia Goicoechea, Research Associate Professor in Biological Sciences and the College of Natural Sciences and Mathematics (NSM) Diversity, Equity and Inclusion (DEI) Officer, attended the ABRCMS 2022 Annual Meeting held

in Anaheim, California, November 9-12. A major objective of her attendance at ABRCMS was to recruit the next class of talented minority graduate students and to distinguish the University of Toledo College of Natural Sciences and Mathematics as one of the leading institutions for graduate (and undergraduate) training and research in the Midwest, nationally and internationally.

ABRCMS aims to build a scientific identity by providing students the chance to network with peers who may have had similar experiences and to connect with role models who can help students solidify a vision of future success for

themselves. The conference also provides opportunities for students to present their research—further developing science identity and self-efficacy. The conference draws world-renowned scientists who share their work with students as junior colleagues. These scientists also give feedback to students and serve as their mentors. In addition to the scientific aspects of the conference, there is an exhibition hall where research scientists, graduate students and postdoctoral fellows, and staff and advisors from universities and programs recruit student attendees for summer research and graduate programs.



## UToledo Fertility Researcher Pursues Commercial Diagnostic Test

Dr. Tomer Avidor-Reiss, pictured right, is ready to put his research to the test. Literally.

Avidor-Reiss, whose groundbreaking work on sperm centrioles has advanced scientific understanding of how life begins, is now working to develop a commercial male fertility test.

In targeting a factor that's not considered in standard semen analyses, specifically, such a diagnostic tool could shed much-needed light on the still often mysterious, often frustrating road to reproduction.

"One out of every seven couples in America is infertile, meaning that they have not been able to conceive after one year of trying. One-third of those couples who consult a doctor end up with no definitive answer as to the cause of that infertility," said Avidor-Reiss, a professor in the UToledo Department of Biological Sciences. "That means that there are mechanisms of infertility that are not clear to us. The centriole is one of those mechanisms, and we are committed to the commercialization of our method of analyzing it."

The work is supported by a National Science Foundation Partnerships for Innovation – Technology Translation grant valued at \$250,000. It covers a two-year period that began in August.

Technology Translation grants aim to put into practice research already funded by the National Science Foundation. They're awarded to projects with "promising commercial potential and societal impact."

Norman Rapino, executive director of Rocket Innovations, an investment fund set up to advance student and faculty entrepreneurship, has been working with Avidor-Reiss.

"Dr. Avidor-Reiss' research has the potential for a valuable real-world impact. Couples invest so much emotionally and financially into the process of in vitro fertilization, and sometimes it turns out that it was doomed from the start," Rapino said. "Moving something from a lab to

a real-world application is not a simple process, but I am confident Dr. Avidor-Reiss will make it happen."

Avidor-Reiss is one of numerous researchers Rapino has steered through the National Science Foundation's Innovation Corps, an entrepreneurial training program that prepares participants to take their ideas and technology beyond the laboratory and into the world.

The University of Toledo is an officially designated I-Corps Site.

Avidor-Reiss' work toward a prototype test builds on years of research that culminated with the discovery of a second centriole on sperm cells, as reported in *Nature Communications* in 2018. That discovery upended conventional knowledge at the time, which held that sperm cells had just one of these organelles.

Dr. Aniruddha Ray, an assistant professor in the Department of Physics and Astronomy.

Avidor-Reiss has since found that this second centriole, called atypical because it is structured differently than the long-known canonical centriole, plays a role in the movement of sperm cells. He's also found evidence to support his hypothesis that abnormalities in the formation and function of the atypical centriole contribute to infertility, subfertility and miscarriage.

That's a particularly relevant discovery for those fertility doctors who find that contemporary fertility tests cannot account for why a couple is struggling to conceive – or for agricultural artificial insemination companies disappointed to find that a bull inexplicably isn't siring up to snuff.

The prototype would be applicable in both cases.

The prototype will attempt to take the complex lab work currently involved in assessing sperm centrioles faster, simpler and cheaper.

Joining the effort on this front is Dr.



Aniruddha Ray, an assistant professor in the Department of Physics and Astronomy and a co-principal investigator on the grant. Dr. Ray will lean on his specialty in biophysics to bring down the cost of the microscopes involved in the assays, and to simplify the analysis of the resulting images. By automating the latter, they should untimely save time and money.

"We've done some preliminary work with it, and we think that it's possible," Ray said. "There's a lot of work to be done but it is extremely exciting."

The grant allows the researchers to bring in two students on the project, one who will work in Avidor-Reiss' lab and another who will work with Ray.

Avidor-Reiss said he hopes to have a prototype lined up next year, in line with the objectives of the grant. But he won't be stopping there: He's already thinking farther ahead, beginning to consider a treatment for subfertility resulting from absent or abnormal atypical centrioles.

"That's very important," Avidor-Reiss said. "Nobody wants bad news. Nobody wants to hear that they have a problem that we don't know how to solve."

*By Nicki Gorny, UToledoNews, September 2023, used with permission*

## New Neuroscience Lab Course for Spring 2024

Development of a new laboratory course (NSCi/Biol3060 Neuroscience Laboratory) for neuroscience students has taken a major step forward this semester, on pace to enroll our first class in Spring 2024. This course will explore neuronal signaling in living animals using electrophysiological and optical techniques. Using Reinvestment Funding provided by the UToledo Provost's office (\$150K), we made a major purchase of electronic equipment, software and microscopes. This equipment will form the core of a state-of-the-art neuroscience teaching laboratory, consisting of six fully equipped workstations. Each workstation will have a stereomicroscope, micromanipulators, extracellular and intracellular amplifiers, a digitizer, and a laptop running acquisition and analysis software suitable for educational and research applications. Working in teams of three, with a maximum course capacity of 18 students per section, students will gain a theoretical and practical foundation in the major experimental approaches used in modern neuroscience research. The course is based on the NSF-funded "Crawdad Project" in which students gain hands-on experience using invertebrate models (crayfish, snails and fruit flies). The experiments will provide students with fundamental insights into how sensory neurons, motor neurons, and central neural circuits work and since basic neural mechanisms are the same in all animals, the knowledge students gain will translate seamlessly to research and clinical experiences with vertebrate animals

and humans.

A critical contribution was also made by the College of Natural Sciences and Mathematics Educational and Instructional Technology Oversight

Committee, which provided matching funding for the purchase of an additional microscope optimized for instruction. This microscope is equipped with a high-resolution wireless video camera so students can watch the instructor perform an experiment, then the instructor can watch the students perform the same experiment and provide real-time feedback to hone their techniques. NSCi/Biol3060 Neuroscience Laboratory will be required for all Neuroscience majors but will also be open to other students with an interest in neuroscience (provided they have taken the Fundamentals of Neuroscience prerequisite courses).



## The Medical Laboratory Science Program at the University of Toledo

So, what is Medical Laboratory Science? Ever had your blood drawn and the physician says we need to run "tests"?

Only graduates from a Medical Laboratory Science (MLS) program accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) are able to perform blood "tests" or analyze your culture for organisms. It is a known statistic that 70% of the decisions that doctors make come from laboratory tests.

At UToledo, upon completion of the B.S. in Medical Laboratory Science degree program, students are prepared to begin their career in a hospital lab, clinic, forensic lab, veterinary clinic, industrial research lab or other type of lab. Graduates can, after passing the MLS (ASCP) certification exam (and some states have licensure), go anywhere in the United States. Job growth and security are high for medical laboratory scientists.

My career history is full of the opportunities I have had in this field. I worked as a generalist, clinical chemistry supervisor, and specialized in microbiology in the laboratory for 20+ years. I thoroughly enjoy sharing my expertise in the MLS field and working with students during their clinical rotations. With my experience teaching students during their clinical rotations and what I had in the field, I thought I would like to teach. I received an M.S. degree in Molecular Biology from Lehigh University in

Pennsylvania, while I was working for Zane State College in Zanesville, Ohio. I loved my job at Zane State, but alas they downsized. I had to find another teaching

position because I had found a job I really loved. I have been an MLS program director twice before coming to UToledo. I wanted to get back to Ohio; I love this state! My family is here and it feels like I came back home. I now have a great opportunity to work with wonderful, professional and respected individuals in their fields (faculty, staff and students) in the College of Natural Science and Mathematics. I am truly blessed to be here.

Lisa Jordan  
MLS Program Director



## New Faculty Profile: Dr. Wei Niu

Dr. Wei Niu, the newest member of our department, is a neuroscientist who studies the genetic causes of neurological disorders. She obtained her Ph.D. in Molecular Biology from the University of Texas at Austin and did her postdoctoral training at Yale University. At Yale, she led the effort to identify the transcription regulatory network using high throughput sequencing as a part of modENCODE project, one of the largest genomic studies funded by NIH.

Before joining the University of Toledo in 2023, Dr. Niu was a research faculty member in the Department of Neurology at the University of Michigan School of Medicine. There she studied the

Epilepsy gene variants as a part of Epilepsy Multiplatform Variant Prediction consortium funded by NIH. In addition to her own work, she collaborated extensively with both the physicians at the University of Michigan and the scientists at Ionis Pharmaceuticals to study potential treatment of PCDH19-clustering epilepsy.

Dr. Niu has published extensively as a scientist including in prominent research journals such as *Science*. She has strong expertise in CRISPR/CAS9 genome editing of hPSCs, differentiation of cortical neurons, and generation of 3D human brain organoids from hPSCs. Her work is currently funded by The Simons

Foundation, a private foundation focused on discovering the mechanism of Autism. In her new lab at the University of Toledo, Dr. Niu will employ pluripotent stem cells (hPSCs) and brain organoid to study brain development in order to find cures for human genetic disorders including Autism and Epilepsy.



## Distinguished University Lecturers Named

Three faculty members have been recognized with the distinction of Distinguished University Lecturer for their commitment to advancing student learning and supporting student success.

The UToledo Board of Trustees approved the honor for the educators at its April 26 meeting.

The 2022-23 Distinguished University Lecturers are:

- **Dr. Sally Harmych, senior lecturer in the Department of Biological Sciences in the College of Natural Sciences and Mathematics;**

- Sandra Robinson, associate lecturer in the Department of Mathematics and Statistics in the College of Natural Sciences and Mathematics; and

- Dr. Kathy Shan, senior lecturer in the Department of Physics and Astronomy in the College of Natural Sciences and Mathematics.

“The Distinguished University Lecturer is an honor reserved for the most dedicated educators who have consistently displayed a commitment to provide our students with a world-class education,”

said Dr. Risa Dickson, interim provost and executive vice president for academic affairs. “The lecturers recognized this year have demonstrated an admirable passion for student learning and success.”

Harmych has been a member of the UToledo faculty since 2003 and has established a welcoming and inclusive classroom environment for students that encourages active learning and provides opportunities to apply their acquired knowledge.

She has provided service on numerous departmental, college and university committees, including service as a faculty mentor for the Summer Scholars Program and participation in the Student Experience Project. Named a National Academies Education Fellow in the Life Sciences in 2015, Harmych has been recognized with UToledo’s Outstanding Teaching Award and Student Impact Award in 2011.

“I am humbled and honored to be selected as a Distinguished University Lecturer,” Harmych said. “I am lucky to be able to do what I love every day at a place that I love. UToledo gave me

a great start as a student and having the opportunity to be a small part of my students’ journeys is a privilege. In my classrooms I strive to help students develop the skills they need to be successful both academically and in life. The statements written by students in support of my nomination affirm that my efforts are having an impact.

“Thank you to all of my students. They motivate me to continue learning and trying new things in the classroom. I look forward to continuing my contributions to the UToledo community staying focused on students and providing them with the best experience possible.”

*By Kirk Baird, UToledoNews, May 2023, used with permission*



## Athens DNA lab, led by UToledo alum Penelope Miniati, helps trace those lost at sea on Aegean crossing

ATHENS, Greece, April 5 (UNHCR) - The phone call comes from New York, seven hours behind Athens. A Syrian woman in the United States is trying to trace her cousin and uncle. She believes both died trying to cross the Aegean from Turkey to Greece. She wants to know for sure and, if so, to be able to make appropriate arrangements and repatriate their bodies.

**Penelope Miniati, the new head of Greece's criminology service, takes the call.** She sees no bodies but her job is to make sure that families know the fate of their beloved ones.

She has, almost single-handedly, supervised the country's DNA service from its inception. It is now a crucial link for thousands trying to trace children, mothers, fathers, brothers and sisters missing on the dangerous crossing from Turkey to Greece in the past year.

"It is an obligation of our state and a mark of civilisation," said Miniati, who was promoted last month from head of the DNA service to oversee the entire criminology service. "If someone is not found and buried, the process of mourning cannot begin. It's as though the souls continue to hover."

About 4,400 people have died in the Mediterranean since 2015. The refugee crisis has meant that the DNA lab, located in an Athens suburb, has gone from dealing with about 30 cases a year on average to as many as 70 in two days, as happened last summer after two major shipwrecks in as many days.

From last year up to March 20 this year, Greek authorities reported 571 people dead or missing on the route from Turkey to Greece.

**Miniati, a graduate of the Universities of Toledo in the United States and Crete, Greece,** set up the country's first DNA lab in 1994 with two other women. The team now numbers about 55 scientists and she is the only original member left.

She says that, as a result of her US education, she insisted that the lab, formally called the Greek Police's Subdivision of Biological and Biochemical Examination and Analyses-DNA, was the

central repository for all genetic material. This will enable the efficient exchange of information with other states and services in the future.

Greece's worst aviation accident, the crash in 2005 of a Helios Airways plane that killed all 121 people on board, was instrumental in teaching her and her staff about the identification of disaster victims, particularly of small children and families, who are more difficult to identify because they are genetically similar.

With children accounting for 38 per cent of those on the move, the chances of them drowning on the crossing from Turkey to Greece have grown proportionately.

During the height of the crisis, an average of two children a day drowned, according to UNHCR figures.

Miniati's staff do not see the bodies but they deal with personal belongings, such as teddy bears and toothbrushes, brought in by relatives to help establish DNA matches.

Besides the sheer volume, there are more specific aspects to the refugee crisis that have made the work of the Greek DNA lab crucial. Many of the dead are identified immediately, but DNA is often used to identify bodies found at sea after decomposition has set in, making it difficult to use fingerprints or dental, surgical or medical records from the refugee's home countries, such as Syria.

The Syrian woman is sure her uncle and cousin were in a shipwreck at the end of October last year, when a total of 221 people died, the deadliest month on record in 2015 for the crossing to Greece. Aristeia Methenitis, the biologist who took the call said some sleuthing was required. The date of the shipwreck did not tally with the dates they had in Greece, but there was one two days later, she said.



The use of DNA will remain an important tool now and in the future in proving kinship when supporting documents are unavailable.

Citing a recent example in Greece of a 14-year-old unaccompanied minor, Miniati said it was extremely important to establish that there was a biological link between the youngster and the man who said he was his uncle. More than 90,000 unaccompanied or separated children registered and applied for asylum, or were in care in Europe last year, mostly in Germany and Sweden

For the Syrian woman in New York, the search for her cousin and uncle will continue via DNA and diplomatic channels. She has already filed a missing persons report with the International Committee of the Red Cross (ICRC) in New York and will send a DNA sample from her aunt, the sister of the missing uncle, to Athens via the Greek diplomatic mission to be matched against what is in the Greek missing persons database.

"Sometimes the identification of a body is as simple as the cross someone is wearing, or the glasses their father always wore," Miniati said. "But when it's not, the easiest way we have settled on is DNA."

*By Maria Petrakis, Athens, UNHCR, April 2016*

<https://www.unhcr.org/gr/en/2999-athens-dna-lab-helps-trace-those-lost-at-sea-on-aegean-crossing.html>

## ALUMNI SERIES ... IN THEIR OWN WORDS

### Roberto Alers-Velazquez (Ph.D. '20)



*"When I reflect upon my academic journey, it becomes evident that my path was far from a linear progression, starting with my undergraduate studies*

*and culminating in my current role as a postdoctoral researcher at the Geisel School of Medicine at Dartmouth. Instead, it has been a series of twists and turns that have ultimately brought me to where I stand today. The pivotal moment in my journey occurred during my post-baccalaureate training at The Ohio State University when I embarked on the quest for suitable graduate programs. I was searching for an academic environment where I could immerse myself in studying viruses while enjoying the benefits of a smaller city. During this period, I was first introduced to the graduate program at The University of Toledo.*

*My years as a Ph.D. student in the Molecular/Cellular Program at Toledo were profoundly enriching and fulfilling. Here, I was afforded the invaluable opportunity to evolve as a scientist and, equally importantly, as a mentor and educator. These experiences played a pivotal role in shaping me into the professional I am today. I owe a debt of gratitude to the unwavering support of the faculty and the vibrant Toledo community. Their contributions, both within and outside the laboratory, rendered my time there truly unforgettable.*

*Under the mentorship of Dr. Leisner, I immersed myself in the intricate world of Cauliflower mosaic virus viroplasm formation. My time as a graduate student at Toledo resulted in the publication of two first-author papers, a feat made possible through exceptional guidance and the remarkable faculty cohort. Presently, I find myself as a postdoctoral researcher at the Geisel School of Medicine at Dartmouth, guided by the expertise of Dr. David Leib and supported by the Burroughs Wellcome*

*Fund. My ongoing research centers on unraveling the mechanisms through which neonatal herpes infection influences the neuroimmune microenvironment, potentially leading to long-term behavioral complications later in life.*

*When I reminisce about my time at Toledo, I am immensely thankful for the opportunities I had to present my research at conferences and contribute to diversity and inclusion initiatives. These accomplishments were only made possible through the steadfast encouragement of my advisor and the unwavering support of The University of Toledo. As I look back on my journey, I am reminded of a fundamental lesson that I wish to impart to both new and seasoned students: it may often seem like you are encountering failure, but it's crucial to recognize that failure can serve as a stepping stone to success, provided you learn from it. Do not shy away from taking on challenging experiments; many remarkable discoveries occur serendipitously!"*

### Chandler Hopkins (B.S. '22)

*"I graduated from the University of Toledo in 2022 with a Bachelor of Science in Biology. I am originally from Kalida, Ohio, a small village slightly over an hour south of Toledo. I began my journey at UToledo in 2018 as I wanted to experience a bigger and more diverse environment than I was used to. I quickly grew to love UToledo for the number of extracurricular activities available as a freshman and the campus style. I spent most of my free time outside of class involved in a national, student-run organization called Camp Kesem at UToledo. They are involved in supporting children who had or currently have a parent inflicted with cancer. During my involvement with the organization, I helped plan and put into action a variety*



*of events that ultimately led to supporting several children over the years. Camp Kesem prides itself on providing year-long support to children and hosting a free camp for children who are also interested. Additionally, I was also heavily involved with undergraduate research while at UToledo. For two and a half years, I worked with Dr. Diakonova and other undergraduate students in her research laboratory. At the time, we focused on breast cancer research while we each had our separate projects. A unique aspect that drove me to want to work with Dr. Diakonova was the fact that her undergraduate students could be hands-on in the laboratory. I was able to use what I had been learning in class in her laboratory by performing weekly experiments and interpreting my results. This is something that not every laboratory allows and was also eye-opening to me.*

*Over the four years I attended UToledo, I am proud to have put in the hard work and pushed through the tough days to achieve my diploma. As I look back, I am grateful for plenty of things, such as being involved with Camp Kesem and undergraduate research. Being able to connect with the children impacted by cancer was an eye-opening experience that helped remind me why I wanted to enter the medical field in the first place. It was a very rewarding organization to be a part of that came with special moments, such as raising \$15,000 towards camp one year. Additionally, my involvement with undergraduate research was also rewarding differently. Through weekly experiments, I was able to apply the different terminology and procedures I had learned in the classroom right before my eyes. This helped solidify my understanding of the material and exposed the areas where I needed improvement. Even though there were ups and downs throughout my college experience, there is not one thing that I would change!*

*Now that I have graduated from UToledo, I am entering the next chapter in my life. I am set to matriculate into the University of Findlay's Physician Assistant Program, which begins in the fall of 2024. Becoming a PA was not my initial goal when I stepped onto campus in 2018, but it was something that I grew to desire as time went on. Given the time between now and then, I*

am continuing to gain clinical experience as a medical scribe and a patient care technician at my local hospitals. UToledo instilled within me the knowledge that I needed to continue my education, and for that, I will be forever grateful. The foundation that UToledo had helped pave for me was extremely helpful in my graduate school admission."

### Jacob Kahle (B.S. '22)

"I graduated with a B.S. in Biology with a Chemistry minor. After a gap year, I now attend the Kentucky College of Osteopathic Medicine in Pikeville, KY.



Growing up in the small town of Kalida, OH, and graduating from Kalida High School, my dream was to pursue becoming a physician and continue to gain knowledge in the field of science. The University of Toledo allowed me to accomplish this, as it gives a small town feel while also being in a big city. Their great reputation of helping aspiring medical students find the best way to get into medical school and their extensive research department led me to commit to UToledo to do my undergraduate studies.

While in school I was a part of numerous student organizations. The campus was filled with plenty of opportunities to participate in to match ones interest. I was a part of starting the Kesem chapter at UToledo, where we supported local children whose parents have/had cancer, with year round help. We hosted events around Toledo as well as a free summer camp to allow the kids to be kids again and grow strong with others who know what they're going through. Along with Kesem and other organizations that I was a part of, I participated in other fun activities like intramural sports. Along with these extracurricular activities, I was honored to have been published doing undergraduate research. Under the supervision and guidance of Dr. Diakonova, I conducted research on JAK2 and its connection to possible diseases and cancers. Doing this, I was able to conduct my own experiments and use immunofluorescence to obtain data that was used and published in our lab's paper. Dr. Diakonova not only helped

me with research, but she was instrumental in helping me learn other material regarding biology as well. Along with my activities at UToledo, I was an EMT back home and a part of service organizations there as well. Lastly, I was honored to have been chosen as the Department of Biological Science's and College of Natural Sciences and Mathematics Spring 2022 Outstanding Graduating Student. This honor truly made me reflect upon my time at the university and how much it helped me to succeed with great mentors like Dr. Diakonova and Dr. Steven, and everybody in the Pre-Health Office. UToledo was the home of so many memories and numerous great times, I hope it has that effect for everyone who walks the halls as well.

Lastly, I remind you to take advantage of your time in Toledo. The 419 allowed me to start my journey to becoming a physician while teaching me other life lessons along the way. UToledo put me in the best situation possible and made the cumbersome and daunting task of medical school applications possible. Not only did UToledo give me a solid foundation, it has let me soar into the future as well."

### Brooke Kimball (B.S. '21)



"I chose to attend the University of Toledo due to its highly remarked reputation within the biological sciences and

medical education. My favorite class that I took at UToledo was Organic Chemistry II with Dr. Cohen because she had a way of breaking down the material in such a simple way, that one of the hardest classes you could take felt natural and easy. I was able to conduct research under Dr. Diakonova and was a member of the team who looked at the role of JAK2 tyrosine kinase in primary cilium. One of my fondest memories about UToledo would be the first experiment I conducted in the role of JAK2 research. It was exciting to see the lengthy project was producing data that both surprised us and was able to be supported. Another one of my favorite memories was when I found out that I was nominated as the 2021 Outstanding Graduating Student for the Department of Biological Sciences.

After graduating from UToledo I took a gap year and then applied to various Physician Assistant programs. I am currently a second year PA student at the University of Findlay, with a projected graduation date of December 2024. My experience at the University of Toledo helped me to get into my top three PA schools of choice and got me one step closer to being certified. However, if I could go back in time to when I was a freshman, I would tell my past self to investigate PA school more and don't be afraid to make that switch for the betterment of your future."

### Leah Rider (Ph.D. '11)

"I am the Director of Clinical Research - Oncology, at Alkermes, a bio-pharmaceutical company. I joined Alkermes in August 2019 as a Senior Medical Science



Liaison and then transitioned to a role in Clinical Development in July 2022 to further my passion for drug development. My current role involves working in a cross-functional team and with our CRO partners to support our ongoing clinical trials in oncology. Prior to joining Alkermes, I was a Medical Science Liaison at EMD Serono for two years and supported the launch of their checkpoint inhibitor, avelumab, in combination with axitinib, in advanced renal cell carcinoma.

Before joining the industry, I received a B.S. degree in Biopsychology at the University of Michigan and then joined the Graduate Program in Biological Sciences at the University of Toledo, in the lab of Dr. Maria Diakonova. I received my Ph.D. in 2011 and then remained in Dr. Diakonova's lab to complete a brief postdoctoral fellowship. I then joined the Department of Pharmacology at the University of Colorado Anschutz, in the lab of Dr. Scott Cramer, to complete a second postdoctoral fellowship.

My time at the University of Toledo and in the lab of Dr. Diakonova was fundamental to my career and professional development. During my time in the graduate program, I learned how to write about scientific research, publishing our findings in multiple manuscripts, which later enabled

*(Alumni Series, continued from page 9)*

*me to successfully apply for and receive an American Cancer Society Postdoctoral Fellowship Award. I also learned how to effectively communicate science by presenting research in our lab meetings, student seminars, and was even given the opportunity to present findings at regional and national conferences. I learned collaboration skills by working with other labs and having mentors in multiple departments. I also learned teaching skills*

*as an instructor for the Introduction to Biology lab for undergraduate students at UToledo. Dr. Diakonova also provided me with the opportunity to train and mentor undergraduate students in her lab, allowing me to gain valuable mentoring skills. The coursework in the Department of Biological Sciences was instrumental in building a solid foundation for my scientific career, and the professors were always supportive and dedicated to making sure*

*we learned the material and were set up for success. I have applied these skills and training throughout my career path and in my role today. I am so grateful for my time at the University of Toledo and the mentorship of my former PI, Dr. Maria Diakonova. I would not be where I am today without my experience at UToledo!"*

## Alumni Spotlight



We are proud to feature one of our outstanding alumni, Dr. Mitchell Oakes, who not only excelled academically but also embarked on an exciting journey from a motocross racer to a successful veterinarian.

Dr. Mitchell Oakes graduated from the University of Toledo with a B.S. in 2012

and later earned a Ph.D. in 2018. However, his path to academic success was far from conventional. As he shared, his initial choice of attending UToledo was primarily due to a scholarship offer and was influenced by his aspirations as a professional motocross racer. Unfortunately, during his freshman year, a motocross accident left him with all four limbs broken, prompting a change of direction in his life.

The turning point came when he discovered his passion for biology. During his undergraduate years, he pursued a range of courses, including Cell Biology, Human Physiology, Physics, Microbiology, and Immunology, which were his favorites. These classes not only fueled his love for biology and science but also ignited an evolving interest in medicine.

Following his B.S., he embarked on a research journey in Dr. Komuniecki's lab, delving into the world of neuropeptide signaling in the *C. elegans* model system, an experience that sparked his love for research. This passion led him to switch to the Ph.D. program, where he initiated groundbreaking research on cannabinoids in *C. elegans*. With dedication and hard work, he uncovered and characterized the endogenous cannabinoid signaling system in these nematodes.

Dr. Oakes fondly recalls his time as a graduate student as the

most cherished memory from his years at UToledo. Overcoming numerous challenges during his Ph.D. journey, he found inspiration in attending conferences and presenting his research. Public speaking at conferences, once a daunting prospect, became an exciting opportunity to share his discoveries and gain new insights from others' research.

After earning his Ph.D. at UToledo, Dr. Oakes continued his academic journey at The Ohio State University College of Veterinary Medicine, graduating with a Doctor of Veterinary Medicine (DVM) degree in 2022. He is now an associate small animal and exotics veterinarian at Oak Tree Veterinary Hospital, a position that allows him to work with a wide range of fascinating animals, from dogs and cats to reptiles, amphibians, birds and fish. His work includes a variety of surgeries, from spays and neuters to more specialized procedures, such as cystotomies and orthopedic surgeries.

Reflecting on his experiences at the University of Toledo, Dr. Oakes highlights the critical thinking skills he acquired during his time at UToledo. These skills have proven invaluable in navigating his professional career and life in general. While his studies at UToledo were initially geared toward human medicine, he seamlessly applied this knowledge to his veterinary practice, demonstrating the versatility and depth of his education.

When asked what advice he would give his younger self, Dr. Oakes emphasizes the importance of following one's passions and instincts. He encourages students to trust themselves and not be swayed by external pressures. Additionally, he recommends focusing on personal growth rather than comparing one's success to that of others, as continuous self-improvement is the key to true accomplishment.

Dr. Mitchell Oakes serves as an inspiring example of resilience, determination and the pursuit of one's true calling. We are honored to have him as part of our alumni community, and we look forward to following his continued success in the world of veterinary medicine.

## GIVE A GIFT, MAKE A DIFFERENCE!

Please join other alumni in supporting education and excellence in the UToledo Department of Biological Sciences!

For more information about giving, including setting up scholarships or additional gift funds, please contact Brittanie Kuhr, Director of Development - Colleges of Natural Science & Mathematics at 419.530.5418 or [brittanie.kuhr@utoledo.edu](mailto:brittanie.kuhr@utoledo.edu).

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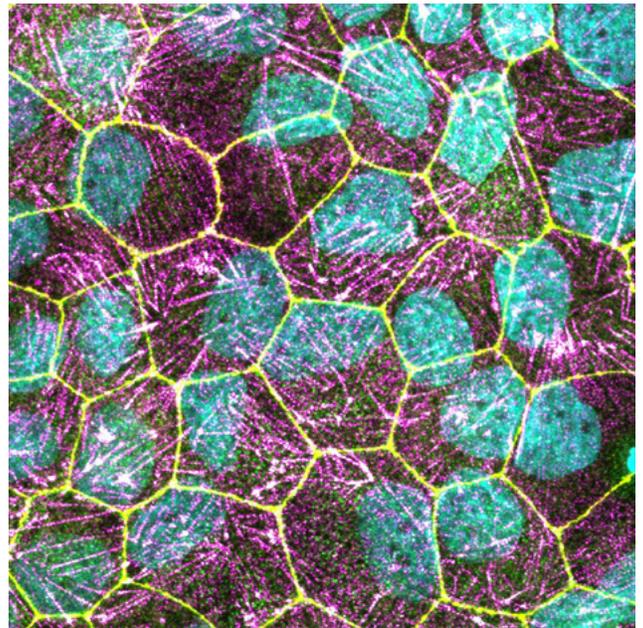
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Department of Biological Sciences  
Mail Stop 601  
The University of Toledo  
2801 W. Bancroft St.  
Toledo, OH 43606-3390

DEPARTMENT OF BIOLOGICAL SCIENCES

FALL 2023



*Image: Contributed by the Garcia-Mata Lab*



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