Fall 2019
Issue 8

DEPARTMENT OF
MICROBIOLOGY AND
MOLECULAR GENETICS
College of Arts and Sciences

Greetings from Microbiology

DR. TYRRELL CONWAY, DEPARTMENT HEAD

As the seasons change I am reminded of several changes this year in our Department. We will welcome a new faculty member, **Dr. Sabrina Beckmann**, next Fall. Sabrina is an environmental microbiologist who joins us from the College of Earth, Ocean, and Environment at the University of Delaware. We said goodbye to Dr. Ed Shaw, who with his wife, Dr. Jennifer Shaw, left to join the faculty at Philadelphia College of Osteopathic Medicine in South Georgia. Ed will teach medical microbiology and immunology. We know his new students will benefit from his gifted teaching. After 15 years in the OSU Microbiology Department, Ed leaves behind many friends and former students. It goes without saying that he will be missed.

Also leaving the department, after 7 years of service, was 2018 Arts and Sciences Outstanding Advisor, Dana Hatter. She left to pursue another of her many passions as Suicide Prevention Coordinator for Payne County Youth Services. We wish Dana well in her new role, knowing she will be helping at risk youth. For the time being, Microbiology majors are without an advisor. This is an opportunity to let our students know that *everyone* in our program is committed to them, not just their advisor. Dana leaves a legacy of student recruitment and retention that is unparalleled in the history of our Department; student numbers have more than doubled under her watch. In the research arena Microbiology continues to lead the college and university in grant dollars awarded per faculty member. Dr. Jeff Hadwiger has a new NIH award to study MAP kinase signal transduction in Dictyostelium. Dr. Randy Morgenstein just received his first NIH grant to study the bacterial cell wall cytoskeleton. Every faculty member in the department is research active and publishes on average 3 manuscripts per year. Together we have 44 graduate students and 77 undergraduates helping on our research projects. These all are signs of a vigorous research program.

We began the 2019-2020 academic year with a record number of graduate students (44) and finished 2018-2019 with yet another record number (78) of Bachelor degrees awarded. Our graduates had a stellar year, with Caroline Graham and Savannah Martin being named **OSU Alumni Association Outstanding Seniors**. Caroline also was named **College of Arts and Sciences Top 10 Senior**, together with Samantha Shafer and Rachel Williams. Following graduation, these amazing honorees started professional school this Fall. Not to be outdone by last year's class, our current Seniors won 7 of 14 Niblack Research Scholarships, OSU's most prestigious research scholarships.

Alumni support and generosity are a big part of the equation for our success. It has been a year of significant donations that make a difference for students in our program. We also received several exciting promises of endowments to support programs, scholarships and fellowships. If you want to invest in the academic careers of Microbiology majors, I hope to hear from you. In closing, I want you to know what a privilege it is to serve our students, faculty and staff. Thank you for the opportunity to share this newsletter highlighting recent events in the **Department of Microbiology**.

Dr. Ed Shaw

Dana Hatter

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FIRST YEAR SEMINAR LAB. A&S1111

During the first semester of freshman year, all microbiology students are required to enroll and complete the First Year Seminar course for Microbiology majors. This is an introductory course to college. The students meet their peers and the people they will be taking classes with for the next four years. As well as, learning important skills for college that many people wouldn't necessarily know if they had never been exposed to the rigorous teaching style that most college courses contain. They learn study skills, make a plan for their time here at OSU and meet microbiology upperclassmen and faculty.

Dr. Conway saw this idea and decided to take it a step further. Fall 2019 is the first semester the Microbiology Department also offered a lab section called, First Year Microbiology Laboratory Experience. This is a unique opportunity for microbiology majors have to option to come to a lab once a week and learn basic microbiology skills. It is a very laid-back course. Students are encouraged to simply show up and be excited to learn. There is a different lab skill highlighted every week of this 16-week course. These students get some lab experience, although limited, within their first semester of coming to college.

It is a great opportunity and we are excited to continue and improve this first year lab experience for our future microbiology majors!

MEDICAL LABORATORY SCIENCE

The Medical Laboratory Sciences program through St. Francis Hospital in Tulsa, OK is a program that allows for students to gain certification in order to be a Medical Laboratory Technician as part of your Bachelor's degree or the year after gaining your Bachelor's. Within this program we spend our time split between attending classes that teach us the material behind the testing we perform, and the other half of our time is spent inside of the Laboratory stationed within the different departments that consists of: Blood Bank, Chemistry, Hematology, Microbiology, Genetics, and Immunology. We get hands on experience within the lab performing patient testing, and during lectures we learn about the testing, how and why it's performed, as well as the diseases that correspond with the tests done at St. Francis.

As a 3+1 Microbiology student – meaning credits for my Senior year at OSU are being earned through the St. Francis MLS program – my years of microbiology courses have helped to prepare me in different ways for this internship. A number of the classes you take as a microbiology student cover the same material, just continuing to build upon it, and having that good foundation of the basics of the biochemistry and molecular machinery that occurs within cells helped me to understand more of what we are learning at St. Francis. In addition, the attention to detail that microbiology classes demand of you has served me well due to medical laboratory science is dependent on understanding and noticing minute details within patients results. One class that stands out to me in particular is the Intro to Microbiology lab where all of the biochemical tests we saw and got to discuss have reappeared in this program, as we talk about those same tests and the particular results for organisms within a fast paced setting. Overall, the amount of work within my micro classes helped me to learn time-management skills, which were particularly helpful these past few months as with any science related field, time management is key in addition to attention to detail.

- Julia Terrell, Current MLS Student

Front: Olivia Bradshaw, Julia Terrell, Jessica Bowman, Casey Johnson

Back: Ashley Pippin, Jessica Everrett, Grace Lebeda, Miriam (Mimi) Braswell

OUR DISTINGUISED ALUMNA: MARTHA A. BURGER

Martha Burger was the Microbiology Department's honored guest at the College of Arts and Sciences Hall of Fame Ceremony this year. Martha Burger is the 18th president of Oklahoma City University and earned her degree in medical technology from OSU in 1973. She is a former executive in the energy industry and served as the senior vice president of human and corporate resources at Chesapeake Energy Corporation.

During her tenure at Chesapeake, the company grew from less than 100 employees to over 13,000 and was recognized by Fortune magazine as one of the 100 Best Companies to Work For in the U.S. from 2008 until 2013. She was instrumental in creating and sustaining the company's vibrant, unique and nationally recognized culture.

Burger is extremely active in civic and professional organizations as well as statewide initiatives. She has a long history with OCU, earning her MBA in 1992 and joining the Meinder School of Business Oklahoma Commerce and Industry Hall of Honor in 2011. She served as a trustee and chair of the university's audit and finance committee. She also received an honorary Doctorate of Humane Letters in 2012.

Martha Burger was recognized as the 2019 Microbiology Distinguished Alumna at the College of Arts and Sciences Hall of Fame Ceremony on September 27, 2019. The Department is proud if the successful individuals who represent OSU-Microbiology in their professions

BREWING MICROBIOLOGY. MICR4003

Science just got better!

It took a full year for Prof. Conway to develop his online course, Brewing Microbiology. This senior level, General Education course, which has no prerequisites, was first offered in 2016, with 150 students enrolled, and has continued to grow in popularity. The Fall 2019 enrollment is 280 students, coming from every College at OSU. While the course is very much about beer, really it is about the science behind brewing. Who would have guessed that beer would be so popular with college students?

Videotaped at several Oklahoma breweries, grain fields, malt houses, research laboratories and even a water treatment plant, the course is structured around beer's ingredients: malt, hops, water, and yeast. Production of the 50 videos that make up the bulk of the course materials was supported by Arts and Sciences Outreach and OSU's Institute for Teaching and Learning Excellence, as well as Iron Monk Brewery.

Iron Monk Co-founders, Jerrod Millirons and Dave Monks, are former instructors who are committed to education. They opened the doors to their brewery to allow OSU to produce the course and a warm relationship developed. Jerrod and Dave even named a beer after Prof. Conway because he was always asking them, "when are you going to make an Irish Red Ale?"

Craft beer is a movement and watching it develop from an insider's perspective has been rewarding for Prof. Conway. More importantly, students who might not otherwise take an upper division life science course are exposed to "real science": from the biochemistry of hops and malted grains to yeast physiology and metabolism. Raise your glasses to a liberal arts – and sciences – education!

DR. YOUSSEF, HIGHEST RANKED PROFESSOR ON RATEMYPROFESSORS.COM

Dr. Noha Youssef is a faculty member in the Department of Microbiology. She is a very well liked professor and is often praised for her structure and teaching style of Introduction to Microbiology. On the website, RateMyProfessor she has been awarded the spot of "Top Professor" for OSU (followed closely by another one of our professors, Dr. Lutter). Dr. Youssef has an overall quality of 5/5, an average difficulty of 2.2/5, and 100% of her students have said they would take her again for her course, Intro to Microbiology (MICR2123).

"Hands down, best professor I've had to date. She is so knowledgeable about microbiology and is very passionate about it. But, she understands that this is not everyone's favorite thing, so she makes it so easy to understand, and makes it actually enjoyable to be there ."

-Student reviews on RateMyProfessor.com

Dr. Youssef is currently conducting research in the OSU Labs at Venture 1 in the Research Park off campus. She is mainly focusing on metabolic diversities in single cell genomes of not-yet cultured Bacteria and Archea. To read more about Dr. Youssef's lab, visit our website!

UNDERGRADUATE STUDENT AMBASSADORS

The Undergraduate Student Ambassadors are a group of students that represent the department in many ways. 7 years ago our advisor at the time, Dana Hatter, had the idea to create a group of undergraduate students that would best showcase our department. This group of students are the best of our major; they apply to be a representative of the microbiology department and once they are accepted, they are our best recruiters. for incoming undergraduate majors. The ambassador team works recruiting events like OSU Up Close and Junior day in addition to visiting the A&S1111, "intro to microbiology." When the ambassadors visit the 1111 class they are there for a variety of reasons. They are able to go in to help the freshmen create their schedule for the next couple of semesters and they are also able to answer any questions the new students may have about life at college and how to survive away from home. The Microbiology Ambassadors are like the "Big Siblings" of the department.

The Microbiology Ambassadors have a wide range of knowledge about the department as well as post graduation opportunities. Some of their favorite events are the ones where future Cowboys and their family have questions about the major and the job opportunities that come with such a rigorous degree,

The ambassador program is a unique attribute of the Microbiology major and we are proud of our students and all of their accomplishments! To read more about our ambassadors or to get in contact with one, visit our website! We have a great group this year and they are here to help you! If you would like to become an ambassador for the 2020-2021 school year call the Microbiology office at (405) 744-6243.

Front: Olga Michka, Abigail Peters, Sydney Bayless, Nina Baggett.

Back: Peter Nunan, Darci Kuck, Troy Adkins, Cole Kiger, Bryn Goldsmith

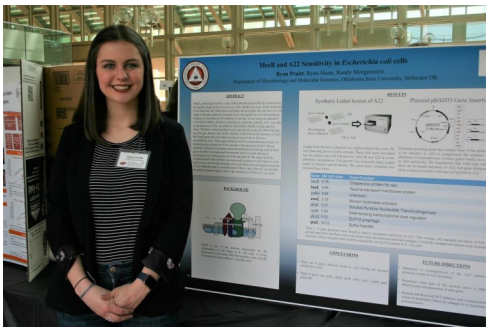
SPRING 2019 ANNUAL SYMPOSIUM

Every year the Microbiology club organizes an Undergraduate Symposium in conjunction with the Graduate Student Association's Graduate Student Symposium. These two events are great opportunities for the students of the Microbiology Department to showcase what they have been working on while in the lab as well as practice their presentation skills.

The students that are involved in undergraduate research prepare a poster and a speech to present to 3 judges. These individuals stand with their poster of all of their hard work and go through the specifics of what they have been spending the last year working on. Each judge scores the presentations and awards are given out to the individuals who do the best and were the most prepared. This event is open to the public so in addition to talking to Microbiology professors, the students presenting have the opportunity to speak to other individuals, such as their peers, about their research.

"While in Dr. Randy Morgenstein's lab we studied the effects that different concentrations of the drug A22 have on MreB, an actin homolog, in E. coli cells. We examined how the drug affects cell shape, and how this affects the viability of the cells." -Ryan Pruitt

The Cabeen Lab



2019-2020 Niblack Scholarship recipient Ryan Pruitt.

SPRING 2019 UNDERGRADUATE AWARDS BANQUET

The Undergraduate Student Awards recognized students involved in the Microbiology department for their commitment and accomplishments for the year. Many of the awards recognized the Wentz Scholars, the Niblack Scholars and other Microbiology related scholarships given to these research-scholars.

The Centerpiece competition was the most exciting part of the event. All the professors and their students brought a small centerpiece that communicated the research that the lab focuses on. We were able to see a foot big chlamydia cell, E. coli and pseudomonas cells with pipe cleaner flagella and cotton biofilm. Many laughs and delicious food plates were shared at the banquet.

We finished the event with recognizing some of the big scholarships for the graduate students, as well as an encouraging speech from the Department Head. He emphasized that the Microbiology department continues to grow in students, as well as incredible research done in our laboratories

Sergio Mares

Dr. Marianna Patrauchan, Julia Terrell, Dr. Tyrrell Conway

THE MICROBIOME INITIATIVE

CONNECTING THE MICROBIOME TO HEALTH

Intricate microbial communities inhabit every available habitat on Earth. The complexity of these microbiomes is vast. Their connections have the potential to benefit health and well-being of animals, plants and physical environments. Rigorous science is required to ensure that medical, veterinary, dietary and ecosystem management interventions targeting the microbiome are effective. The Microbiome Initiative brings together OSU experts from microbiology, human and veterinary medicine, nutritional sciences, computer science, mathematics, behavioral sciences, social sciences and engineering to better understand microbiome-associated processes that impact health and the environment.

In September 2019, Oklahoma State University selected four research areas for focused investment and growth in the coming years, based upon compelling societal needs. These are called Tier 1 Research Initiatives (Timely, Impactful, Engaged Research). OSU Vice President for Research, Dr. Kenneth Sewell, "considers the entire process a great success for advancing interdisciplinary research across OSU". President Burns Hargis said at the launch of the competition. "Our Tier 1 Research Initiatives represent a commitment to Oklahoma that we intend to use our research strengths to make a major difference." The leaders of the Microbiome Initiative are honored to achieve Tier 1 status.

Interest in microbiomes is a movement that encompasses all of the life sciences. Project leader, Dr. Tyrrell Conway, Regents Professor and Head of Microbiology, said "OSU is positioned strategically to become a leader in microbiome research. If you are a biomedical researcher of any kind, you are thinking about the microbiome. If you don't have the capacity in your laboratory to test some of these things, you wish you did. That's why the central focus of the Microbiome Initiative is to provide the OSU scientific community with a toolkit for microbiome research."

The Tier 1 Microbiome Initiative is led by – in addition to Dr. Conway – Dr. Gerwald Koehler, Professor of Biochemistry and Microbiology at the Center for Health Sciences in Tulsa; Dr. Jerry Malayer, Associate Dean for Research and Professor of Physiological Sciences at OSU's College of Veterinary Medicine; and Dr. Brenda Smith, Regents Professor of Nutritional Sciences in the College of Human Sciences. The four project leaders are joined by dozens of colleagues from every college on the Stillwater campus and OSUHSC.

In the immediate future, Microbiome Initiative leaders are organizing work groups to share ideas, experiment designs, and technologies. Preliminary gap analysis identified metabolomics as a core technology that needs to be developed further at OSU. This strategy will enhance the suite of "omics" technologies that already are available on campus. These technologies include 16S sequencing, metagenomics, transcriptomics, proteomics, and anaerobic microbiology. Tying omics technologies together requires bioinformatics and OSU's VPR has pledged to increase staffing. Furthermore, OSU is committed to hiring faculty whose scholarship centers on microbiome research. A primary goal of the Tier 1 Microbiome Initiative is to obtain long term, large-scale federal funding.

Exploration of microbiome function and the connection to human health is something that likely will impact many aspects of our lives in the coming decades. Microbiology graduates will be in high demand. It is a privilege to be a microbiologist in such exciting times!

From left to right: Dr. Jerry Malayer, Dr. Gerwald Kohler, Dr. Tyrrell Conway, and Dr. Brenda Smith.

NIBLACK SCHOLARS

Oklahoma State university has named 14 individuals as the 2019-2020 Niblack Research Scholars. Each of these individuals have received $8,000 scholarships and the opportunity to conduct research guided by a faculty sponsor and graduate student mentor.

7 of the 14 chosen individuals are Microbiology majors or are conducting their research in microbiology! We are so proud of our undergraduates and all they are doing during their time here at OSU.

The Microbiology Students and their faculty advisors are:

Adam Bronson, Dr. Matthew Cabeen

Ryan Pruitt, Dr. Erika Lutter

Kathryn O'Connell, Dr. Mostafa Elshahed

Cassandra Salinas, Dr. Marianna Patrauchan

Ryan Hahn, Dr, Noha Youssef

Nina Bagett, Dr. Matthew Cabeen

Ty Derouen, Dr. Erika Lutter

MICR 4001: PROFESSIONAL TRANSITIONS IN MICROBIOLOGY AND MOLECULAR BIOLOGY

Microbiology Majors should begin to plan their career paths by Junior Year. To help guide them in making the transition from undergraduate education to post-graduate education or employment, the faculty offer "Professional Transitions." In this course, students hear from microbiologists who work in different occupations , hone their resumes and learn job hunting skills.

There are a wide variety of jobs that are available to individuals who earn a degree in Microbiology. These range from M.D./Ph.D. to Lab Tech to Brewer! In the photo to the right is Dr. Chris White, Dr. Conway, and Cody Driscoll gathered for the Oklahoma Craft Beer Forum 2018. Dr. White is the owner of White Labs and author of the book Yeast: The Practical Guide to Beer Fermentation (Brewing Elements) and he is featured in MICR 4003: Brewing Microbiology. Cody Driscoll is a graduate of the OSU-Microbiology Program (2018), brewer at Marshall Brewery in Tulsa, OK and he is a regular speaker in MICR4001.

Are you in a profession our students would benefit from hearing about? Please contact me at the email address below and we will work you into the course schedule next semester!

Tyrrell Conway

tconway@okstate.edu

Dr. Chris White, Dr. Tyrrell Conway, and Cody Driscoll

THINKING BIG ABOUT THE SMALL THINGS

DR. JEFF HADWIGER

Last spring Dr. Jeff Hadwiger was awarded an NIH grant to study the regulation and function of an atypical MAP kinase (mitogen-activated protein kinase) that the Hadwiger lab had previously shown to be required for cell movement in response to chemical signals. Atypical MAP kinases exist in animals, including humans, and other organisms capable of cell motility. This protein represents a potential target for regulating cell movement in immune responses and possibly cancer cells. The Hadwiger lab is analyzing this protein in the soil amoeba Dictyostelium, a premier model organism for understanding signal-driven cell movement. Much of the excitement about this study has come from a recent break-through in a collaboration with Dr. Huaqing Cai, formerly a post-doc in Dr. Peter Devreotes' lab at Johns Hopkins School of Medicine but now runs her own lab in the Chinese Academy of Sciences. Drs. Hadwiger and Cai determined that this protein regulates the shuttling of a fluorescently-tagged gene regulator (transcription factor) from the nucleus to the cytoplasm. This regulation allows members of the Hadwiger lab to use confocal fluorescence microscopy to monitor MAP kinase activity in real time and analyze the responses of single cells within a population. This technology may someday allow for rapid screening and identification of chemical signals that regulate cell movement in a wide range of eukaryotes, including human cells.

The Hadwiger lab has been recruiting new students to undertake this study. Imani McGill joined the lab as a Masters student at the beginning of the year and Ramee Aranda has recently joined as a PhD student. These graduate students oversee a cast of undergraduate students that includes Cole Kiger, Stormie Dreadfulwater, and Kierra Dixon, all of whom had been Life Science Freshman Research Scholars (LSFRS) last spring. The latter two students are also part of the Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP) program and Ms. Dreadfulwater has been awarded a NIH supplement. Two new LSFRS members, Rebecca Lindley and Becca Pegram will be joining the lab this spring. These graduate and undergraduate students will be pursuing projects that aim to identify which regions the atypical MAP kinase define specificity for this class of MAP kinases and examine how an atypical MAP kinase can bind and regulate other proteins. In addition, the research team plans to further develop the technology of fluorescent reporters that could be used in a wide variety of organisms to identify new chemical signals that regulate cell movement.

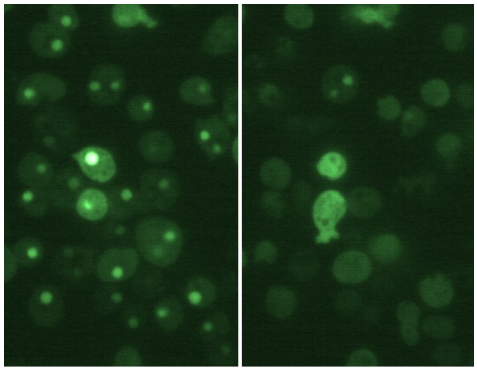


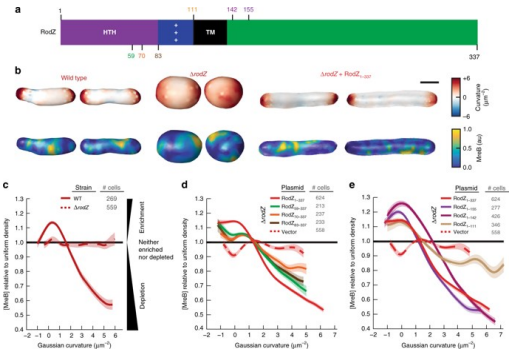
Figure: Fluorescent-tagged gene regulator in the nucleus of Dictyostelium prior to stimulation with a chemical signal (left) and the same cells 4 minutes after a chemical signal activated the atypical MAP kinase, allowing the gene regulator to shuttle out of the nucleus (right).

DR. RANDY MORGENSTEIN

The Morgenstein lab has grown a lot since he first came to OSU in 2016. The lab currently consists of two graduate students, 2 undergraduate Freshman Research Scholars, 1 Wentz scholar, 1 sophomore, and 1 senior. Together they are studying the relationship between cell shape and function using the bacterium Escherichia coli as a model organism. His research goals involve understanding how rod shape is achieved by uncovering the molecular function of different cell shape determinants, such as MreB, MreC, and MreD. Because many of these are essential for growth, the lab is taking a CRISPR interference approach to knock down gene expression. Additionally, because these genes are essential, they have the potential to make good antibiotic targets. The lab is currently studying novel mechanisms for resistance to MreB targeting antibiotics.

Another research goal is to determine how perturbation of MreB affects other cellular functions, independent of cell shape changes. To this end, Dr. Morgenstein has been awarded an R15 from the NIH to study the role of MreB in chemotaxis. The lab is also examining how disruption of MreB affects global transcription levels through the use of RNA-seq.

Overall the Morgenstein lab research program will provide new information on the functional relationship of cell shape, the evolution of the cytoskeleton, and discover potential targets for antibiotic discovery.



The cytoplasmic domain of RodZ is necessary for MreB curvature localization

DR. MATTHEW CABEEN

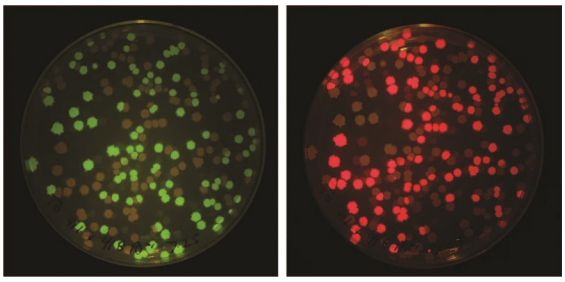
It has been a busy and fun year in the Cabeen Lab. Our PhD students Chris Hamm and Rabi Khadka both study the mechanisms of stress responses in the non-pathogenic model bacterium *Bacillus subtilis*, while Somalisa Pan and Amal Yahya study the signaling pathways underlying biofilm formation in the opportunistic human pathogen *Pseudomonas aeruginosa*. All 15 of our students are making excellent research progress, and they gave over 25 oral or poster presentations in 2019 at local, regional or international meetings, winning 5 presentation prizes in the process.

In May we sadly said goodbye to our first graduating senior Samantha Shafer, who moved to Washington DC to complete a competitive post-baccalaureate program at the National Institutes of Health. Sam was one of four 2018-19 Wentz Scholars in the lab, with Sid Bush, Jake Osborne, and Julia Terrell. Adam Bronson and Nina Baggett were both awarded Niblack Research Scholarships for the 2019-2020 year.

The lab was awarded an OCRID Pilot Project Grant in July 2019 to study a novel protein with a role in *P. aeruginosa* biofilm formation; Somalisa is spearheading this project. Dr. Cabeen's Antibiotics and Antibiotic Resistance course, which he first introduced in Fall 2018, is growing, with more than 50 undergraduate and graduate students enrolled in Fall 2019. Dr. Cabeen also teaches Introductory Microbiology in the Spring semester. He is excited to be teaming up with Regents Professor Dr. Tim Murphy in the English Department, an expert in science fiction, to teach a Cambridge Scholars Program course to OSU students in August 2020 in Cambridge, UK. The course, titled "Disease, Drugs & DNA: Science Fact and Science Fiction in the 20th Century", discusses penicillin development and DNA structure discovery and explores how these discoveries intersected with literature and film.

Some of our students, led by PhD student Chris Hamm, developed an inexpensive and portable apparatus that can be used with a smartphone camera to view fluorescent materials. We primarily use this apparatus for competition assays, where the relative numbers of two different strains can be counted based on their fluorescence color. We envision that our system will be useful for science education at the high-school and college levels, and we are currently preparing a publication to report our results. Meanwhile, undergraduate William Colton has teamed up with business students to develop a startup company, named Paldara, focused on reducing bacterial infections on urinary catheters. Will's team won several awards in 2019, including the Love's Cup entrepreneurship competition in April, which carried a $20,000 prize.

It's not all work in the Cabeen lab. In summer 2019 we held "Pizza Fridays" in which we invented new pizza-topping combinations, including Chick-Fil-A pizza and cheeseburger pizza. Talk about cooking up some delicious results!



Red and green fluorescence images of the same plate of *Bacillus subtilis* colonies, taken with a smartphone and our fluorescence illumination apparatus.

Our own creation—Chick Fil A pizza, topped with chicken and waffle fries.

The Cabeen lab plus friends at one of our "Pizza Fridays" this past summer.

DR. KAREN WOZNIAK

The Wozniak lab studies the fungal pathogen *Cryptococcus neoformans* and focuses on examining the relationship between immune cells and this pathogen. *C. neoformans* is initially inhaled from the environment, but in immune compromised patients, it can spread throughout the body and cause cryptococcal meningitis, leading to approximately 220,000 cases per year and 180,000 annual deaths. The Wozniak lab is interested in studying the initial interactions this pathogen has with innate immune cells in the lungs. The lab received a pilot grant from the Oklahoma Respiratory Center for Infectious Diseases (OCRID), which has helped fund a portion of this research concerning pulmonary immune cell interactions with *C. neoformans*. The Wozniak lab currently consists of two graduate students – Benjamin Nelson (PhD student) and Ashlee Hawkins (master's student, OK-LSAMP bridge-to-doctorate fellow) as well as eight undergraduate students – Emma Maritz, Brinley Cannon, Brittney Conn, Savannah Beakley, Cheyenne Daugherty (McNair scholar), Brenden Determann II (OK-LSAMP scholar), Sierra Posey (OK-LSAMP scholar), and Michaela Allison. The undergraduate students work on a range of research projects, including evaluating the pulmonary immune cell response to *C. neoformans* as well as examining novel therapeutic options that could be used to treat crypThe Wozniak lab studies the fungal pathogen Cryptococcus neoformans and focuses on examining the relationship between immune cells and this pathogen. C. neoformans is initially inhaled from the environment, but in immune compromised patients, it can spread throughout the body and cause cryptococcal meningitis, leading to approximately 220,000 cases per year and 180,000 annual deaths. The Wozniak lab is interested in studying the initial interactions this pathogen has with innate immune cells in the lungs. The lab received a pilot grant from the Oklahoma Respiratory Center for Infectious Diseases (OCRID), which has helped fund a portion of this research concerning pulmonary immune cell interactions with C. neoformans. The Wozniak lab currently consists of two graduate students – Benjamin Nelson (PhD student) and Ashlee Hawkins (master's student, OK-LSAMP bridge-to-doctorate fellow) as well as eight undergraduate students – Emma Maritz, Brinley Cannon, Brittney Conn, Savannah Beakley, Cheyenne Daugherty (McNair scholar), Brenden Determann II (OK-LSAMP scholar), Sierra Posey (OK-LSAMP scholar), and Michaela Allison. The undergraduate students work on a range of research projects, including evaluating the pulmonary immune cell response to C. neoformans as well as examining novel therapeutic options that could be used to treat cryptococcal disease. Ultimately, the Wozniak lab aims to use immunotherapy as a way to treat this deadly fungal infection.

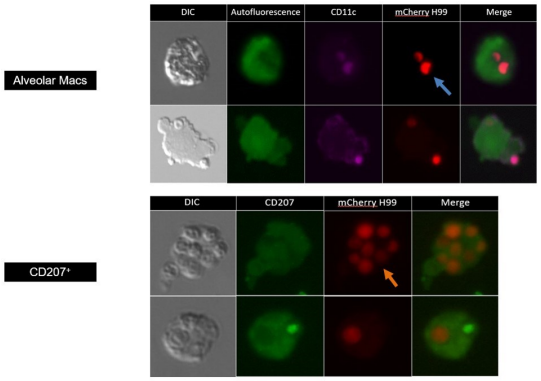


Figure 1: Human innate cells from the pulmonary cavity interact differently with *C. neoformans*. Alveolar macrophages are beginning to kill *C. neoformans* (observe small cells and c-shape), while CD207+ cells allow multiple fungal cells to reside inside the cells.

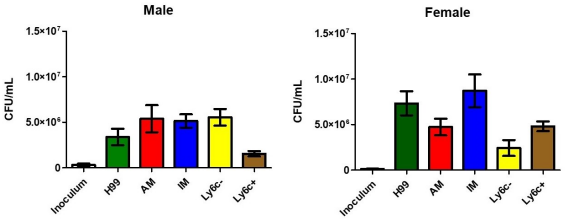


Figure 2: Mouse innate subsets from the lung have differential anti-fungal activity, and the activity differs in male mice compared to female mice

Lab photo: The Wozniak Lab members conducting research and presenting findings at conferences.

DR. ERIKA LUTTER WINS DISTINGUISHED EARLY CAREER FACULTY AWARD

We just learned that Associate Professor Erika Lutter will receive the Distinguished Early Career Faculty Award at the Provost's University Awards Convocation during finals week. This award goes to faculty members who were tenured within the past three years with strong potential for continued outstanding scholarship and excellent teaching. Dr. Lutter has the highest possible rating on RateMyProfessor.com and she is a leading Chlamydia researcher in the field of pathogenic microbiology. It amazes us that Dr. Lutter is the second Microbiology faculty member to win the Distinguished Early Career Faculty Award (Dr. Youssef, 2018). We are proud of Dr. Lutter's accomplishments.

WHY WE CHOSE MICROBIOLOGY

I chose microbiology because it is something that would be studied forever. There is so much we know about it, but so much we do not. Once I started attending OSU with this major in mind, I was suddenly surrounding by a support system of students, professors and leaders that were just as curious as I was. Making the decision of choosing micro as my academic home was the easiest thus far, and I recommend it to all who are needing to couple it with a Pre-Med option and use it as a gateway to extend into a career of research or any medical field.

-Olga Michka

Class of 2021

When I was enrolling for classes my freshman year my major was psychology. I wanted to be a Genetic Counselor (I still do) and I thought that was the correct path to take. As soon as I told Dana Hatter (the Microbiology Advisor at the time) my plan, her eyes lit up and she started talking about all of the wonders of the microbiology department--the people involved, and how this program would be the one to help me become excellent in my chosen profession. She was right, everything that I love about OSU has to do with the microbiology department. It is like my second home. I am confident and proud in the major I have chosen and I am excited for what the future holds in this field and in my life.

-Abigail Peters

Class of 2020

Coming into OSU, I was 100% positive that I wanted to major in a science. However, I was indecisive about which science until after I completed MICR 2132- Introduction to Microbiology Laboratory the summer before my Junior year. After spending June & July collecting, isolating, and identifying an unknown environmental species, I fell in love with working in the Microbiology laboratory. I soon made the decision to major in Microbiology and explore the awesome field of Medical Laboratory Science.

-Robin Spencer

Class of 2021

GRADUATE COORDINATOR'S REPORT

Our graduate program is growing! Currently, forty-six students (23 PhD and 23 MS students) are enrolled in our graduate program. Two PhD and Three MS degrees have been awarded in the last year.

Between August 2018-August 2019, our graduate students were co-authors of thirteen different publications in highly respected peer-reviewed scientific journals such as Proceedings of the National Academy of Science, Cellular Signaling, Applied and Environmental Microbiology, msystems, Biochimica et Biophysica Acta-Bioenergetics, and frontiers of cellular and Infection Microbiology. Our graduate students publish, on average, 3.0 papers during their PhD, with an average Ph.D. completion time of five years.

Students in our graduate program continue to be very active in attending and presenting their research at scientific conferences. On average, each graduate student in our program is involved in 4.43 scientific presentations per year, with 46.1% of these presentations occurring at regional, national, and international meetings.

In Fall 2017, we admitted fourteen new Ph.D. and MS students into our program.

In short, our graduate program is still going strong! We are very proud of our wonderful graduate students, and we will always strive to mentor them to the best of our abilities.

Dr. Mostafa Elshahed

Graduate Coordinator

GRADUATE STUDENT CORNER

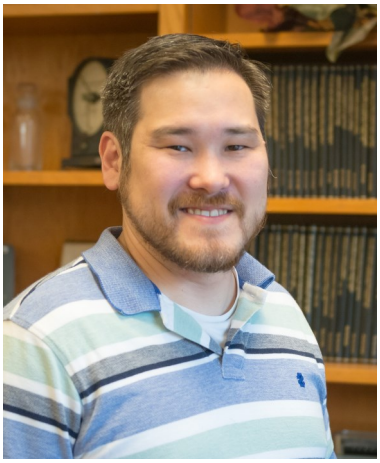
Graduate Student Association President's Report

The past year saw a lot of change over from older graduating students to the younger class including myself only being the second year of graduate school. Being thrust into this position, I had no idea what to really expect! Gone were the old stalwarts on the fourth floor of LSE, like Nick Kuburich and Jorge Lightfoot, from whom I received much guidance in my first year.

Much of the leadership was now being filled with first- and second-year graduate students, which is why I would like to especially thank some of the more senior students, like Melissa Brewer and Michelle King, who gave precious amounts of their time away from their work to mentor the newer students. It was a year of firsts for many of us in this leadership position including Deepali Luthra as vice president and Archana Yadav as secretary. Despite the learning curve, our association had quite a successful year! We continued the tradition of selling beverages while educating the public about microbes and diseases at the walkaround the night before America's greatest homecoming celebration. This was especially important during a brisk and damp evening!

Several times throughout the year, we hosted social events in conjunction with the undergraduate microbiology club at places like The Garage and The Roller Dome. There was also our annual departmental symposium where we highlighted the research being done in our community. Between both the graduate and undergraduate students, there were over 50 participants, necessitating the need to use the expansive and beautiful Noble Research Center's atrium. During the day, we talked with alumni, retired professors, other professionals, and new prospective students about all things microbiology and was even able to welcome our guest speaker: Dr. Paul Fidel Jr., who talked about his work at Louisiana State University. Finally, we hosted another summer chapter of Grandparent University. This, in particular, would not be possible without the tireless work of Michelle and her dedication for outreach into the community.

With a new year, I pass the leadership mantle onto new group of students. I have every confidence that the new president, Will Marsh, will take what we have set up and achieved this year and bring the graduate student association into new places and higher prestige .



Ben Nelson

Former GSA President

Current GSA Officers:

President: Will Marsh

Vice President: Denver La Force

Treasurer: Ashlee Hawkins

Secretary: Tarosha Salpadoru

CHUNKS OF LOVIN'

Chunk, department therapy dog and Pete's Pet Posse member, turned nine years old this Fall, but she's not slowing down a bit. At home Chunk frantically chases balls and squirrels and swims to stay fit. On campus Chunk is very popular, so much so that her handler has to leave early for appointments because she frequently is stopped to be petted. Chunk is a regular attendee of committee and faculty meetings and goes to all of the student recruiting events, some of which draw thousands of people. This Fall, Chunk attended Freshmen Convocation and when Pistol Pete shot his shotgun right over the heads of the audience, she barely flinched (while the faculty all jumped out of their seats). Every day on campus is an adventure, one way or another.

It's the quieter moments, one-on-one with humans, that are the most meaningful. Chunk has learned to find the person in the room who needs her most and wants to sit by that person. It's not unusual for students to break down in tears with their arms around Chunk for emotional support – this happens especially during the first and last weeks of the semester when stress is highest. In one encounter, a student in distress hugged Chunk while telling Chunk's handler a story that would break anyone's heart. That student held on to Chunk for what seemed like an eternity, then stood up and pronounced himself ready to go to class. Sometimes Chunk is exhausted at the end of a day on campus.

Chunk's handler is grateful to be able to bring his dog with him to school. The two of them go on frequent walks around campus. Chunk's favorite place is Theta Pond (plenty of squirrels) and she likes Morrill Hall and Old Central, too. The frequency of Chunk's walks sometimes is determined by the kind of day the Department Head is having. Chunk has her water bowl and bed in the corner of the Department office and makes herself at home between walks and visits and meetings. As an Oklahoma State University alum, Chunk's handler couldn't be happier than when walking around campus. Chunk couldn't be happier than when she is working her important job.

THE MICROBIOLOGY CLUB

I am very excited for this year and for all the activities we have planned for the Microbiology Club. With the help of my fellow executive board officers and the Micro club advisors, Dr. Matthew Cabeen and Dr. Karen Wozniak, we strive to create a environment that allows students to freely come to, when in need of help or just a place where they want to meet other Microbiology students.

The Microbiology club has hosted numerous events this year and last to help students academically excel such as Resume Workshops and Professional Headshots to fun events to take their mind off the thought of school temporarily by having Pizza Party's and game nights etc. We are all very excited for the growth of our Club and for the plans we have for this upcoming year!

Troy Adkins

Current Microbiology Club President

Other Club Officers:

Vice President: Natali Edwards

Secretary: Jennifer Perez

Treasurer: Rosa Gorham

Advertisement Co-Chair: Savannah Beakley

Advertisement Co-Chair: Bahar Nazar Gul

Social Media and Outreach Chair: Abigail Peters

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Our Alumni and Friends have the unique opportunity to partner with us in the important work we are doing in Microbiology and Molecular Genetics. As one of the region's best Microbiology programs, we impact the world through our students and our research. To help make a difference in our Department and to make the OSU experience more affordable and enriching for our students, consider donating to our fund today!

OSUgiving.com/microbiology-donation