THE UNIVERSITY OF TOLEDO

MOLECULAR, CELLULAR AND DEVELOPMENTAL BIOLOGY NEWSLETTER

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Dear alumni and friends,

I hope you are enjoying your summer. Try to spend some time with your family and friends even if you cannot take a long leave of absence.

"When the going gets tough, the tough get going." The song pops up in my mind as I reflect upon what has happened in the past few months. There is no doubt nowadays that scientific research and science education face tremendous challenges, coming from the political environment, AI and the ever-growing complexity of science itself. But really, how unique are we, the problems we see and the achievements we attain? In a 1980 self-study by our department, then known as the Biology Department, I found this description: "Considering the variety of academic programs currently offered by the department as well as the number of students enrolled in its courses, the department is grossly understaffed." In addition, "...the funds for supplies, equipment, travel, honorarium, etc., are still inadequate..." and "graduate assistant stipends needs much upgrading to the level competitive enough..." Going online, I also found the frontpage article in the August 22, 2005, UT News was titled "UT prepares for enrollment-related budget shortfall."

Maybe I should feel more frustrated, but seeing these themes recurring decades later is somewhat amusing and soothing to me. No, I don't think we are going in circles, but higher education indeed presents similar concerns to generation after generation of faculty, staff and students. Uncertainty and insecurity suit researchers who are accustomed to exploring the unknown. If we become content too easily and do not keep updating ourselves, we will be swept away by history. The fact that the University and the department still stand tall is a powerful testimony that we are doing something fundamentally right. Maybe we are not that unique, but we are tough enough to carry on and get going.

We are part of the continuum, something bigger than individuals. When people bury themselves into daily minutiae, we tend to forget how connected we are or should be. About a year ago, I was at our former chair Dr. Woon Jyung's memorial service. None of the current faculty and students knew Dr. Jyung personally, including myself. However, our emeritus faculty, Drs. Rick and Patsy Komuniecki and Dr. Ernie Dubrul, were there and pointed out to me that Dr. Jyung had the vision to introduce modern molecular and cell biology into the department and laid the foundation for us to become what we are now. In that sense, his legacy stays with us.

With President Holloway and Provost McKinney officially starting at UToledo last year, we have felt a renewed energy within the academic enterprise. One key aspect of that allowed us to conduct searches for new faculty. With the help of the dean's office, we are glad to report that Dr. Anjali Gray and Dr. Divya Ganapathi Sankaran will join the faculty in the 2026-27 academic year. Their joining will strengthen our commitment to the student learning experience while also positioning the department for continued advancement in scientific and educational research.

I am happy to announce that Vaneesa Panchal, Siana Demirovski and Jenna Kaake were selected as the very first cohort of student reporters for the Molecular, Cellular and Developmental Biology (MCDB) Department. Please check out the contributions of Vaneesa and Jenna inside this issue, as well as the exciting student stories on Sophia Durham and Taylor Klaiber. To keep our students engaged is not a slogan in this department. The dedication and commitment our faculty and staff put in to help our large number of majors cannot be measured by the "workload," defined either by the University policies or state laws. We recognize that every student has different expectations, but our goal is to provide a college education that prepares students with real skills, strong knowledge and long-term value. More than half of our undergrad majors have gained hands-on research experience in research labs within our department, or in other departments at UToledo, and even in nationally selective programs elsewhere. The beauty is that students can do research to earn stipends or earn credits that count for their graduation requirement! If you know any students who need help with lab placement, please send them to our own Dr. Scott Crawley, the department director of undergraduate research experiences. For years the admission rates of our graduates into M.D./D.O. programs, dental and vet schools have been higher than the national average. We believe that the hands-on research experiences of our students play an important role in getting them into their dream schools, and more importantly, having them thrive in professional schools. In addition to research, our undergraduates in different career tracks have also maintained camaraderie with their fellow students. For example, our pre-vet students have kept the pre-vet club vibrant under Ava Marascio's leadership (see article inside).

Our graduate programs have grown to meet the needs of our students too. An M.S. degree in science is a great launching pad to prepare students for professional schools or bio-pharm jobs. As we expand our B.S./M.S. pipeline program and the M.S. program, I would like to invite you to read a personal story from Jenna Bearden, the first graduate from the B.S./M.S. pipeline program.

I do not have to emphasize again how important it is that our alumni keep sharing their career and personal stories with the young people in the department. Your stories highlight life's possibilities and help young people see beyond the anxieties and uncertainties that often accompany youth.

May prosperity be with the MCDB Department and its students, faculty, staff, alumni and friends!

Song-Tao Liu
Professor and Chair, Department of Molecular, Cellular and Developmental Biology, UToledo

INSIDE THIS ISSUE

Biology Graduate Research Symposium 2026

A CELEBRATION OF DISCOVERY, INNOVATION AND COMMUNITY

By Dr. Rafael Garcia-Mata

On March 27, 2026, we celebrated our annual Biology Graduate Research Symposium (BGRS), one of the most anticipated events in our departmental calendar. Held at the Memorial Field House on Main Campus, the event drew more than 50 participants, including graduate students, undergraduates and faculty, all united by a passion for biological research.

This year's symposium was masterfully organized by the department's graduate students, led by GSA President Harindi Suriyaarachchi and Vice President Marium Zehra. Their tireless dedication behind the scenes ensured a seamless and memorable day for everyone involved. The symposium opened with a warm welcome and introduction by department chair Dr. Song-Tao Liu, who set the tone for a day of inspiration and intellectual exchange.

The heart of the symposium was the research itself. More than 30 graduate students showcased their work through vibrant poster presentations, fielding questions and engaging in lively scientific discussion with faculty judges who provided thoughtful, detailed feedback. The poster hall was a testament to the depth and diversity of research happening right here in our department.

Adding to the excitement, five exceptional graduate students, Pritha Chowdhuri, Luke Achinger, Trupti Devale, Gaurab Karki and Hafiza Sidra Basir, were selected to deliver oral presentations of their research.

These talks offered a window into some of the most cutting-edge work underway in our labs, and each speaker rose to the occasion with impressive clarity and confidence.

The afternoon brought an extraordinary highlight — the keynote address by Dr. Anthony Brown, a professor of neuroscience at The Ohio State University. Dr. Brown's talk, which spanned his scientific career studying neurofilaments, was inspiring.

The day concluded with an award ceremony recognizing outstanding poster presentations. This year, awards were given in two categories: Junior (1st-3rd year students) and Senior (4th year and above).

Beyond the science, what makes the BGRS truly special is the spirit it cultivates. This annual gathering offers a rare and cherished opportunity for the entire department, students and faculty alike, to step away from the bench, engage with each other's work and rediscover the shared curiosity that brought us all to biology in the first place. In the relaxed, festive atmosphere of the symposium, collaborations spark, friendships deepen and the bonds that make our department a true community grow stronger. Here's to another year of great science, great people and great discoveries ahead!

JUNIOR CATEGORY (1ST-3RD YEAR)

1st Place:
Varmila Kulasegaram (Chen lab)

2nd Place:
Sydney Conrad (Conti lab)

3rd Place:
Jasvinder Bharaj (Crawley lab)

SENIOR CATEGORY (4TH YEAR+)

1st Place:
Trevor Glanz (Conti lab)

2nd Place:
Raissa Songwa (S-Liu lab)

3rd Place:
Harindi Suriyaarachchi (G-Liu lab)

How We Got Here: The First Cohort of Neuroscience B.S. Students Graduate!

The University of Toledo's undergraduate neuroscience major launched in spring 2023 as the institution's first baccalaureate degree in the field, even though UToledo had long maintained a doctoral neuroscience program. It is one of the fastest growing majors in the institution with approximately 80 students currently enrolled in the program.

The B.S. in neuroscience degree program was jointly developed by the Department of Molecular, Cellular and Developmental Biology in the College of Natural Sciences and Mathematics and the Department of Neurosciences in the College of Medicine and Life Sciences. Conceived in 2017, it was spearheaded by Dr. Bruce Bamber and Dr. David Giovannucci, who envisioned a curriculum that distinguished itself from typical biology-and-psychology neuroscience programs by integrating a medical component.

The effort brought together colleagues from the two departments, as well as faculty in pharmacy, chairs Song-Tao Liu and Robert Smith, the Provost's Office, and college deans Marc Seigar and Christopher Cooper to develop the curriculum and operational structure, garner strategic funding for faculty and equipment for a teaching lab, and shepherd the nascent curriculum through internal and external peer-review and Board of Trustees approval. Final approval was granted by the Ohio Department of Higher Education in 2022 and the major launched in spring 2023.

On May 2, 2026, the first cohort of students graduated with their degree conferred by both the College of Natural Sciences and Mathematics and the College of Medicine and Life Sciences (COMLS). Of the ten graduating students, five will matriculate this fall into the COMLS M.D. program, one is enrolled in the neurosciences Ph.D. program, two will matriculate into podiatry programs in Ohio and two are applying to medical school for admission in 2027.

We are proud of this successful program and its potential to shape students' career paths. This is made possible with the continued support of outstanding, dedicated faculty who advance and innovate the curriculum and mentor students, engaged and professional staff who support the program's operations, and the chairs, deans and other institutional leaders who value, support and advance excellence in education.

From Curiosity to Confidence: My Journey at The University of Toledo

By Trupti Devale, Ph.D. Candidate, UToledo Department of Cellular, Molecular and Developmental Biology

When I joined The University of Toledo as an international student, I came with curiosity, determination and a strong desire to learn. I was stepping into a new country, a new academic environment and a research world that felt both exciting and unfamiliar. I did not have extensive hands-on research experience at the time, but I knew I wanted to grow, challenge myself and learn how to think like a scientist. Over the years, that goal has shaped my journey in ways I could not have imagined.

Now in my final year as a Ph.D. candidate in Dr. Malathi Krishnamurthy's lab, I can say that UToledo has played a major role in helping me become the scientist I am today. My research focuses on how human cells respond to viral infection, DNA damaging chemotherapeutic drugs and other harmful triggers that activate innate immunity and cellular stress pathways. I am especially interested in understanding how cells detect danger, adapt to stress and decide between survival and defense. My findings have shed light on a previously unrecognized link between these two pathways as well as on non-canonical role of proteins like G3BP1 and STING, which have antiviral functions to eliminate infection. These questions are important because they help us better understand disease mechanisms and may eventually guide new therapeutic strategies.

My graduate journey has been defined by many meaningful milestones. I have published two first-author papers, presented my research at multiple regional and national conferences, and received recognition through the Graduate Student Research Award in 2023 and the Outstanding Graduate Student Award in 2026. I have also had the opportunity to contribute to interdisciplinary collaborations, including a publication with a scientist studying neurodegenerative disorders. Equally rewarding has been mentoring several undergraduate students in the lab and helping them develop their skills in research, scientific writing and poster and oral presentations. Seeing them excel and pursue paths toward medical school has been especially fulfilling. Each of these experiences has strengthened me not only as a scientist, but also as a communicator, mentor and collaborator.

Beyond the lab, UToledo also gave me space to grow as a leader. Serving as both vice president and president of the graduate student association in the Department of Molecular, Cellular and Developmental Biology allowed me to build leadership skills while contributing to the student community in meaningful ways. The department not only gave me opportunities to showcase my research and leadership but also exposed me to distinguished visiting scientists whose talks expanded my perspective and inspired me to think more intentionally about my future as an independent scientist and aspiring faculty member.

Like many Ph.D. journeys, mine was shaped as much by challenges as by achievements. There were failed experiments, long hours, uncertainty and the emotional challenge of being far from home while balancing graduate school with personal struggles. Some accomplishments took months of persistence before they finally came together. In hindsight, those difficult moments became some of the most important parts of my training. They taught me resilience, patience and independence, and transformed me from a student stepping into an unfamiliar world into the scientist I am today; someone who can ask thoughtful questions, communicate research and mentor others.

What has made this journey especially meaningful is the support I found at UToledo. My advisor consistently challenged me to grow and encouraged me to believe in my own abilities. My committee members provided valuable guidance and motivation throughout the process. I was also fortunate to have lab mates who made even the most difficult years of COVID memorable. They helped shape my early research training by teaching me foundational techniques, and the friendships I built with them will remain for life.

As I look ahead to postdoctoral training in academic research, I carry with me the knowledge, confidence and resilience that I built at UToledo. More than just a place where I earned my degree, this University became the place where I learned how to do science, how to lead and to recognize my own potential.

Preparing Future Veterinary Professionals Through the UToledo Pre-Vet Club

The Pre-Vet Club here at The University of Toledo is a welcoming community for students interested in veterinary careers, animal science or other animal-focused paths after graduation. It is a place to meet and grow with people who share your interests, learn from each other and gain hands-on experience. From volunteering and job shadowing to guest speaker events and club discussions, our members build real-world skills while aiming to make a positive impact on animal welfare. Whether you're just starting to explore the field or already know where you're headed, you'll find support, opportunities and a group of people who care about animals just as much as you do.

Interested?

Contact Ava Marascio at ava.marascio@rockets.utoledo.edu to learn more.

From a Kitchen Spice to Cellular Signals: Curcumin Targets Septin in Cytokinesis

By Varmila Kulasegaram, 3rd year graduate student from Qian Chen lab

Science is always exciting, no matter how small the question may seem at the beginning. Some of the most meaningful discoveries come from unexpected observations. During my graduate research, I experienced one of those defining "eureka" moments while studying curcumin — the active compound in turmeric, a well-known kitchen spice — using fission yeast as a model system.

My work focuses on understanding calcium signaling during cytokinesis using a fluorescent calcium reporter. During this project, Daphne, a visiting student from Brazil, joined our lab during summer in 2024, to explore how curcumin influences calcium signaling. Using the reporters we developed, we began imaging cells to observe how calcium levels changed upon treatment. Within minutes, we noticed a striking green band forming at the division site of the cells. I still remember how excited we were at that moment. Because our calcium reporter emits green fluorescence, we initially believed this signal represented a localized calcium increase, an exciting finding on its own.

However, science often requires us to question even our most exciting results. To confirm our observation, we repeated the experiment in a control strain that did not contain the calcium reporter. Surprisingly, the same ring-like green fluorescence appeared again. That was the turning point. We realized that the signal was not coming from calcium at all; it was curcumin itself fluorescing and forming a distinct ring at the cell division site. This completely shifted our direction, moving us away from calcium signaling toward a new and unexpected question.

This observation revealed that curcumin is not randomly distributed within the cell but instead targets a specific cellular structure. This finding led us to investigate further, and we discovered that curcumin modulates septins, key structural proteins involved in cytokinesis, the final step of cell division. As a result, curcumin treatment slows down the cytokinesis process in fission yeast, highlighting a direct functional impact on the cell division machinery. An additional advantage of this discovery is curcumin's intrinsic autofluorescence, which allows it to act as a molecular probe. Without the need for additional labeling, it can be used to visualize septin in real time, offering a simple and powerful tool for studying cell division in yeast. This study has now been accepted for publication in the Journal of Cell Science (JCS), marking an important milestone in my graduate research journey.

For me, this study represents the excitement of scientific discovery where a familiar molecule from everyday life reveals an entirely unexpected role at the cellular level. What initially began as a study on calcium signaling evolved into uncovering a new molecular target and a potential imaging tool. Just as importantly, this journey was shaped by collaboration, working closely with lab mates, learning from each other and sharing ideas that ultimately led us to this discovery.

Moments like these remind me why science is so rewarding. Even the smallest questions can lead to surprising insights, and sometimes, the most important discoveries are the ones we never set out to find.

First Graduate of the B.S./M.S. Combined Pipeline Program

By Jenna Bearden

The University of Toledo was not initially a school that was on my radar, but I couldn't be more grateful for the time I've spent here and the time I will continue to spend here. I started at UToledo in the fall of 2023 as a biology major, with minimal insight into research or what it would entail. I joined Dr. Tomer Avidor-Reiss' lab in the fall of my second year and was quickly enticed by the hands-on learning that research provided, which was different from any of the classes or experiences I'd had thus far. Under his guidance, I quickly set out on independent projects, presenting at poster expositions and seminars. I learned about the newly developed 4 + 1 BS/MS pathway program at UToledo, and I was quickly drawn to the idea of further extending my research interest and expanding my research experience. I spoke with my advisors and the program directors and they were more than helpful to ensure a smooth transition into the program, helping me to plan my coursework and get everything settled. This program has allowed me to build a strong base and foundation in molecular and cellular biology through rigorous coursework and these skills directly translate to the work I do in the lab every day. Through this program, I have grown as both a scientist and a student, which has been instrumental in shaping my academic and professional goals, preparing me for future endeavors.

MCDB Welcomes First Cohort of Student Reporters

Big congratulations to Vaneesa Panchal, Siana Demirovski (not pictured) and Jenna Kaake, who have been selected as the very first cohort of student reporters for the MCDB department.

In this new role, they will highlight student achievements, capture everyday moments across the department and help share the stories that make the MCDB community unique. Their work will offer a closer look at student life while celebrating the people and experiences that shape it.

We're excited to see the impact they'll have — strengthening connections, fostering a greater sense of belonging and providing valuable feedback to help the department continue supporting its students.

Jenna's Story

My name is Jenna Kaake and I am first year Ph.D. student in the MCDB program here at UToledo. I am currently pursuing my doctoral training with a focus on neuroscience and I have the privilege of conducting research in Dr. Bruce Bamber's lab.

When I began my Ph.D. journey, I anticipated academic rigor and the challenges that come with research. What I did not fully anticipate, however, was how impactful a strong and supportive community would be in shaping my experience as a graduate student.

Much of graduate training takes place in environments that can feel isolated — like long hours in the lab, troubleshooting experiments and navigating uncertainty, which are all a part of the process. Yet, within the MCDB department, I have found a culture that actively works to counter that feeling of isolation. There is a genuine effort from both faculty and students to foster connection, mentorship and a sense of belonging.

Some of the most meaningful moments in my experience so far have come from events that bring our department together outside of the lab. The graduate student Holiday Party and Talent Show, for example, created a space where faculty and students could engage with one another in a more relaxed and personal setting. Seeing mentors and peers step outside of their formal roles and simply enjoy being part of the community was both refreshing and grounding. It reinforced the idea that we are supported not only as scientists, but as individuals.

Experiences like these play an important role in sustaining graduate students through the demands of research. Feeling valued and connected strengthens our ability to collaborate, remain motivated and continue pushing forward in the face of challenges. It is through this environment that I have been able to grow with confidence, both academically and personally.

As I continue my training, I am proud to be a part of a department that prioritizes both scientific excellence and student well-being. The sense of community within the MCDB department is not only meaningful in the present, but also foundational in shaping the future scientists and leaders that this program continues to develop.

Jenna H. Kaake
Ph.D. Student

Vaneesa's Story

Most students taking courses in the MCDB department have only experienced the first floor of Bowman-Oddy — but beyond that familiar space lies an entirely different world. On the second, third and fourth floors, you'll find doors that open into discovery: rooms alive with cutting-edge technology, groundbreaking ideas and the kind of curiosity that drives science forward. With nearly 20 research labs exploring everything from cancer biology to infertility, the department is constantly pushing the boundaries of what we know to shape what comes next.

And the best part? These spaces aren't off-limits. They're filled with opportunities. MCDB labs offer undergraduates the chance to step beyond the classroom and into real research — where you're not just learning science, you're doing it. Many students even earn authorship on publications.

To find out what happens behind those doors, I spoke with a few principal investigators (PIs) to better understand what discoveries they are working towards.

Dr. Crawley's Lab
One such lab, led by Dr. Crawley, jokingly calls its members "molecular grease monkeys." Their work focuses on how molecular motor proteins keep epithelial cells functioning properly — basically tinkering with the cell machinery to figure out how it all works. On a larger scale, the lab is interested in how problems in these systems can lead to disease, especially in the intestine and sensory systems.

Undergraduate students in Dr. Crawley's lab typically get hands-on experience with techniques like cell culture, microscopy and molecular biology, while also having opportunities to present their work at events like the NSM Undergraduate Research Expo and Data and Donuts. Dr. Crawley's lab is currently looking for undergraduate researchers for fall 2026 and spring 2027.

Dr. Bamber's Lab
Dr. Bamber's lab focuses on how brain activity translates into behavior. The human brain, with approximately 86 billion neurons, is incredibly hard to study. So instead, the lab uses a model organism with only 302 neurons, a tiny worm called C. elegans.

Their goal is to connect neural activity patterns to observable behaviors — like how the worm moves or responds to its environment. Even though it's a simple organism, a lot of the basic brain organization is surprisingly similar to humans, so what's learned here can help us understand bigger, more complex brains too.

Last semester, there were over a dozen undergraduates in Dr. Bamber's lab, running experiments, writing reports and sharing ideas. This lab emphasizes collaboration, as everyone works on the same experiments, figuring out what data means and what their next steps are. This lab is currently recruiting undergraduate researchers for the fall and spring of 2026 and 2027.

Dr. Garcia-Mata's Lab
The Garcia-Mata Lab studies the cytoskeleton, which is basically the "skeleton" of a cell that helps it keep its shape and move. The cytoskeleton is dynamic; cells constantly change shape during processes like wound healing, development and immune responses.

The Garcia-Mata Lab is especially interested in how these processes go wrong in cancer, where cells use the cytoskeleton to move, invade other tissues and spread throughout the body. By using techniques from molecular biology and biochemistry, the lab works to figure out the exact mechanisms controlling these changes, which can help us better understand both normal cell function and disease.

Undergraduates in the lab get hands-on experience and work closely with a Ph.D. student. Along with research, undergrads also help with everyday lab tasks like preparing solutions and keeping things organized, which helps the lab run smoothly. The lab is planning to take on one or two new undergraduates in the fall, so it's a great opportunity for students who want to get involved in research.

These three labs offer just a glimpse into the kind of innovative and ground-breaking research happening across the department. From exploring fundamental biological processes to tackling complex questions related to health and disease, they represent the creativity and impact that define the department's scientific work. At the same time, they are only a small sample — many other labs are conducting equally exciting and diverse research in a wide range of fields.

For students, this means there are plenty of opportunities to get involved. Undergraduates are strongly encouraged to participate in research. No matter the specific area of interest, students can find a lab that aligns with their goals and gain valuable hands-on experience while contributing to meaningful scientific discoveries.

Vaneesa Panchal
Undergraduate student

Biology Honors Student Discovered a New Career Path: Research

By Taylor Klaiber

I was first introduced to The University of Toledo in the fall of 2019 after my father, an alumnus of the University, gave me an informal tour of the University while in Toledo for my brother's hockey tournament. At the time, I was a junior in high school and was looking at different universities to attend once I graduated high school. Unbeknownst to me, this would be the only "guided" tour I would have at a university because a few months later, the COVID-19 shutdown would occur.

Regardless, my father was a knowledgeable tour guide.

He had nothing but positive things to say as he walked me around Centennial Mall and pointed out the different buildings and halls. I did not know it then, but a little less than two years later, I would be starting my undergraduate degree in biology at UToledo and was not aware how much it would change my career's trajectory.

As long as I could remember, I knew I was going to study biology. My ideal careers when I was younger included veterinarian, scientist and doctor, all of which can use biology as a launching point. Even in high school, when I was still considering what path I wanted to take as I applied for college, I knew then that I wanted to start with a biology major and use that as a base and go from there. So even when I was applying to UToledo, I knew I was going to join the College of Natural Sciences and Mathematics. I remember some of my family members encouraging me to apply for bioengineering, but I was dead set on just focusing on biology. Due to COVID-19, I applied to nine universities in the fall of 2020 because restrictions prevented me from college visits. When the acceptance letters began to arrive in the spring, I was not really sure where to go, but one university accepted me for more than just admissions.

The Jesup Scott Honors College ended up being the deciding factor that had me choose UToledo over other colleges and proved to be pivotal in my academic development. The opportunities it provided while also setting high standards really pushed me to be the best possible student I could be. I always knew UToledo to be an engineering school based on what my father said, but I quickly learned that UToledo encourages students to be well-rounded, especially in the honors college. The emphasis on discussion and the interdisciplinary approach encouraged me to make connections through social sciences, arts and writing as I worked on my biology degree. The most notable effect of honors was the undergraduate research requirement which shaped my academic trajectory.

I originally wanted to study medicine and become a doctor or physician's assistant when I began my higher education studies. My mother always told me to use my powers for good, and I thought going into medicine would allow me not only to focus on biology but also help people. It was not until I started honors research in the laboratory of Dr. Maria Diakonova [a professor in the Department of Biological Sciences] that I realized that research was my calling.

I joined her lab in the fall of 2023, and I became fascinated with Dr. Diakonova's signal transduction and breast cancer research and enjoyed the hands-on approach that allowed me to work on experiments. I experienced first-hand the frustration of experiments not working until the right procedure was figured out and the excitement when it finally did produce results.

It was in the fall of 2024 when I made the decision to switch paths from a physician or physician assistant to a Ph.D. My friends, family and mentor supported my decision and helped and encouraged me to pursue my new path. Until I joined research, I was worried that I would go through medical school and training and end up being stuck in something I was not passionate about. The opportunity to do research under Dr. Diakonova not only allowed me to grow as a biology honors student but also led me down a career path that I am passionate and proud to be a part of.

In the spring of 2024, I added an environmental science minor to complement my biology major and chemistry minor. I have always had a love of nature, with vacations to national parks and a love of hiking attests to this, but I wanted to learn how to apply some of my knowledge from my biology courses to a wider scale. I enjoyed being able to see the real-world implications of certain theories and everyday-life applications that I could use to help better myself and the environment around me.

My instructors also really hit home the notion that there is not always an easy solution to problems and that it is important to investigate as many factors as possible when trying to consider one. A major lesson in this field is that everything is connected, the courses and professors encouraged me to make these connections and taught me to think of the bigger implications of certain actions and ideas.

Reflecting on my journey, The University of Toledo and its College of Natural Sciences and Mathematics and Jesup Scott Honors College provided guidance and opportunities as I worked towards my degree. The institution's resources and supportive community enabled me to discover a new path that aligns both with my professional goals, but also my aspirations. I know my journey is not over, but I am glad that The University of Toledo with the College of Natural Sciences and Mathematics along with the Jesup Scott Honors College has been a big part of it.

Taylor Klaiber graduates from UToledo with her bachelor's degree in biology on Saturday Dec. 13.

UToledoNews, December 2, 2025, used with permission

https://news.utoledo.edu/index.php/12_02_2025/biology-honors-student-discovered-a-new-career-path-research

Goldwater Scholar Prepares for Career in Scientific Discovery

By Gayle Heer

As she graduates from The University of Toledo on Saturday, May 2, Sophia Durham leaves with more than a degree.

A summa cum laude graduate earning a bachelor of science degree in cell and molecular biology with a minor in French, Durham has distinguished herself as one of UToledo's most accomplished undergraduate researchers.

Durham joined the lab of Dr. Rafael Garcia-Mata, a professor in the Department of Molecular, Cellular and Developmental Biology, as a first-year student.

"Being in Dr. Garcia-Mata's lab gave me the confidence and tools to ask my own questions," Durham said. "That felt empowering — like I had a voice people wanted to hear."

From that opportunity, she mastered advanced techniques including cloning, cell culture, microscopy, optogenetics and quantitative image analysis — building a foundation that allowed her to take on complex scientific questions early in her academic career.

Her research focuses on invadopodia, specialized structures that enable cancer cells to invade surrounding tissue during metastasis.

By studying the molecular mechanisms behind these structures, Durham contributes to a growing body of work aimed at understanding how cancer progresses and spreads.

She has shared her findings at The University of Toledo's Undergraduate Research Symposium and at national conferences, and her work has contributed to multiple ongoing projects expected to lead to future publications.

Her achievements have earned her significant recognition, including the prestigious Barry Goldwater Scholarship — one of the nation's highest honors for undergraduate researchers in science, engineering and mathematics — along with multiple University research awards and a fully funded travel grant to present her work at Rice University.

Beyond the lab, Durham sought out opportunities to lead and support others.

As a supplemental instructor at UToledo for biology courses, she helped students navigate complex material while developing her own teaching approach. She also expanded her experience through teaching and research roles beyond UToledo, including at the University of Michigan.

"My professors have shaped my vision as a teacher," Durham said. "Their teaching styles and student interactions helped me discover who I want to be for my students."

Originally enrolled in the BACC2MD program, Durham shifted her focus during her sophomore year, choosing to fully commit to research. The decision, she said, clarified her goals and strengthened her confidence.

Garcia-Mata said Durham's impact extends beyond her technical ability.

"It has been a genuine privilege to mentor Sophia over the past four years," he said. "She is an exceptional researcher — intellectually gifted and genuinely passionate about science in a way that sets her apart. She is generous with her time, always willing to support her colleagues, and brings a sense of energy and curiosity to everything she does."

After graduation, Durham plans to continue her research during a gap year while preparing for doctoral studies. She is considering several opportunities, including graduate study in Canada, a post-baccalaureate program at Washington University in St. Louis or continuing her work at UToledo.

Her long-term goal is to become a tenure-track professor, combining research and teaching to advance scientific discovery.

"After graduation, I look forward to discovery — whether that is researching or exploring new environments," she said. "I want to find out as much about my surrounding world as possible."

For undergraduate students considering research, Durham offers practical advice grounded in her own experience.

"Just ask," she said. "Show interest, be curious and be willing to learn. If you are genuinely interested in what you are doing, people will invest in you. And ask questions — life can get boring without those."

UToledoNews, April 29, 2026, used with permission

news.utoledo.edu/index.php/04_29_2026/goldwater-scholar-prepares-for-career-in-scientific-discovery

A New M.S. Program in Cell and Molecular Biology

By Dr. Qian Chen

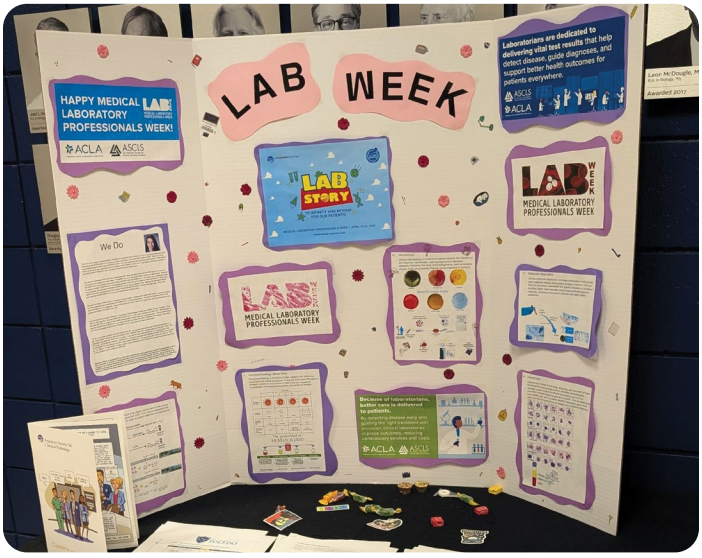
A new Master of Science in Cell and Molecular Biology program was launched by the department in the fall of 2024. The program offers students an opportunity to receive their M.S. degree in just over a year through both intense classroom learning and vigorous bench work experience.

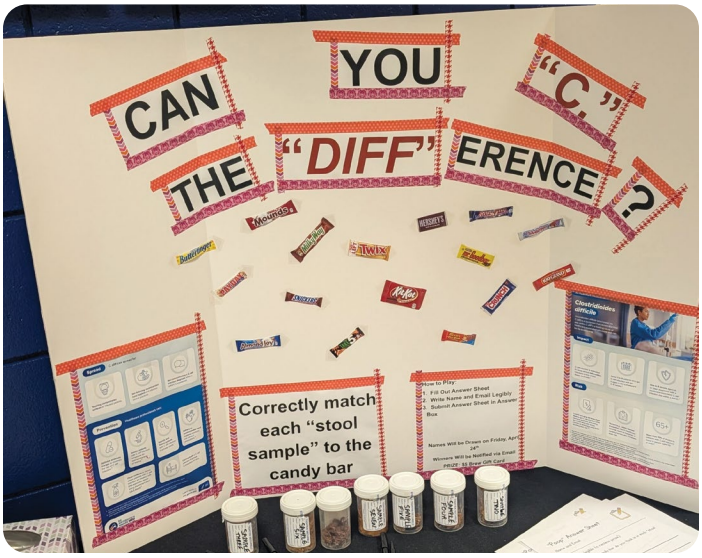
Students can choose two separate tracks, thesis and non-thesis. Students in the thesis track have the opportunity to work with a faculty member, in a variety of research areas — ranging from cancer biology, immunology, neuroscience, plant biology and basic cell biology — for one year on a research project. In addition, the students will also learn about the newest developments in cell and molecular biology as all the doctoral graduate students do in the department's Ph.D. program.

This new program started with a cohort of just two students in 2024-25, but it quickly expanded to a class of eight in 2025-26. Eight more students are expected to join this program in the fall of 2026. Looking forward, this new M.S. program is expected to serve as a springboard for graduates of both UToledo as well as other colleges in the area for their pursuit of a future career in either healthcare or biomedical research.

Medical Laboratory Science Program Celebrates Lab Week

By Lisa Jordan, Program Director



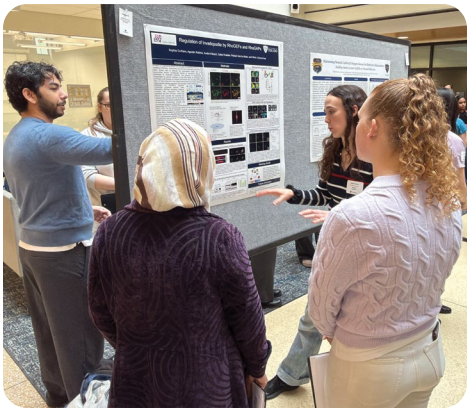


The Medical Laboratory Science (MLS) program celebrated Lab Week at The University of Toledo by treating our MLS students to daily coffee, homemade cookies and gifts. The week included games and prizes — such as bingo, a scavenger hunt and a coloring contest — and ended with a pizza party. Students also participated in hallway activities, including guessing the number of microcentrifuge tubes in a 2 L jar and identifying "simulated" stool specimens made from melted candy bars, with entries eligible for a $5 Sip Coffee gift card drawing.

Laboratories play a vital role in modern medicine by providing fast, accurate test results that help guide patient care. In heart disease, tests like troponin and natriuretic peptides help doctors quickly detect heart damage and heart failure so treatment can begin right away. In infectious disease, labs identify the specific cause of illness using reliable diagnostic tests. They also measure markers of the body's immune response — such as WBC, CRP, PCT, IL-6, ferritin and MDW — and use tools like MeMed BV to help tell the difference between bacterial and viral infections. In neurodegenerative disease research, blood-based biomarkers like p-tau217, GFAP, NfL, BD-tau and APOE ε4 are helping researchers better understand diseases like Alzheimer's and support earlier detection.

As we celebrated Lab Week, we recognized the essential contributions of laboratory professionals and students who work behind the scenes to advance healthcare. Their expertise not only supports accurate diagnoses and timely treatments but also drives innovation and discovery across the medical field.

2026 NSM Undergraduate Research Expo



The College of Natural Sciences and Mathematics (NSM) hosted its Second Annual Undergraduate Research Expo on Thursday, April 2. The college was excited to once again offer this event to NSM undergraduate student majors performing undergraduate research.

All NSM undergraduate students conducting undergraduate research were encouraged to submit an abstract and participate in the expo to help enhance their learning, develop valuable skills and gain recognition for their work. Awards were presented to the top oral and poster presentations.

NSM's Undergraduate Research Expo provides a great opportunity for students to present their research to a broader audience, apply theoretical knowledge to real-world problems and build crucial skills like communication and networking.

Scan the QR code to learn more.

Awards and Accomplishments

SCHOLARSHIPS

The C. V. Wolfe Scholarship
Emily Jean McConocha

Joseph A. and Mary A. Capobianco Memorial Scholarship
Kiran Kaur
Noura Khatib
Ilayda Rahime Ozbay
Breanna A. Smith

Dr. Bruce A. Crider Memorial Scholarship
Alexander Ray Brown
Brooke Elizabeth Moreland
Sama Ahmed Shehata
Maryam Mujahid Sheikh

Dr. Charles Creutz Scholarship
Noah Alexander James

Biology Merit Scholarship
Layla Ettaher
Carter J. Wright

Dr. Peter C. Fraleigh Memorial Scholarship
Shalika Sangras

OTHER AWARDS

Outstanding Graduating Senior, MCDB Department (Spring 2026)
Sophia Durham

Outstanding Graduating Senior, NSM College (Spring 2026)
Sophia Durham

Outstanding Graduate Student Award, Grad College (Spring 2026)
Trupti Devale

Graduate Fellowship
Harindi Suriyaarachchi
Pritha Chowdhury

Graduating Ph.D. Students
Mariah Rozier
Gaurab Karki
Hafiza Sidra Bashir
Trupti Devale

Graduating M.S. Student
Derek Kluczynski

Welcome Dr. Anjali Gray

Please join us in welcoming Dr. Anjali Gray as our new Visiting Assistant Professor (VAP). Dr. Gray holds a Ph.D. in molecular genetics and joins us from Lourdes University, where she served as chair of the Department of Biology and Health Sciences. She brings a wealth of experience in college-level teaching, student mentoring and program development. We are excited to have her join our department and we look forward to her contributions. Dr. Gray will start her appointment at UToledo in the 2026 fall semester.

ALUMNI STORIES

Lora Wolph

Lora graduated with honors from The University of Toledo in 1988 before going on to earn her Doctor of Chiropractic degree in 1992. Her career has proven to be both financially and personally rewarding, with more than 33 years dedicated to helping others achieve improved health through natural approaches.

During her time at UToledo, her favorite courses included genetics and embryology. The knowledge she gained in these subjects laid the foundation for her deep appreciation of the sanctity of life, as well as her understanding of the body's innate healing potential.

Lora currently practices in Fostoria and Bowling Green, where she also incorporates acupuncture and nutrition into her patient care.

Dean Raniele

Dean knew early on that his primary interests lay in the sciences. After initially choosing a major in chemical engineering, he transitioned to biology with the goal of becoming a physician — a path he believed would combine scientific rigor with meaningful human connection. He graduated from The University of Toledo in June 1980.

During his time at UToledo, Dean especially enjoyed his coursework in biology and chemistry. Classes such as embryology with Dr. Dubrul, as well as organic chemistry, biochemistry and immunology, stood out as particularly engaging. He also found anthropology with Dr. Metress to be fascinating. Looking back, he emphasizes the importance of stepping outside one's comfort zone to fully benefit from the college experience. As someone who identified as somewhat introverted, he reflects that he wishes he had made more of an effort to connect personally with his professors.

After graduating from UToledo, he attended the University of Cincinnati College of Medicine, earning his medical degree in 1984. He credits his undergraduate experience with providing a strong foundation that prepared him well for medical school.

Dean went on to match at Hennepin County Medical Center/University of Minnesota, where he completed his internship, residency and served as Chief Resident in internal medicine.
He then pursued a two-year fellowship in nephrology at the Regional Kidney Disease Program in Minneapolis.

Following his training, he entered private practice in nephrology and internal medicine in Medford, Oregon, where he has spent his entire career. He and his family live in Oregon.

Reflecting on his journey, Dean views the path to becoming a physician as a step-by-step process, with each phase building upon the last. Beyond mastering a vast body of scientific knowledge, he emphasizes the importance of developing strong communication skills to effectively care for patients.

Nancy Collins

For Nancy Collins, The University of Toledo has been a lifelong source of opportunity, mentorship and inspiration. Nancy earned her B.S. in Biology, Cum Laude, through the University Honors Program in 1969, followed by a M.S. degree in 1974. Alongside her husband, Gene Collins, she has spent more than 60 years connected to the University as a student, faculty member, supporter and alumni volunteer.

Nancy's connection to UToledo began in childhood. Her father attended the University during the Great Depression and often spoke about the excellent education and strong sense of community he experienced here. Those stories, combined with the innovative Honors Program led by Dr. Ernest Gray and Professor James Larson, inspired Nancy to choose UToledo for her studies.

At UToledo, Nancy immersed herself in both science and the humanities, while also participating in student government and laboratory work. Faculty mentors — including Drs. Clifford Smith, Harold Lee, Donald Pribor, Violet Gilson and Dr. Freimer at the newly formed Medical College of Ohio — helped guide her toward a career in microbiology and immunology.

One of Nancy's most memorable undergraduate experiences was conducting independent senior research on bacterial contamination in the Ottawa River during the winter months, the first study of its kind on the river near campus. She credits her Honors seminars as some of her favorite classes, particularly courses exploring science, morality, religion, literature and humanities.

After earning their master's degrees at UToledo, Nancy and Gene continued their studies at the University of Rochester. Nancy later completed postdoctoral work at the University of Pennsylvania and spent nearly 30 years at Memorial Sloan Kettering Cancer Center, where she contributed to groundbreaking stem cell transplantation and cellular therapy research.

Following retirement, Nancy and Gene returned to UToledo as faculty members. Nancy worked with mentoring and STEMM initiatives, helping support graduate students, women in science and underrepresented students pursuing careers in medicine and research.

Among Nancy's fondest memories is a candid photograph taken in 1968 of her and Gene walking in front of University Hall, completely unaware the moment had been captured. Today, the photo hangs in their home as a reminder of where their journey together began.

Looking back, Nancy believes UToledo gave her the confidence and mentorship needed to pursue ambitious goals and contribute meaningfully to science and medicine. If she could offer advice to her freshman-year self, it would be simple but powerful: keep asking questions, believe in yourself and never be afraid to admit when you need help. She believes scientific progress depends on collaboration, curiosity, humility and a willingness to learn from others — values that have guided her throughout her career and lifelong connection to UToledo.

Robert Welch

Robert graduated from The University of Toledo in the spring of 1973. At the time, his family did not have the financial means to cover tuition, so Robert worked weekends and occasional nights to make his education affordable. He often reflected that, even then, it was an exceptional value.

Robert initially commuted to campus with former high school friends before later moving into a fraternity house during his junior and senior years. As a commuting student, joining a fraternity provided an important sense of community and connection, leading to memorable experiences and lifelong friendships. More than 50 years later, Robert remains close with one of his fraternity brothers, with whom he communicates almost daily and meets at least twice a month.

Robert's decision to attend UToledo was largely based on practicality, given his circumstances at the time, as well as a desire to avoid the Vietnam War draft. He recalls his first-day freshman orientation, when a speaker told students, "Look at the person on your left and on your right — one of you won't be here next year," a message that stands in contrast to the more supportive advising environments offered to students today.

Among his most meaningful academic experiences was a variation of English Literature, which helped him develop an appreciation for the nuances of writing and communication. Through the study of classic and contemporary works, he gained a broader understanding of the world. He also found it a welcome contrast to a demanding year of engineering physics and calculus — courses he later felt were overemphasized for a biology degree.

During his time at UToledo, Robert also enjoyed the University's strong football tradition, including the era led by quarterback Chuck Ealey. He frequently attended games with his girlfriend, who was enrolled at Mercy School of Nursing, located just a few blocks from his fraternity house. That relationship led to marriage during his senior year, and Robert credits his wife Sally with helping him stay focused and on track through medical school, internship, residency and fellowship.

Although Robert credits UToledo with providing a strong foundation for discipline and study, his path into medicine was unconventional. His academic performance at graduation was not competitive for U.S. medical schools, so he followed a friend to Mexico to begin medical training there, completing his basic science education. With improved academic performance and test scores, he later transferred for clinical training to the University of Cincinnati and the Louisiana State University Health Sciences Center New Orleans. He ultimately chose LSU, where he found the training both rigorous and enjoyable, culminating in an M.D. degree that opened further professional opportunities.

Robert later reflected that he sometimes wondered about not remaining in the South for additional training, despite appreciating the lack of snow compared to northern climates. However, he ultimately pursued opportunities in the Detroit Medical Center system, where he found extensive academic and clinical experiences and worked alongside highly talented physicians and nurses. He was eventually promoted to professor of obstetrics and gynecology at Wayne State University.

In his leadership career, Robert went on to chair an OB/GYN department comprising 44 attending physicians covering the full spectrum of the specialty. During this period, he also earned a Master of Science in Administration from Central Michigan University.

Now retired, Robert looks back on a fulfilling career in medicine with gratitude. He continues to proudly fly a University of Toledo flag at his lake house, honoring the institution where his journey began.

Carol Barlage

Carol Barlage graduated from The University of Toledo in 1989. From the time she was 12 years old, she knew she wanted to attend medical school. She chose UToledo for her premedical journey for several important reasons. Toledo was close to home, allowing her to remain connected to her close-knit family and visit them easily when needed. The University also offered outstanding honors and biology programs that would help prepare her for a successful medical school application. In addition, scholarships from the University enabled her to complete her undergraduate education debt free.

Early in her sophomore year, Carol learned of what she considers the opportunity of a lifetime. The University gave her the chance to study abroad for her entire junior year at the University of Salford in England.

Carol thoroughly enjoyed her time at UToledo. She had an exceptional residential experience living in Parks Towers during her first two years and formed friendships that have lasted to this day. Her freshman biology courses solidified her decision to major in biology as she pursued her path toward medical school. Dr. William Bischoff took a personal interest in his students, and Carol especially remembered introductory genetics with Dr. Stephen Goldman. She later conducted research with Dr. Goldman on genetically modified corn — long before she realized how significant that field would eventually become. It was also during her first general biology course that she first learned about the emerging HIV epidemic, although it had not yet been named at the time.

Although Carol loved biology, her favorite course was actually a graduate-level art history class she was able to take as an honors student, held at the art museum.

By far the most formative experience of her time at UToledo was the year she spent abroad in England. The experience distinguished her medical school application and gave her valuable insight into different educational systems, perspectives that later proved invaluable during her graduate studies. The friendships and life experiences from that year have remained deeply important to both her personal well-being and professional career.

After graduating from UToledo, Carol attended medical school at Johns Hopkins University. She completed a residency in family medicine in Cleveland, followed by a fellowship in OB/GYN in Harrisburg. Most recently, she completed a fellowship in Integrative Medicine through the University of Arizona. Throughout her career, Carol has worked in a variety of settings, including Stanford University, the Indian Health Service and currently serves as Medical Director for a federally qualified health center in Springfield. She often notes that her very first roommate at UToledo was from Springfield, making her current role feel like a return home in many ways.

A few years ago, the University sponsored a reunion for participants of the study abroad program. Just two weeks later, Carol ran a marathon that both started and finished on the University campus. During those two weekends, she felt an overwhelming sense of gratitude and pride — gratitude for the friendships, experiences and opportunities UToledo provided her, and pride in calling herself a University of Toledo graduate.

COLLEGE OF NATURAL SCIENCES AND MATHEMATICS
THE UNIVERSITY OF TOLEDO

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NSM 171

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