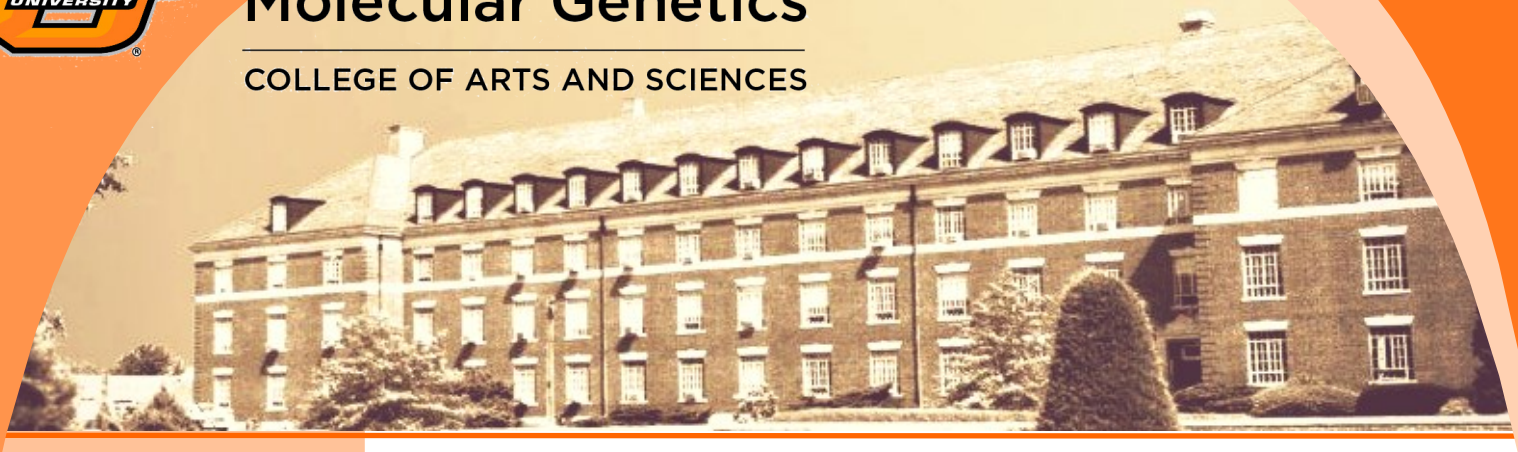
Issue 7
Fall 2018

DEPARTMENT OF
Microbiology & Molecular Genetics
COLLEGE OF ARTS AND SCIENCES



The Department of Microbiology and Molecular Genetics offers these degrees: Microbiology/Cell and Molecular Biology, Pre-Medical Professional and Medical Laboratory Sciences

Department Head
Dr. Tyrrell Conway
Graduate Program Coordinator
Dr. Mostafa Elshahed
Undergraduate Academic Advisor
Dana Hatter
Administrative Staff
Becky Hergenreder & Alice Bules

Contact
Department of Microbiology and Molecular Genetics

Oklahoma State University
307 Life Sciences East
Oklahoma State University
Stillwater, OK 74078
405-744-6243
Microbiology.okstate.edu

DR. TYRRELL CONWAY, DEPARTMENT HEAD

Greetings from Microbiology

Every student has a story. The path they took to Oklahoma State University, what they hope to accomplish while they are with us, and the dreams they take with them when they graduate are all stories that are uniquely theirs. I love to retell their stories. Our students may not realize it, but we (their faculty, advisors, and staff) relish their successes. Having students deserving of our pride is one of the best perks of being in this department.

By every measure, OSU Microbiology is thriving. We graduated 72 B.S. students during the 2017-18 academic year, shattering the previous record of 48 graduates set the year before. The number of Microbiology majors remained high (275) as the Fall semester began and our enrollments once again have reached all-time highs. This semester we opened a newly renovated teaching laboratory (317 LSE) and filled every seat in every new section of Introduction to Microbiology Laboratory. We also began this academic year with the largest incoming graduate class ever – 19 new graduate students!

The department closed out the 2018 fiscal year at the top of the College of Arts and Sciences in new research awards ($3 million). While the faculty put considerable effort into developing our teaching skills, we certainly have not neglected our research. Congratulations to Dr. Noha Youssef, who recently was promoted to Associate Professor with tenure. Dr. Youssef published an astonishing 32 journal articles in the four years leading up to her promotion. Dr. Rob Burnap, who is a Fellow of the American Academy of Microbiology, was named an Einstein Visiting Scholar at the Free University of Berlin. I was humbled to be promoted to Regents Professor. Our Coordinator of Introduction to Microbiology Laboratories, Connie Budd, was given the Provost's Distinguished Service Award. Our Senior Academic Advisor in Microbiology, Dana Hatter, was named the College of Arts and Sciences Outstanding Advisor. I take great pride in the accomplishments of these faculty and staff. Many more student, staff, and faculty achievements are highlighted in this newsletter. Following a successful 2017-18 academic year for OSU-Microbiology, we anticipate that 2018-19 will be even better.

Best wishes,
Dr. Tyrrell Conway, Department Head

Our Distinguished Alumna: Dr. Deborah Huff, M.D.

Dr. Huff was recognized as the 2018 Microbiology Distinguished Alumna at the College of Arts and Sciences Hall of Fame Ceremony on September 21, 2018. The Department is proud of the successful women and men who represent OSU-Microbiology in their professions.

Deborah Huff was born and raised in Oklahoma. At Oklahoma State she trained in Microbiology, leading her to the University of Oklahoma Medical School where she graduated with honors and specialized in Obstetrics and Gynecology. Debbie along with two women physicians went into practice and developed the largest OB-GYN group in the state of Oklahoma. Early in her practice it became her goal to improve women's health care in Oklahoma. She was instrumental in the founding and building of the award winning Lakeside Women's Hospital in Oklahoma City, which she was the physician manager of. Dr. Huff has delivered over ten thousand babies and served on the Oklahoma State Medical Board for many years. She was honored as Oklahoma Woman of the year in 2002. She went on to attend Auburn University and got a Master of Business degree.

One of Debbie's greatest accomplishments has been the mother of four successful children and a grandmother of two young girls. Her children excelled in their endeavors and started their own design business, became physicians, and trained in animal care. She has been married to Dr. John Huff for thirty seven years. Debbie recently retired from medical practice and has been active in medical missions in India and Haiti on numerous occasions. She continues in her entrepreneurial spirit and is currently involved in real estate management.

MICR 4001 Professional Transitions in Microbiology and Cell and Molecular Biology

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

A perennial favorite guest speaker in Professional Transitions is Dr. Brian McDowell, our 2017 Distinguished Alumnus. Dr. McDowell does not pull any punches when it comes to telling students what to expect as medical students – it's a huge amount of work. He tells them why he chose to open his Pediatrics clinic in Owasso and how he learned to run his own business. Dr. McDowell attributes his success to hard work, good marketing research, and preparation. Students in the class are riveted as he quietly relates his stories.

Are you in a profession our students would benefit from hearing about? OSU-Microbiology graduates have much to offer students today. Please contact or email me at the address below and we will try to get you booked in the course schedule for next Fall semester.

Tyrrell Conway
tconway@okstate.edu

Dr. Brian McDowell, M.D.

Meet our New Graduate Students!

Record setting graduate student cohort

Sydney Rudy,
Accelerated Masters Student
Sydney received a Bachelors of Science in Microbiology in 2018 from Oklahoma State University

Ashley Hawkins,
Research Masters Student
Ashley received a Bachelors of Science in Microbiology in 2018 from Oklahoma State University.

Somalisa Pan,
PhD Student
Somalisa received a Bachelors of Science in Microbiology in 2015. She also received a Masters of Science in Microbiology in 2017 from St. Xavier's College in Kolkata, India .

Tarosha Salpadoru,
PhD Student
Tarosha received a Bachelors of Science in Molecular Biology and Biotechnology in 2016 from the University of Peradeniya in Sri Lanka.

Ross Walker,
PhD Student
Ross received a Bachelors of Science in Microbiology in 2018 from Oklahoma State University.

Imani McGill,
Research Masters Student
Imani received a Bachelors of Science in Biochemistry in 2016 from Oklahoma State University.

Suman Maharjan,
PhD Student
Suman received a Bachelors of Science in 2011 and a Masters of Science in 2017 both in Microbiology from Tribhuvan University in Kirtipur, Kathmandu, Nepal.

Rabindra Khadka,
PhD Student
Rabindra received a Bachelors of Science in Microbiology in 2011 from Tribhuvan University in Kathmandu. He also received a Masters of Science in Biotechnology in 2014 from Bangalore University in Bangalore.

Colleen LaForce,
Research Masters Student
Colleen received a Bachelors of Science in Biology in 2005 from Colorado State University. She also received a Bachelors of Science in Biochemistry in 2012 from Oklahoma State University.

Addison Grinnel,
Research Masters Student
Addison received an Associates Degree in Biology in 2015 from Rose State College. She also received a Bachelors of Science in Biology in 2018 from Oklahoma State University.

Meet our New Graduate Students!

James Teel,
Accelerated Masters Student
James received a Bachelors of Science in Physiology, Pre-medical Sciences in 2018 from Oklahoma State University

Danielle Lemus,
Accelerated Masters Student
Danielle received a Bachelors of Science in Microbiology/Cell and Molecular Biology in 2018 from Oklahoma State University

Megan Martinez,
Accelerated Master Student
Megan received a Bachelors of Science in Biochemistry and Molecular Biology in 2017 from Oklahoma State University

Ace Mulliner,
Accelerated Masters Student
Ace received a Bachelors of Science in Microbiology/Cell & Molecular Biology in 2018 from Oklahoma State University

Britny Johnson,
Accelerated Masters Student
Britny received a Bachelors of Science in Microbiology and Molecular Genetics in 2018 from Oklahoma State University

William Marsh,
Research Masters Student
William received a Bachelors of Science in Microbiology in 2018 from Oklahoma State University.

Cerra Linn,
Accelerated Masters Student
Cerra received a Bachelors of Science in Biological Science in 2018 from Oklahoma State University

Chris Hamm,
Research Masters Student
Chris received a Bachelors of Science in Microbiology in 2018 from Oklahoma State University

Kara Daniels,
Accelerated Masters Student
Kara received a Bachelors of Science in Animal Science, Pre-Vet in 2017 from Oklahoma State University

Development Corner

Ed and Mary Grula at the lab bench, 1960

Students of Microbiology continue to benefit from the generous donations given by many **Microbiology Alumni** to the department general fund. The sustained growth of the department means that your gifts are needed more than ever. As tuition and fees increase, there is a growing need for undergraduate scholarships and graduate fellowships. I am grateful for your generosity and commitment to this department and its students. I encourage you to consider supporting our academic programs by giving to your Alma Mater.

Former graduate students of Ed and Mary Grula, myself included, continue to give to the **Grula Lectureship**, which honors the legacy of our graduate advisors. The words that follow are those of my bench-mate in graduate school, Frank Champlin, who reminisces about his time in graduate school. I could not say it better myself…

By Tyrrell Conway
Regents Professor and Department Head

(Continues on next page)

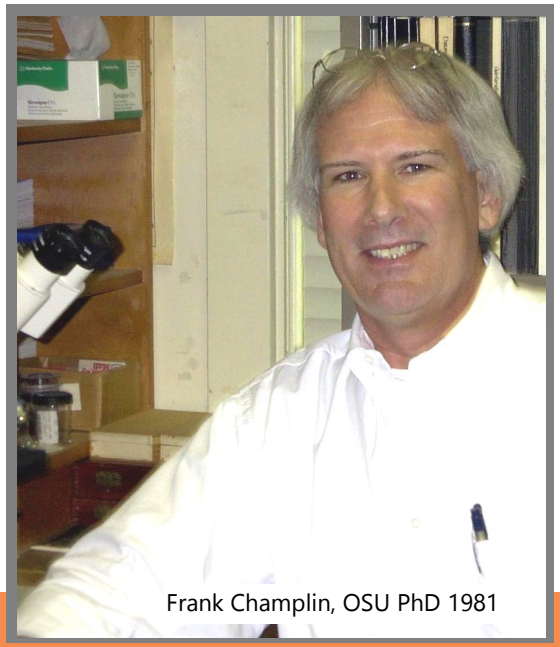
Development Corner continued

I first met Dr. E.A. Grula in about 1972 when I was an undergraduate in the Microbiology Department at Oklahoma State University. We were both standing on the observation deck of a racquetball court in the Colvin Center. He casually mentioned that the safety lanyard on my wooden racquet (yes, there once was such a thing) was leather and would soon be weakened by my sweat. So, his first words to me were an "admonition" (as I later learned he would have called it) that the organic acids in my perspiration would cause the only safety feature on my racquet to eventually fail. This set the tone for my relationship with the professor who would, against all odds, exploit my love for bacteriology as a means for training me to be a scientist.

Despite the fact that Dr. Ed Grula enjoyed a reputation as a tough guy who was not to be messed with, I do not ever remember being intimidated by him. I soon learned that, while he did not suffer fools gladly, he loved people in general and students particularly. Dr. Mary Grula, on the other hand, scared me to death. For my first several years I only knew her in passing as a person clearly operating on an intellectual plane far above mine. I was mortified when I was eventually assigned to be her sole graduate teaching assistant in *Industrial Microbiology*. However, I soon came to know her to be one of the most caring individuals I had ever met. And, fortunately for me, she extended this attitude to all living creatures, including new graduate students. She would end every week by giving me a hand-written, detailed outline of everything we would need for the following week. She would then go over it with me and patiently discuss all my queries, despite how callow and naïve they must surely have sounded. I am sure that I learned more from that laboratory than her students did. It was in 1981 that I clearly remember her being one of the last people I talked with before leaving the department for my post-doctoral position. She told me I was constantly walking the halls with a smile on my face and that she would miss that very much. I wish that I could have showed her in some way how much those words meant to me.

It is not a coincidence that I ended up in 2006 as a medical bacteriologist at the OSU Center for Health Sciences after 25 years as a bacterial physiologist at Mississippi State University. Rather, it is a result of the influence that Drs. Ed and Mary Grula had on me during my years in the Microbiology Department at Oklahoma State University. I have several reasons for knowing this, but the most cogent by far is that my favorite course as an undergraduate was Doc's *Pathogenic Microbiology*, and my favorite graduate course was Dr. Mary's *Bioenergetics of Prokaryotic Metabolic Pathways*.

I know that I am not the only person who benefitted from the love that the Grula's had for the education and development of young scientists. I consider it a particular honor to have this opportunity to encourage all of their students (Doc's pups and fillies) to support the **Grula Lectureship** through the OSU Foundation. I know of no other way to better honor their memory and thank them for what they did for us. Well, Doc would have probably appreciated a life-sized statue on campus beside that of Dr. Henry Bennett, but we all know that oversized personality was just one of his ways of sharing his love for microbiology with young scientists. Plus, he and we always had Dr. Mary there to keep us grounded.



Frank Champlin, OSU PhD 1981

By F.R. Champlin
B.S., 1975 Ph.D., 1981
Professor of Medical Microbiology
Oklahoma State University Center for Health Sciences

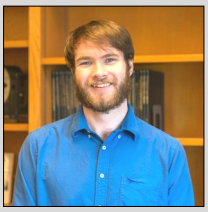
Farewell to our Graduating Students

Shelby Calkins
Graduated Fall 2017, Advisor: Dr. Noha Youssef
Shelby worked on the physiology and genetic manipulation of the anaerobic gut fungus *Pecoramyces*. She is now a Biology instructor at Northeastern State University, Broken Arrow, and Tulsa Community College.

Ibrahim Farag
Graduated Fall 2017, Advisor: Dr. Mostafa Elshahed
Ibrahim worked on the ecology and genomics of uncultured candidate phyla in anaerobic environments. He is now a post-doctoral fellow at the University of California in Berkeley, California. He is a member of the Earth and Planetary Sciences Department in Professor Jillian Banfield's lab.

Juliana Artier, Ph.D.
Graduated Summer 2018, Advisor: Dr. Robert Burnap
Juliana's research focused on understanding how *cyanobacteria* acquire CO_2 from its environment. She was interested in the high affinity CO_2 specialized protein system that *cyanobacteria* use (similar to a supercharged car), to boost its internal CO_2 level, later integrated with photosynthesis reactions. This has potential applications in CO_2 capture and biomimetic projects as well as reengineering *cyanobacteria* for production of high-value compounds. Juliana has a postdoctoral research position at CU Boulder in a project using *cyanobacteria* for production of "living materials".

Jie Ren, Ph.D.
Graduated Summer 2018, Advisor: Dr. Wouter Hoff
Jie's research focused on using spectroscopic methods to study the molecular mechanism of diverse photoactive yellow proteins (PYP). It included using spectroscopic approach to examine tuning of active site properties in PYP by strong, short hydrogen bonds and using PYP to understand residues that are conserved in the PAS domain superfamily. Currently, Jie is helping Dr. Hoff to launch a new undergraduate course called Discovering Unexplored Genome Diversity: Honors. This course if funded by the HHMI-LSFRS Program.



Nick Kuburich, Ph.D.
Graduated Summer 2018, Advisor: Dr. Jeff Hadwiger
Nick's research focused on investigating signal transduction pathways that function to transmit environmental signals that lead to a response from the cell. He primarily focused on the regulation of the phosphodiesterase, RegA, in the model organism *Dictyostelium discoideum* by phosphorylation. He identified phosphorylation events and determined their functionality during his time at OSU. Nick's research will be helpful in further understanding the regulation of phosphodiesterases which are medically important targets for treating human diseases. Also, RegA is an essential signaling protein for pathogenic amoeba such as *Acanthamoeba castellanii.* Nick works as a Postdoctoral Fellow at MD Anderson in Houston, TX in Dr. Sendurai Mani's lab. There he is studying inhibitors for metastasizing breast cancer cells that target the protein FoxC2, which is essential in cancer metastasis when epithelial cells become mesenchymal.

Jorge Lightfoot, Ph.D
Graduating Fall 2018, Advisor: Dr. Rolf Prade
Jorge's research was focused on RNA interference in the filamentous fungus *Aspergillus nidulans*. Particularly in using the RNA interference pathway to develop a novel combinatorial gene silencing method that will allow for dramatic metabolic changes within a single genetic intervention. Outside of his research, Jorge has been involved in the department's graduate student organization as well as being a OKLSAMP Bridge to Doctorate Fellow. Jorge is hoping to move into industry after he graduates but is not turning his back on research quite yet

Tenure Track Assistant Professor Position in

Microbiology and Molecular Genetics

Oklahoma State University

The Department of Microbiology and Molecular Genetics at Oklahoma State University (http://microbiology.okstate.edu) invites applications for a 9-month tenure-track faculty position at the level of Assistant Professor. This position consists of research, teaching, and service. We seek outstanding candidates exploring environmental microbiology/microbial ecology. The successful applicant is expected to develop a strong, externally funded research program and establish collaborations within the department. Moreover, we seek applicants who will contribute to our departmental reputation for excellence in undergraduate and graduate teaching.

The Department of Microbiology and Molecular Genetics is a dynamic center of discovery, innovation, and collaboration. We have 14 faculty members mentoring approximately 30 graduate students and 250 undergraduate majors. Our nationally funded research programs cover bacterial and eukaryotic systems, including microbial ecology/environmental microbiology, mechanisms of pathogenesis, molecular genetics and cell biology. Our research programs are supported by state-of-the-art core facilities for genomics and bioinformatics, mass spectroscopy, microscopy, protein analysis, and biophysical instrumentation.

Applicants must hold a Ph.D. in Microbiology or a closely related field. At least two years of post-doctoral research experience are required. Applicants should provide evidence of past research accomplishments with a strong potential for obtaining external research funding. Candidates will be expected to support the learning needs of students from diverse backgrounds and demonstrate a commitment to engaging communities underrepresented in the academy.

The successful candidate will receive a competitive salary and substantial start-up funding. Review of applications will begin on September 17th, 2018 and will continue until the position is filled. Only complete applications received by this date will be assured full consideration.

Interested applicants should submit a cover letter, CV, research plan (maximum 3 pages), teaching interests and philosophy (maximum 2 pages), and three references. Please direct any academic inquiries to the search committee chair, Noha Youssef (405-744-1192, noha@okstate.edu). For all other inquiries, please contact Becky Hergenreder (405-744-7180, rdherge@okstate.edu). https://apply.interfolio.com/54249

Note from Department Head: The most important role of the faculty is to hire new faculty members. The Department has been remarkably successful in this regard, hiring Professors Morgenstein, Wozniak, and Cabeen in the past three years. We hope to be equally successful in this current search.

Transforming Our Space

This year our facilities underwent two major renovations. Our teaching lab was gutted and made new. The project took three months. Our Graduate Student Lounge was also remodeled with new counters, furniture, and kitchen area (See next page).

"The anticipated prerequisite to alleviate the growing pains experienced by our teaching labs due to a continuing increase in enrollment over the past several years was culminated this Fall semester with the christening of our new teaching laboratory space by six sections of the current sixteen sections of MICR 2132 students. The newly renovated space not only provided a third teaching laboratory space for Microbiology labs, but it provides students sufficient and welcoming work space with an upgrade in technology and basic equipment. The included upgrades for our teaching preparation laboratory will benefit not only our students but our laboratory staff which also incorporates several work study students each semester. Thank you to all who worked on each aspect of this project and brought it to a successful completion."

Connie Budd
Teaching Laboratory Coordinator

Before the Renovation

After the Renovation

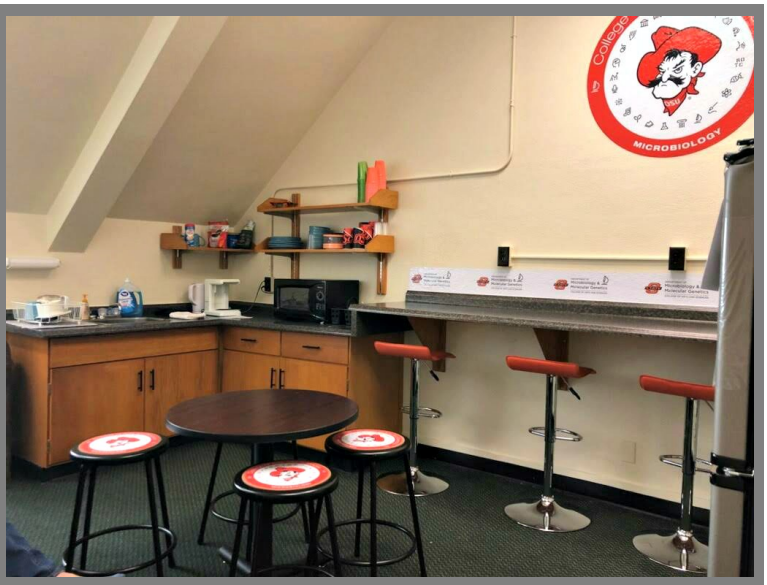
Students working hard in the new lab

Left: Connie Budd, Charles Smades, and Construction workers smiling at the finished product

Renovated Graduate Student Lounge

If you ask me what is the one place in the department where all of the graduate students feel the most comfortable, I would say room 411 in Life Sciences East. The graduate student lounge is the best place for students to relax during a long day at work. During the summer of 2018, it underwent renovations providing an elegantly well-furnished and comfortable room to the students with a new large couch, counter top with fancy chairs, new refrigerator, computer system, and lovely orange Pistol-Pete curtains, with matching cushions and a throw on the couch. It is a perfect den for students to hang out, have lunch, seek a break from the lab work or to find shelter in between their teaching schedules. It's a retreat for the coffee addicts to come and pour a cup while enjoying the view of the lawn from the window. Certainly, this place is something magical. Regardless of if it's the students who have graduated or the ones who have just joined the department, no one was left uncharmed by it. The blend of traditional and contemporary look makes the new graduate student lounge cozy enough to feel at home even when you are at work.

Deepali Luthra
GSA Vice President



Special thanks to Becky Hergenreder and Alice Bules for taking charge and leading the renovations!

Spring 2018 Annual Symposium

Congratulations to our Winners!

Graduate Student Winners:
1st Place: Radwa Hanafy
2nd Place: Anton Avramov
3rd Place: Nick Kubrich and Biraj Kayastha

Undergraduate Student Winners:
1st Place: Chris Hamm and Sarah Winburn
2nd Place: Julia Terrell
3rd Place: Leah Kafer

MICR 4003 - CRN 68026

Science just got better.

Brewing Microbiology is about the science behind beer brewing. Learn about the microbiology of yeast (including growth, metabolism, aseptic technique, and contamination), biology of grain, biochemistry of malted barley, chemistry of water, preservative nature of hops, and human physiology of taste and smell.

Enroll now!

- Open to OSU students, non-OSU students, and the community.
- 100% online course, no required on campus meetings.
- 3-credit-hours of upper division science, no prerequisites.
- Students do not have to be 21 years old to take this course.
- Virtual tour of Stillwater's oldest brewery: Iron Monk.
- Coursework begins August 2018

OSU STUDENTS

OSU CREDIT
MICR 4003, CRN 68026

Enroll as an OSU student through the OSU registrar to earn 3 hours of OSU course credit, subject to tuition and fees, you will have full access to all course content, course activities, including discussions and assessments.

NON-OSU STUDENTS

OSU CREDIT
MICRO 4003, CRN 68026

Enroll as a Non-OSU student to earn 3 hours of OSU course credit, subject to tuition and fees. You will have full access to all course content, course activities, including discussions and assessments.

COMMUNITY

NON-CREDIT AND FREE

This course will be available as a MOOC (Massive Open Online Course) for non-credit at no cost. Learn more about the topic and participate in the course without earning OSU credit.

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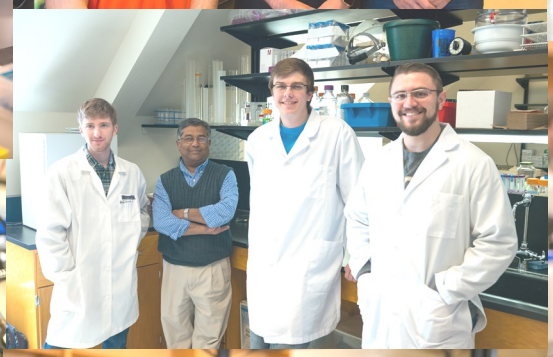
Brewing Microbiology is a course about the science behind the craft beer movement. Videotaped on location in grain fields, malt houses, beer breweries and research laboratories, this course is a labor of love for Professor Tyrrell Conway. Enrollment for OSU credit grew to 190 students this Fall, while another 200 students are taking the Massive Open Online Course (MOOC) for free. Those enrolled in the MOOC include family members of OSU students and brewers from around the world.

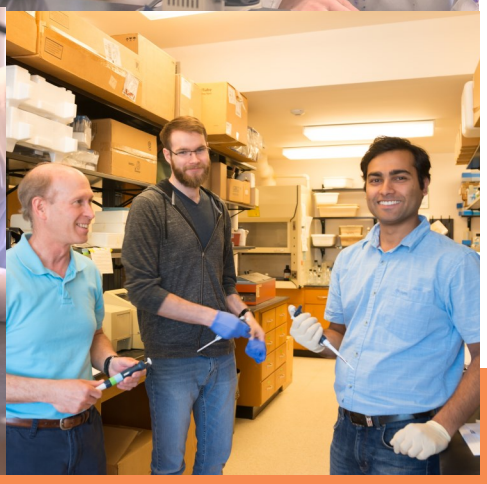
htpps://cas.okstate.edu/brewing-microbiology

Fall 2018 Semester Welcome—Meet & Greet a.k.a. Chunk's Family Reunion

Therapy dogs throw great parties! Chunk partnered with the Undergraduate Ambassadors to welcome students back to campus. Students, Staff, and Faculty brought food in the traditional Oklahoma potluck way. New students were introduced to current students and faculty to help them integrate into OSU and get connected in the microbiology department. We had a great turn out this year and Chunk was given many treats when no one was looking!

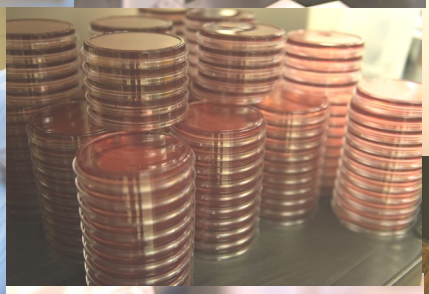
Oh the places you'll go while playing with microbes



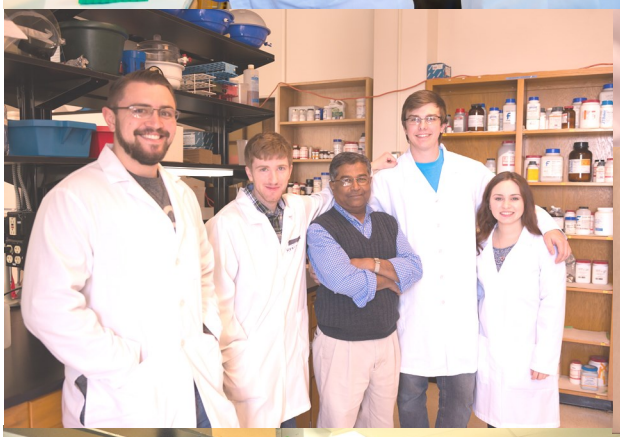












HOT
Bacteria
NOW



2018 Advisor of the Year

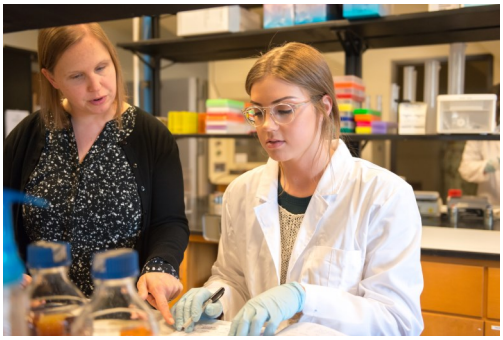
Congratulations to our Department Academic Advisor, **Dana Hatter**, for achieving the "College of Arts and Sciences 2018 Advisor of the Year Award" for her hard work and dedication to her students. According to Amy Martindale, the Assistant Dean for the College of Arts and Sciences, Dana has received more student nominations for this award than any other advisor for the past several years. This year, several students worked together to write one of her letters of support and said, "We can testify that there are many of us who would not even be in college if it hadn't been for Dana. She truly cares for every single one of her students."

Check out this article written by Kevin Sharp to learn more about the ways Dana Hatter has impacted her students. https://cas.okstate.edu/news/1516-cas-advisor-of-the-year-believes-in-students

New Faculty Updates

In the Fall of 2017, our department welcomed two new faculty members, Karen Wozniak and Matthew Cabeen. The Cabeen lab now has 11 undergraduate researchers, including four 2018-19 Wentz Scholars: Nina Baggett, Nicholas Boyne, Adam Bronson, Sid Bush (Wentz), William Colton, Jake Osborne (Wentz), Samantha Shafer (Wentz), Katherine Smith, Julia Terrell (Wentz), Madeline Toews, and Sarah Winburn. Chris Hamm graduated last spring and is now working on his Research Masters with Dr. Cabeen. The Cabeen lab is principally interested in two topics: 1) the features and mechanisms of bacterial stress responses, using *Bacillus subtilis* as a model species, and 2) biofilm formation by the opportunistic human pathogen *Pseudomonas aeruginosa.* Their research uses many different techniques, from bacterial molecular genetics and traditional culture techniques to modern "omics" approaches and advanced microscopy. About half of the research team is working on characterizing genes that affect how *P. aeruginosa* builds biofilms, which are communities of cells encased in a self-produced extracellular matrix. The other half of the team studies the more basic-science problem of how different stress-response patterns affect bacterial cell fitness and survival. Microfluidic technology plays a key role in the lab, allowing long-term observation of individual cells under a light microscope as they grow under precisely controlled conditions for tens or hundreds of generations. The Cabeen lab was proud to take both first (Sarah Winburn and Chris Hamm) and second (Julia Terrell) prizes in the Spring 2018 Microbiology and Molecular Genetics Symposium undergraduate poster competition. This semester, Dr. Cabeen is teaching a newly designed upper-level course on antibiotics and antibiotic resistance.

Karen Wozniak's lab is interested in the interactions of the fungal pathogen *Cryptococcus neoformans* with innate immune cells including dendritic cells and macrophages. Wozniak has one graduate student, Ben Nelson, and four undergraduate students working in her lab: Emma Maritz, Savannah Beakley, Brittney Conn, and Sierra Posey. Wozniak's lab is working on immune therapies to prevent or treat fungal meningitis caused by *Cryptococcus neoformans.* Wozniak works on three main projects: 1) examining the mechanism involved in fungal cell wall degradation by the lysosomal enzyme cathepsin B, 2) examining dendritic cell (DC) factors associated with killing the fungal pathogen *Cryptococcus neoformans* and 3) determining mechanisms that govern macrophage killing vs intracellular growth of fungal pathogens.*Cryptococcus neoformans* is an opportunistic fungal pathogen that primarily affects immune compromised patients, including those with AIDS and those on immune suppressive therapies to prevent organ transplant rejection. The disease begins as a pulmonary infection that eventually spreads to the central nervous system causing meningitis. Current estimates suggest that approximately 275,000 people are infected with this pathogen each year, and approximately 180,000 die each year due to cryptococcal meningitis (Rajasingham et al, *The Lancet*, 2017). The initial interaction with the host begins in the lung, and the innate immune cells of the lung (primarily macrophages and dendritic cells) are the front-line of defense against this pathogen.

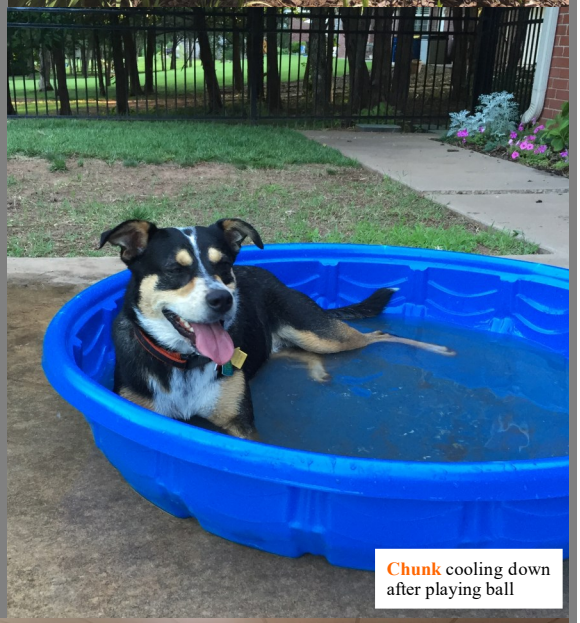


Chunks of Lovin'

Hi, my name is Chunk and I am an eight year old Blue Heeler-mix. I was adopted by the Conway family in September of 2015. I am a member of Pete's Pet Posse, OSU's Pet Therapy Program. I love going to work with my dad, Dr. Tyrrell Conway. I work hard to motivate the microbiology students with my cute face and wagging tail. When they are stressed out with classes or personal things going on, I like to put my head in their lap and give them a big hug to let them know that they will be okay. The first thing I do every time I come to work is greet the staff, faculty, and students in the office and hallway of Life Science East. I like going up to them and smelling their shoes and backpacks. Once I give everyone a good sniffing over, I go see Alice Bules at the front desk. She gives me treats because I am a very good girl. Then I go to the front door of the office and roll around on my back until someone pets me.

I am the four-legged reporter for the Microbiology Department. I like to keep up to date on current events and report on the success of our students achievements. This summer, I helped little microbiologists collect environmental samples during Grand Parent University. I took them to Theta Pond and showed them where to find good samples in the soil and the pond. I did a good job of showing them where to find squirrels and ducks too, but for some reason dad did not want them swabbing the wildlife. In April, I attended the Annual Spring Symposium to support the graduate and undergraduate microbiology students who were presenting posters on their research. Those students sure are smart. While no one did any research on the best way to catch a squirrel or how to chase your tail without getting dizzy, there were some pictures of green bacteria called *Pseudomonas aeruginosa.* I like meeting prospective students on Scholars Day. Every Tuesday and Thursday, I visit the students in first year seminar (A&S 1111) to show them the ropes of campus and prepare them for professional careers. I usually get a lot of back scratches during class. Sometimes I run into Pistol Pete on campus. Most dogs are afraid of him because of his big hat but I am brave enough to let him pet me. I protect my family at home by circling the yard to look for invaders. I am always ready for action, so those squirrels had better watch out.

Chunk posing in front of Old Central

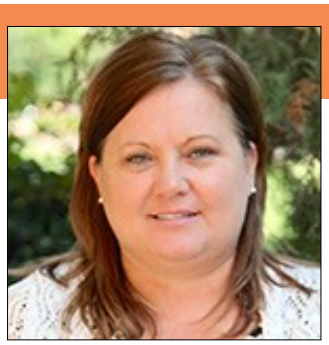


Chunk cooling down after playing ball

Most dogs are afraid of Pistol Pete, but not Chunk.

First year seminar (A&S 1111) students meet Chunk.

From our Advisor,



Each year, we continue to grow as a department. Our students seem to accomplish more and set an excellent example of what OSU has to offer. Rather than my words, I thought I would let a few of them explain why the Microbiology Department is such a great place.

Dana Hatter,
Microbiology Advisor

I had the opportunity to take a microbiology class while in high school and instantly fell in love with it. So naturally, when I found out Microbiology was offered at OSU, I had to make it one of my degrees. I met with Dana to talk and if I hadn't already been sold on adding Micro as my second major she would have easily convinced me. I was amazed at the amount of opportunities that their students had- such as working in research labs with the professors- as well as the friendly atmosphere that the entire department supplies. Every professor actively looks to get engaged with the students, as well as do their best to help the students succeed. I'm so glad to have chosen Microbiology as my second degree and to be surrounded by my new college family that help me to be the best version of me I can be! -Julia Terrell

When I was enrolling for classes my freshman year my major was Psychology, because I wanted to be a genetic counselor and didn't know any better. As soon as I told Dana the path I wanted to take for my education 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. 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

I started off at Oklahoma State as a Sports Media major. Before my first semester of freshman year ended, I felt a pull towards the medical field so I switched to Biochemistry Pre-Med. As soon as I took the Introduction to Microbiology lecture, taught by Dr. Youssef, I immediately switched my major to Microbiology Pre-Med. I knew this was the major for me because I didn't dread going to class, and learning the material came natural because of my huge interest. I'm so dedicated to this science that I started doing environmental microbial research with Dr. Youssef, and I recently was awarded the Niblack Research Scholarship. This major makes me want to say in college forever! -Jenna Borrelli

I chose Microbiology because it really seemed to fit what I was interested in: a science degree full of classes that were fascinating and useful for my future career, which is medicine. I came in freshman year as a Chemical Engineer major, thinking that would set me apart from other med school applicants. However, I realized I wasn't interested in Engineering, and spending four years on that degree would not have been enjoyable for me. After looking into other programs I could switch to, Micro really caught my eye because of the variety of classes offered. They all sound so interesting - it's hard to pare down which ones I want to take each semester! The degree is challenging enough to keep me working hard for my grades, but the material is so applicable and useful that it doesn't feel like work when I'm studying. I love the Microbiology Department! -Morgan Williams

Graduate Coordinator's Report

Our graduate program is growing! Currently, 43 students (24 PhD and 18 MS students) are enrolled in our graduate program, compared to 32 a year ago. Five PhD and 2 MS degrees have been awarded in 2017.

Between August 2017-August 2018, our graduate students were co-authors of six different publications in highly respected peer-reviewed scientific journals such as Cell Reports, Cellular Signaling, and Mycologia. Our graduate students publish, on average, 3.8 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 2.8 scientific presentations per year with 43.3% of these presentations occurring at regional, national, and international meetings.

In Fall 2018, we admitted five Ph.D. students, and a record fourteen new 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

Congratulations to Connie Budd our Teaching Laboratory Coordinator for achieving the 2018 Distinguished Service Award.

"Connie has impacted several thousand students as Director of Undergraduate Microbiology Laboratories. All staff members at OSU impact students in one way or another, many of them indirectly, but in Connie's case her impact is direct, immediate and life changing. Under Connie's supervision, Introduction to Microbiology Lab enrollments have grown from 144 students per semester in 2006 to 312 students per semester in 2017. That's 5,436 undergraduate students she's benefitted."

Dr. Tyrrell Conway
Department Head

Left to right: Provost, Gary Sandefur and Connie Budd



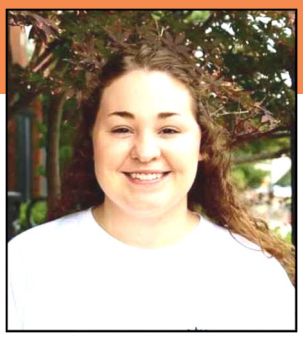
Graduate Student Association President's Report

In reflecting on the previous academic year, one descriptor best summarizes the state of our graduate community-inspired. In completing my second year as president of the Microbiology and Molecular Genetics graduate student association, I found inspiration in the actions of my colleagues. As an organization, we worked overtime hours to enhance our reputation throughout Stillwater (an endeavor with which our graduate students proudly engage). During Homecoming, we sold cold beverages and dispensed knowledge to the community, accented with a raucous water balloon game for local kids. On two different evenings, we hosted organizational fundraisers with the assistance of the kind folks at The Garage. Not only did we offer new polos and sweaters with our logo, we also sold customized pint glasses for the first time. On top of this, we held social events to foster a sense of community with our friends at Iron Monk Brewing Company. Most importantly, we jointly hosted the Student Research Symposium in April with the undergraduate microbiology club. This exciting day gave researchers of all levels an opportunity to showcase their work and celebrate each other's accomplishments. More than fifty students took advantage of this event, and participation was exciting for all department members involved. On the graduate side, first place went to Radwa Hanafy, second place to Anton Avramov, and third place was shared between Nick Kuburich and Biraj Kayastha. Truthfully, all members who participated were winners. On a sadder note, some our treasured colleagues finished their tenures with the department and have transitioned to other opportunities. Ibrahim, Nick, Jie, and Julianna all successfully defended their thesis projects. But while we will miss our friends as they embark on future careers, we celebrate their achievements and look forward to welcoming the incoming graduate students. Finally, I'd like to take a moment to thank my colleagues for the opportunity to serve as president for the past two years. I feel proud of what we've done. Our graduate community has worked diligently together with an unyielding sense of dedication and fellowship. We have mutual admirations for each other, free of judgment or tones of innuendo. I was able to serve with great people, who helped me in different ways. In particular, I want to thank my fellow officers Jorge, Nick, and Michelle for their good work. Becky and Alice deserve immense credit for their often-unheralded labors. Dr. Conway was always available with helpful advice, despite his busy schedule. Finally, Dr. Hoff continues to provide me with guidance, even from his sabbatical across the globe. Although I cannot mention everyone by name, you all have my sincere appreciation. I'm proud to call all of you my friends. Your support and encouragement will sustain me throughout my remaining time with the department. I only hope that I left the state of our organization slightly better than before. Regardless, my heart swells with joy when I look back on my time as president, and I am fiercely confident that the next administration will see us ascend to new heights.

Jon Riggs,
Former GSA President

2018-2019 Officers
Ben Nelson, President
Deepali Luthra, Vice President
Michelle King, Treasurer
Archana Yadav, Secretary

Undergraduate Microbiology Association



This last year has been one of many successes and changes for the Undergraduate Microbiology Association! Last year consisted of many social events like skate nights, pizza parties, and even picnics with the faculty. Aside from social events, we had informational opportunities like AgarArt where students were able to learn and practice streaking and aseptic techniques. One of our favorite events of the semester, the annual poster symposium, had nearly 30 separate projects presented! We have seen growth in numbers over this last year and we expect to see more in this coming year! With these successes, there have also been many changes. This year, we will have two new co-advisors. Dr. Matthew Cabeen will be heading up the social and recruitment activities while Dr. Karen Wosniak will be over our administrative and financial tasks. Finally, with the help and persistence of our previous advisor, Dr. Mariana Patrauchan, and our previous graduate student co-advisor, Michelle King, we were able to apply and be accepted into the national American Society of Microbiology (ASM) as a national chapter. This will offer a wealth of opportunities both financially and socially! This year is bound to have many more successful events and many innovative changes that will continue to grow our presence on campus. The club officers are very excited to welcome our Micro Cowboys, both new and old, back for a great semester at OSU!

Samantha Shafer,
Micro Club President

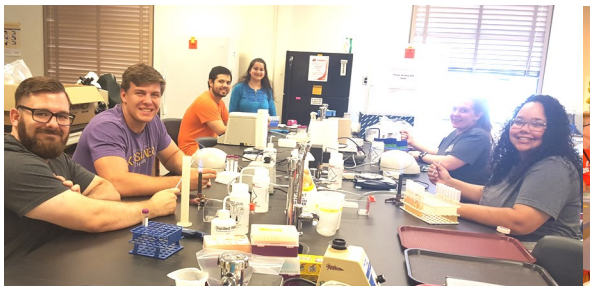
2018-2019 Officers:
President: Samantha Shafer
Vice President: Allison Bates
Secretary: Brooklyn Mossier
Treasurer: Sarah Winburn
Advertisement Chair: Madelyne Sweger
Activities Chair: Alejandra Medellin
Activities Co Chair: Kaylee Mach
Social Media Chair: Savannah Beakley
Social Media Co Chair: Abigail Peters
Outreach Chair: Aubrey Williams

Grandparent University (GPU)

This was the second year that the Microbiology department hosted a major for Grandparent University! Our major is designed to introduce the legacies to bacteria and the world of microbiology. It gave students a broad overview of some common techniques used in the laboratory such as PCR and gel electrophoresis. We started our exploration by collecting samples from the environment, so we could see the types of microorganisms that are present all around us! Next, we discussed the extremely important topic of antibiotic resistance by testing the tolerance of *E. coli* towards increasing concentrations of Kanamycin. Then we had a lot of fun drawing colorful images using bacteria during our agar art portion of the session! Students learned about the widely used technique Polymerase Chain Reaction and amplified short DNA fragments that we ran using gel electrophoresis. All in all we had a blast introducing future cowboys to the Wonderful World of Bacteria!

Michelle King,
GSA Treasurer

Departmental Outreach



Late Night Cafe

Tradition of Pancakes at OSU,

"When I first started at Oklahoma State University I was eager to immerse myself into the customs and traditions at my new academic home. What impressed me was how much campus felt like a home and the efforts that OSU made to help and welcome students on campus. The first time I heard about the Late Night Café, a semester event where pancakes are made and served by volunteers to thousands of students each night of final exams week, I knew I had to get involved! Each semester I volunteer to make and serve pancakes for thousands of students. We show up a bit before 9 p.m. to set up and start making pancakes. Music starts, OSU TV comes by to film or take pictures and in no time at all a line of students forms in anticipation of getting the first set of pancakes. The line is long, spanning far out of sight inside the Student Union. Then my favorite part of the evening starts. We start serving pancakes and I see the faces of thousands of students walk by! Many students are stressed about upcoming exams and tired from a lack of sleep, but what stands out is that they are all excited about free pancakes and a break from studying. I enjoy watching for students I know and asking them how their exams and studying are going. I also enjoy seeing students recognize other professors, staff and even deans in the pancake flipping crew and the interactions that result. The evening goes by quickly and eventually the line slows down and the rush of students going by turns into a trickle. A few hours after it starts, Late Night Café ends and we do our final clean up before heading home tired, exhausted, covered in pancake batter and ready to do it all over again the next semester!"

Dr. Erika Lutter

Women in Science

Women in Science is an annual event hosted by EPSCOR and geared to encouraging young women from across the state of Oklahoma to join STEM fields. This year was the 3rd year that the Microbiology hosted a booth at this event. This year the booth was run by an amazing group of passionate undergraduate students. We aim to show young women the variety of organisms that microbiologists work with by bringing microscopes with a variety of slides. In order to discuss complex topics such as molecular biology and motility we made pipe cleaner DNA strands and bacteria. We highlight different professions a microbiology degree can prepare you for like dentistry or the medical field.

Michelle King,
GSA Treasurer

Undergraduate Ambassadors

Our Microbiology and Molecular Genetics Ambassador Team are students in our department that are involved in various activities on campus and in the community. The members of this team are mentors for the students on our campus. They visit the Introductory to Microbiology course to meet with freshmen and sophomores to introduce them to the world of Microbiology and help them transition into college and our department. They also volunteer to assist with various projects in our department, and help set up, prepare, and clean up for events. This past spring one of our ambassadors, Allison Bates, wrote a song inspired by the Pathogenic Microbiology course that our department offers. She performed it at our Annual Spring Awards Banquet. Here are the lyrics:

This was on my Pathogens exam
I hope I aced it
We learned about Bordetella strains,
like *B. pertussis*
It causes whooping cough
Its reservoir are humans,
I hope you're vaccinated
Cause its highly infectious

I streaked a pathogen and I like it,
It was a gram negative cocco-baccilus
I streaked a pathogen just to try it
hope its strain is attenuated
It felt so wrong, it felt so right
Don't mean there's a pandemic tonight
I streaked a pathogen and I liked it
I liked it

Treponema, Borellia, and Leptospira
Are spirochete bacteria
They look like strange work things
With a weird flagella
And guess what, *T. Pallidum*
Will give you syphilis
We also talked about Chlamydia
But lets not get into it.

I streaked a pathogen and I like it
It was *Borellia burgdorferi*
I streaked a pathogen just to try it
Hope its train is attenuated
It felt so wrong, it felt so right
Don't mean I have Lyme disease tonight
I streaked a pathogen and I liked it
But now I hate ticks

Us student we are so paranoid
Most foods are colonized by pathogens
Not to mention antibiotic resistance
Their too good to ignore it
Ain't no big deal if you have an immune system

I streaked a pathogen and I liked it
It was antibiotic resistant
I streaked a pathogen just to try it
Hope its strain is attenuated
It felt so wrong, it felt so right
Don't mean im not paranoid tonight
I streaked a pathogen and I like it
No I loved it

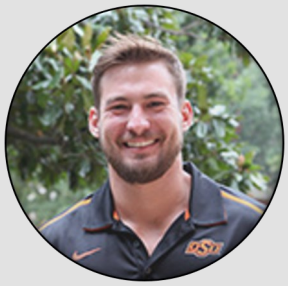
Allison Bates
Micro Club Vice President


2018 Ambassadors


Ambassadors Cody Driscoll and Aubrey Williams greeting new students


Allison Bates singing at the Awards Banquet

Graduate Student Awards 2017-2018



Jorge Lightfoot (Advisor Dr. Prade)

-Edward A. and Mary M. Grula Award

Michelle King (Advisor Dr. Patrauchan)

-ASM National Meeting Travel Award, 2018

-Women Faculty Council Research Award, 2018

- Cox Research Fellowship 2018

Prakash Sah (Advisor Dr. Lutter)

-Norman Durham Fellowship

-Otto S. Cox Graduate Fellowship for Genetics Research

Justin Bowen (Advisor Dr. Conway)

-1st Place poster ASM Regional Meeting

Nick Kuburich (Advisor Dr. Hadwiger)

-1st Place: Missouri Valley ASM, Cell and General Microbiology Category, 2018

Juliana Artier (Advisor Dr. Burnap)

-Best Talk Award, 43rd Annual Midwest/Southeast Photosynthesis Conference, 2017

-Travel Fellowship, Gordon Research Conference-Photosynthesis, 2017

-OSU Graduate College Summer Dissertation Fellowship, Summer 2017

Undergraduate Student Awards 2017-2018

Adam Bronson
Ray and Helen Freeman Scholarship

Brandon Couch
Embde-Phillips Endowed Scholarship

Alexis Davis
OK-LSAMP STEM Scholar

Caroline Graham
Outstanding Undergrad Researcher (Sliver), Niblack Research Scholarship
3rd place Undergraduate 3MT Contest

Natalie Heigle
Kidd-Ferrell-Conway Scholarship

Sarah Soliman
Nancy Charlene Malkenhorst Scholarship

Sergio Mares
OK-LSAMP STEM Scholar, HMMI Freshmen Scholar, Nancy Charlene Malkenhorst Scholarship

Samantha Shafer
Janet Farhood Scholarship

Jenna Borrelli
Niblack Research Scholarship

Brittney Conn
Joan Marie Tippeconnie Scholarship

Savannah Martin
Lew Wentz Research Scholarship

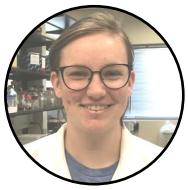
Kayla Kifer
Anne Clark McHale Scholarship

Rachel Martin
Dan Wesley Award for Outstanding Junior

Thomas Cox
One of the 2 OSU Nominee for the Udall Scholarship

Michele Palmer
Anne Clark McHale Scholarship

Kate Smith
Competitive Indian Health Scholarship



Katie Mueller
Niblack Research Scholarship

Julia Terrell
2nd Place Poster presentation Department of Microbiology and Molecular Genetics Annual Symposium

Brynn Danilowicz
George and Mary Lou Gries Scholarship

Emily Gietzen
Women's Faculty Council Research Award, OSU nominee for Research Day at the Capital, OSU Goldwater Nominee, Niblack Research Scholarship, Lew Wentz Scholarships (2017, 2018)

Mandy Truelock
Internship Award for Texas A&M Biochemistry REU Program, Vanderbilt Internship for the Cellular and Molecular Biology Department

Leah Kafer
2nd place Oral presentation ASM Missouri Valley Branch, Baylor College of Medicine SMART Program Internship,3rd Place Poster presentation Department of Microbiology and Molecular Genetics Annual Symposium

Kaylea Bixler
1st place & People's Choice, 3MT Undergraduate Competition, Ray and Helen Freemen Scholarship, Lew Wentz Research Scholarship, Freshman Research Scholar

Chris Hamm/Sarah Winburn
1st Place Poster presentation Department of Microbiology and Molecular Genetics Annual Symposium

New Faculty Grants

Dr. Robert Burnap was awarded a grant from the National Science Foundation entitled, "Assembly and Function of the Photosystem II (PSII) Complex." Photosystem II (PSII) produces the vast majority of reductant used to fix inorganic carbon into the earth's biosphere. At the same time, O_2, the by-product of the H_2O-oxidation reaction catalyzed by PSII, has rendered respiration by the earth's heterotrophs possible. PSII, therefore, is of critical importance from both agricultural and ecological perspectives. An integral part of his project is the funding and mentoring of Oklahoma High School teachers in collaboration with Prof. Julie Angle in the College of Education. This program integrates with the NSF pure research component of the project and provides five-week summer programs to gain authentic research experience to the teachers and help them develop innovative curricula for their students.

Dr. Burnap also received a grant from the US Department of Energy, Energy Biosciences Division entitled, "Structure, Function, and Regulation of the NDH-1 Complexes in Cyanobacteria." Photosynthetic organisms have specialized mechanisms to extract CO_2 from the atmosphere and concentrate it in the cellular environment of the major carbon fixing enzyme, RubisCO, which has a notoriously poor affinity for CO_2. Understanding these mechanisms is critical for optimizing bioenergy production and will be important for the design of biomimetic devices capable of performing artificial photosynthesis and for the development of the next generation CO_2 scrubbing materials. The natural mechanism thus provides a basic scientific template for the development of engineered devices addressing critical national energy goals.

Dr. Babu Fathepure was awarded a grant from OCAST entitled, "Pretreatment of switchgrass by fungi-bacteria co-culture for effective saccharification and butanol production." Plant biomass is abundant and considered an attractive source of bioenergy and biobased chemicals. The plant biomass is mainly composed of cellulose, hemicelluloses, and lignin. Of these, lignin is the most recalcitrant polymer forming a major obstacle for efficient hydrolysis of plant polysaccharides by bacteria/enzymes into sugars for further fermentation into biofuel. This project explores synergistic interaction of fungi and bacteria for efficient degradation plant lignin.

Dr. Marianna Patrauchan was awarded a grant from the NIH COBRE Phase II grant entitled, "Two pathways for calcium signaling and virulence regulation in *P. aeruginosa.*" Patrauchan aims to study two different routes of calcium signal transduction and their regulatory role of virulence and resistance of a human pathogen, *Pseudomonas aeruginosa,* in response to calcium in a host. We will characterize two proteins EfhP and CarP, mediating these pathways, their calcium-dependent functions and roles in *P. aeruginosa* interactions with a host and development of acute and chronic infections.

Dr. Edward Shaw and **Dr. Erika Lutter** received a grant from Oklahoma State University Office of the Vice President for Research, Swinging for the Fences entitled "Establishing the Feasibility of Two Novel Approaches Towards a Q Fever Vaccine." *Coxiella burnetii* is a bacterial pathogen that only grows inside of higher order (eukaryotic) cells in nature and is the causative agent of Q fever, a debilitating acute disease characterized by headache, fever, photophobia, and pneumonia in some cases. The disease also manifests in chronic forms in some exposed individuals and is associated with heart valve damage and hepatitis. Development of a vaccine against this organism that can be used in all people has been difficult. We are pursuing two concepts to approach this problem: 1) To generate a live-attenuated strain of the bacteria that does not cause disease, but can generate a strong immune response; and 2) demonstrate and isolate vesicles from the bacteria's outer membrane which can be used to vaccinate without causing an infection. Both of these approaches have been used in other bacteria, and we hope they give us the tools to develop a vaccine to prevent Q Fever. Dr Ed Shaw and Dr. Erika Lutter are collaborating on this research.

DEPARTMENT OF
Microbiology & Molecular Genetics

Oklahoma State University

307 Life Sciences East

Stillwater, OK 74078-5032

America's Brightest **ORANGE**




Our alumni and friends have the unique opportunity to partner with us in the important work we are doing in Microbiology & Molecular Genetics. As one of the region's best Microbiology programs, we impact the world through our students and our research.

Gifts to the Department of Microbiology & Molecular Genetics help make the OSU experience more affordable and more enriching for our students.

As a donor to the Department, you will make a world of difference for students who, in turn, make a difference in the world.

MAKE A DIFFERENCE WITH A GIFT TODAY!

BRANDING SUCCESS
THE CAMPAIGN FOR OKLAHOMA STATE UNIVERSITY.

To make a gift online today, visit us at
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