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From the Department Head

Michael Lynes
Professor and Head

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We are also moving in new research directions with the addition of four new faculty members this year. Professor Sarah Hird’s research centers on the evolution of host-associated microbiomes, particularly the gut microbiomes of wild birds. Professor Noah Reis uses functional genomics to evaluate and predict biological responses to marine pollution at short and evolutionary timescales. Professor Aoi Heaslip examines the biology of the human pathogen Toxoplasma gondii, especially its protein excretion mechanisms used to enhance survival in its host. You will find interviews with Professors Hird and Heaslip in this issue. Professor Simon White’s lab uses cryo-electron microscopy (the subject of the most recently awarded Nobel Prize in Chemistry) to explore the mechanism of assembly of picornaviruses such as polio. He joined us this August from the University of Leeds and his work will be featured in a future issue. We welcome these new members of the MCB faculty and look forward to telling you about the exciting research they bring to MCB.

Also in this issue we report on the latest projects undertaken by our graduate students through their new organization GO:MCB. Sarah McNulty, a Microbiology PhD student, created an outreach program for schools that went instantly international. Read about her Skype A Scientist program here.

Other articles about our faculty’s research include Prof. Eric May’s supercomputer-driven modeling of viral protein transformations, Prof. Jonathan Klassen’s search for new pharmaceuticals from fungal gardens tended by ants, and Prof. Rachel O’Neill study of complex chromosome evolution among gibbons.

In faculty news, it is with a mixture of sadness and pleasure that we celebrated the retirement of Prof. Arlene Albert and we wish her well in her new post-academic life. We congratulate Prof. David Benson who was named a Fellow of the American Association for the Advancement of Science in November.

The AAAS grants Fellow status based on scientifically or socially distinguished efforts to advance science or its applications. The world’s largest general scientific society, AAAS publishes the journal Science and several other scientific publications, and aims to advance science and serve society through initiatives in science policy, international programs, science education, and public engagement.

David Benson’s research and teaching expertise are in the broad areas of bacterial molecular genetics, and microbial physiology and ecology. He is particularly interested in genomic and biochemical characteristics that align with the distribution of microorganisms in environments.

Much of his work focuses on nitrogen-fixing plant symbioses, cheese ripening microbiology, and tick-borne diseases. His recent work has used genetic and protein sequence analysis to study microbe-plant interactions. His work has been funded by the National Science Foundation, the U.S. Department of Agriculture, and for disseminating his scientific discoveries in a manner that is well received.

Benson was honored for highly-regarded leadership in understanding actinomycete-induced symbiotic nitrogen fixation and for disseminating his scientific discoveries in a manner that was well received.

Benson is a Fellow of the American Academy of Microbiology, and served as a Jefferson Science Fellow at the U.S. Department of State from 2012-2013, advising on issues related to microbiology, including biological warfare.

The recipients received their awards at the February 2017 AAAS Meeting in Boston.

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David Benson Named AAAS Fellow

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PSM photos, Elaine Mirkin; UConn photo, Sean Flynn, Christine Buckley (CLAS), Kim Krieger (UConn Communications), Elaina Hancock (UConn Today), Colin Poitras (UConn Communications), Reid Direnzo (UConn Communications), Elaine Mirkin, UConn photo, Sean Flynn, Peter Morenus, Kasia Thomas, and Kim Krieger.

ON THE COVER: The new Engineering and Science Building, was nearly completed in summer 2016. MCB faculty in the Institute of Systems Genomics previously in Beach Hall moved onto one of the floors of the new building this summer. The five-story building incorporates an open lab design. The School of Engineering occupies three of the five floors. The second and third floors will house the Institute for Systems Genomics and related programs.

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Searching for tools to stem parasite’s mind control

The lytic cycle of Toxoplasma gondii begins with parasite host cell invasion (1). Once inside, parasites replicate inside a specialized vacuole (2). At the end of replication cycle, when host cell nutrients are depleted because the parasite egress from the host cell and disseminate to reinfect a new cell (3).

Like something out of a bad sci-fi movie, single-celled Toxoplasma gondii can manipulate the behavioral neurons of rats to make them less averse to cat urine. Consequently the rats do not avoid cat habitats and are more likely to join them for lunch. That is, as lunch. This “manipulation hypothesis” has been proposed to account for various human behaviors, but those data are at best correlative. Why would a microbe evolve to cause this? Though T. gondii can infect virtually all mammals, cats are the only known host in which it can sexually reproduce, so increasing its chances to be consumed by cats has obvious selective advantages. It can, however, reproduce asexually in many mammal and bird hosts, including humans. Humans usually do not show symptoms during T. gondii infection, but those with compromised immune systems can suffer from sometimes fatal infections.

MCB Professor Aofe Heaslip studies how T. gondii cells make themselves at home once they enter the cells of their host. “They spend the vast majority of their time inside a host cell,” Heaslip said. The host cell encloses T. gondii cells inside structures called vacuoles. Inside the vacuoles T. gondii cells undergo asexual reproduction so T. gondii cells need to stabilize the otherwise unstable vacuole. To do so, T. gondii cells insert some of their own proteins into the walls of the vacuoles. These proteins are released from secretory vesicles called dense granules that are inside T. gondii cells. We do not know how the proteins are released from these granules, and since vacuole stabilization is an important step in the T. gondii infection process, Heaslip has set out to study this process.

To release proteins outside the T. gondii cells from inside the dense granules, the granules have to first make their way to the inner surface of T. gondii cells’ membrane. Organelles and granules are moved around inside cells by complex trafficking protein structures that include molecular motors (called myosins) and tracks (called actins). At least that’s what should happen. “There is still a controversy in the field about the ability of Toxoplasma actin to form filaments,” Heaslip explained.

In contrast to the actin from other species, when T. gondii actin proteins are studied outside of cells, they do not form filaments. It does not bind the typical reagents used to visualize it in cells and it is difficult to microinject these reagents into Toxoplasma cells when they are inside host cells. Consequently the activity of this actin inside Toxoplasma cells is difficult to study. The amino acid sequence of this actin protein is also unlike that of other actins.

In her published work, Heaslip labeled the granules with fluorescent dyes so she could observe their movements in living cells. Then she made mutations in those cells to find out which proteins drive the motions of the dense granule vesicles. In her current work, Heaslip intends to continue making mutations of Toxoplasma cells to find out which other genes control the movement process. “We try to look at the process itself,” she said. In her mutants, she will release the vesicles before they are transported. Is the parasite replicating correctly? Are the parasites able to egress? Are the parasites able to reinvade? Finding mutants with defects in any of these parts of the process will provide clues as to the mechanism underlying vesicle movement in cells and the function of dense granule proteins once released from the parasite. The mutants will show what aspect of the cycle of invasion, growth and egress is actually being perturbed in the absence of any given protein.

There are plenty of targets for her mutagenesis strategy. Toxoplasma has one actin and 11 myosin motor genes and she recently discovered that one of these 11 myosins (named Myosin F) is needed for granule transport. The function of myosin motor is of great interest to her.

She has also discovered that Myosin F is used to distribute intracellular organelles inside a dividing T. gondii cell to each of the new cells. The Heaslip Lab is now asking how does Myosin F know which function to carry out and at what time during Toxoplasma’s stay in the host cell? “We have no idea how this motor is associated with these organelles and how it is getting regulated throughout the cell cycle,” Heaslip said. One part of her lab will work on this while the other will do the work on actin.

Dense granule movements are critically important to the life cycle of Toxoplasma cells. Given the likelihood that Toxoplasma infections will be found to be responsible for other, subtle effects on hosts’ behaviors, it is important to understand details like granule movement so that effective medications can be discovered to ward off such infections.

Two MCB projects awarded University funding

The University called for proposals for the third year in its Academic Plan Investment program. Submissions were for individual and group investigator projects as well as purchase of large equipment. Ten proposals were selected for a total award of $2.5 million. The selected projects will support the growth in research & scholarship, undergraduate education, graduate education, teaching effectiveness and public engagement.

Professors Joerg Graf, Nichole Broderick, and J. Peter Gogarten will administer “The UConn Microbiome Initiative.” The new program sets out to elevate microbiome research and training to build up the nationally recognized strength of this area at UConn. They will develop workshops for undergraduates, host an annual symposium and recruit talented graduate students. The funding will enable UConn to compete nationally for training grants in this area.

Professor James Cole was awarded funds to purchase analytical ultracentrifugation equipment as part of a “Next Generation Analytical Ultracentrifuge at UConn STORrs” program. The award recognized that UConn has been a leading center for analytical ultracentrifugation research and training since the 1960s. The multivavelength analytical ultracentrifuge to be purchased with the awarded funds will enable rapid data collection at multiple detection wavelengths and greatly increase the scope and power of this technology to analyze complex materials. This capability will have broad impact on fundamental studies underway at UCONN in molecular biology, pharmaceutical research and material science. Additionally, the instrument will enhance teaching basic biophysical concepts and train undergraduate and graduate students in state-of-the-art molecular analyses.

Two intracellular T. gondii mother parasite cells (two larger, elongated cells outlined in green) each contain two daughter parasites (smaller green cells) that will grow and destroy the mother cell. The protein contents of the dense granules (pink) are secreted after host cell invasion. The host cell is not visible.

Prof. May given access to world’s fastest supercomputer

Professor Eric May and his postdoctoral research assistant Dr. Shivangi Nangia received an allocation on the Anton2 supercomputer donated to the Pittsburgh Supercomputing Center by D.E. Shaw Research. The allocation was granted based upon an application peer reviewed by a panel convened by the National Research Council. The allocation will allow them to perform biomolecular simulations of viral protein-membrane interactions over timescales which are not feasible in standard supercomputing environments.

Prof. Malone selected as member of the Global Young Academy

Professor John Malone was selected to become a member of the Global Young Academy. The Academy provides a voice for young scientists around the world and an environment for young scientists to work together on topics of global importance. It is composed of 200 members representing 50 countries. Members are selected for their record of science and commitment to service and serve 5-year terms.
UConn Scientists Develop New Antibody for Bowel Disease

UConn molecular and cell biologist Michael Lynes and an international team of researchers have developed a novel antibody designed to prevent the patient’s immune system from attacking its own body. Lynes is shown here with lab manager Clare Melchiorre. (Taylor Hudak ‘18 (CLAS, ED)/UConn Photo)

Existing antibody treatments for IBD are ineffective in some IBD patients and pose a risk to the normal functioning of the immune system.

The new antibody, co-invented by the UConn researchers together with a team from Ghent University in Belgium, is designed to prevent the patient’s immune system from attacking its own body and potentially causing irreversible damage.

More than 1.6 million Americans have IBD. Two of the most common forms of IBD are Crohn’s disease and ulcerative colitis, chronic but treatable conditions that affect children and adults. One in 10 people with IBD are under 18, according to the Crohn’s & Colitis Foundation.

More than a decade ago, Lynes, professor and head of the Department of Molecular and Cell Biology at UConn, and his research team discovered a novel and important role that a protein called metallothionein (MT) plays in influencing the body’s immune function. The body produces MT when cells are under stress, and extended periods of stress cause MT to be released from the cells that produced it, Lynes says. MT is an unusual protein that holds onto chemicals in the body — both those that are beneficial, such as zinc and copper, and those that are harmful — such as cadmium and mercury.

While studying MT, Lynes and his research team noticed that MT released from cells could mimic some of the signals that the immune system uses as cues to tell cells to go to one place or another in the body. Under normal circumstances, immune cells use these signals to guide them to local infections or other tissue damage. When cells are stressed over prolonged periods, this can mean that there is persistent inflammation accompanied by damage to nearby healthy tissue. About 30 million people, or 20 percent of the U.S. population, suffer from some form of autoimmune disease or chronic inflammation, according to the American Autoimmune Related Diseases Association. More than 80 autoimmune diseases have been identified, and autoimmune diseases are becoming increasingly prevalent, for reasons unknown, according to the National Institute of Environmental Health Sciences.

A team of Belgium doctors and scientists studying IBD had published a paper saying that their sickest patients were those whose bodies produced the most MT. The MT protein, which serves as a normal part of the cell’s internal machinery inside the cell, was getting outside the cell and causing damage: That paper by Dr. Martine DeVos, Dries Laquenke, and Lindsay Devischer led to a collaboration with Lynes.

Since the protein serves an essential purpose, researchers can’t shut it off altogether, so they had to find a way to stop MT from prolonging inflammation and damaging healthy cells. Lynes and his team produced an antibody protein that basically attaches itself to MT when it is outside the cell and inactivates it — preventing the body from attacking its intestinal system. This approach dramatically reduced IBD in mouse models of the human disease.

“Just like we have created a partner for MT that binds it and hugs it and won’t let it go,” Lynes says.

The UConn team has been testing this treatment on mice, and is working on creating a form of the antibody that their collaborators can test in humans.

Since one form of stress on cells comes from environmental triggers, Lynes and his team have received funding support from the National Institute of Environmental Health Sciences. He and his team have also received funding from UConn and from the state’s quasi-public investment agency, Connecticut Innovations, to commercialize the anti-MT therapeutic. This includes $50,000 from UConn’s SPARK Technology Commercialization Fund, and $500,000 from the Connecticut Bioscience Innovation Fund managed by Connecticut Innovations. He has also worked with the External Advisory Board and received funding for the project from Yale University’s Program in Innovative Therapeutics for Connecticut’s Health (PITCH).

“This is a prime example of cutting-edge research from a UConn lab being translated into a potentially life-changing treatment for patients,” says Jeff Seemann, vice president for research at UConn and UConn Health. “The exciting research being conducted by internationally recognized faculty at UConn is not only important for the scientific community, but also for our citizens and our state’s economy.”

Lynes’ research is significant, because while there is a great deal of research being done to try to keep autoimmune diseases at bay, his work seeks to learn more about the causes. Autoimmune diseases are increasing in both industrialized and developing countries, so his work has strong public health and commercial potential.

Meanwhile, Lynes is also working with Ciencia Inc., an East Hartford-based biotech company, to develop a test that could measure 1,000 different kinds of molecules in a drop of blood to find patterns of molecular biomarkers that can serve as red flags for the early onset of autoimmune disease.

“We are excited about the opportunity presented by Dr. Lynes’ innovative work,” says Arturo Pilar, president of Ciencia. “UConn has been a great partner, and university support for this effort has been critical to the substantial progress made to develop a commercial product.”

Sadikshya Bhandari, a Ph.D. student in molecular and cell biology, is reconstituting a chemoattractant to set up a chemotaxis experiment. (Taylor Hudak ‘18 (CLAS, ED)/UConn Photo)
Shape-shifting viral proteins gain entrance to host cells

Viruses need to enter cells to reproduce. Viruses enclosed within membrane envelopes often simply fuse their membranes with those of the host cell releasing the virus particle into the host cell cytoplasm. Viruses that lack an enclosing membrane envelope have an enclosing shell called a capsid. These viruses are engulfed by host cells, as though they were a food particle. They are then enclosed in a vesicle called an endosome where the host introduces enzymes and acids in an effort to break down the virus. These conditions cause the virus to change the shapes of its capsid proteins, exposing a portion of each protein, a peptide, that allows it to attach to the vesicle membrane and move the virus particle across the membrane into the host cell's cytoplasm.

Since these non-envelope viruses cause diseases such as common cold, polo, and hepatitis, it is important to understand how they gain access to our cells so we can discover ways to prevent this. Professor Eric May was recently awarded a 5-year, $1.8 million NIH grant to examine the molecular rearrangements of the capsid protein that drive viral transport across membranes. He primarily uses sophisticated computer models to simulate the motions of these proteins to dissect the transport process. He is also collaborating with MCB Professor Nathan Alder on a project to perform laboratory manipulations of capsid proteins to confirm and inform the computational studies.

Though we know the basic role of the capsid proteins in releasing viruses into the host cell, we do not understand the details. “The peptide is sequestered on the inside of the capsid shell until the virus gets in an endosome where they get in an acidic environment,” May explained. “Then these peptides go from inside the capsid to the outside of the capsid where they can interact with and disrupt membranes.” It is from here that the questions begin. “How do these peptides bind to membranes and form pores in membranes?” May asked. He also wants to know how does a virus “knows” it is in an endosome environment and how it responds by reshaping its capsid proteins.

Forcing a peptide from inside the capsid to the outside involves the expense of a lot of molecular energy. Presumably this involves changing the charge, or protonation state, of its amino acids as it is exposed to acidic conditions. “Our idea is that we can generate these externalization events and we can calculate the energy of that and we can model the changes in protonation state,” May said.

To do so requires a great deal of computational power. “It’s a more challenging problem because we’re dealing with many proteins there so the computational cost is much higher,” May said. His computer work is done on supercomputers available at UConn and at national NSF-supported supercomputer centers. There is also a special purpose supercomputer, designed by D. E. Shaw Research, designed specifically for molecular simulations that he applies to use. These resources allow his research group to model the atomic movements of proteins on nanosecond timescales, compared to nanosecond timescales typically achievable on stand-alone workstations.

These peptides come together, or aggregate, to create a form likely necessary to pierce the membrane. The peptides may bind to the membrane and then transition to their embedded position. May has been able to see multiple peptides come together to form a channel through the membrane. Alternatively, the peptides may aggregate inside the capsid and only a part of the peptide gets externalized. “Aggregation might be a key consideration,” May said.

May was among the first early stage investigators to be awarded in the newly created NIH Maximizing Investigators’ Research Award (MIRA) program. MIRA awards are meant to provide highly talented and promising investigators with greater stability and flexibility, to enhance scientific productivity and the chances for important breakthroughs. The award allowed May to propose more than one research effort, thus allowing him to pursue areas of investigation that alone might not have been sufficiently developed to be competitive.

A second area of work he will pursue under MIRA funding is an examination of the mechanisms of recognition of viral RNA by a nucleoprotein, a protein that coats the RNA inside the virus. He will study these mechanisms in the Lassa virus that causes hemorrhagic fevers in infected individuals and has high mortality rates. This nucleoprotein is essential for viral replication inside host cells.

The nuclear structure of the virus’ RNA and RNA binding by the nucleoprotein is not understood. The nucleoprotein forms a ring structure of 3 proteins that open up to bind RNA. Its group has not yet computationally solved the structure of the protein bound to RNA. He wants to know how the ring structure opens and binds RNA. Computer simulation is difficult and he has so far observed the protein conformational change, but needs more analyses to support this. He is planning to work with MCB Professor Jim Cole to see if RNA fragments with different nucleic acid sequences can disrupt the trimer state in the laboratory. Perhaps it is not sequence but RNA structure that allows nucleoprotein binding. May expects to find out through this combination of computer and laboratory investigations.

May hopes that both of these research areas can lead to novel antiviral strategies targeted against their respective viral agents. This new NIH funding mechanism gives him more freedom to shift his laboratory’s research direction as new results dictate.

by Kenneth Hour

On the Cover


Prof. Spurling receives Outstanding Faculty Award

Professor Colleen Spurling was awarded the Kappa Alpha Theta Outstanding Faculty Award in recognition of her passion to inspire students and for actions connected to the organization’s aspirations to intellectual curiosity, leadership potential, commitment to service, and personal excellence. “Our chapter sees Dr. Spurling as the epitome of a leading woman,” said members of the Gamma Zeta Chapter. “A leading woman encourages others to move forward, while also ensuring that those who fall behind are not forgotten. Theta aspires to see women reach their full potential, no matter where they come from. Dr. Spurling supports the victories of successful students, but gives ample attention and opportunities to those who struggle. She brings out the best in herself in order to bring out the best in those around her.”

Microbiology PhD students Sarah McNulty and Allison Kerwin, (both in the Nyholm lab) who won the Best Poster Award at the 2017 Gordon Research Conference on Animal-Microbe Symbiosis.
Microbes of the feathered work together

Increasingly the human microbiome is in the news. We hear that a body’s microbiome, all the microbes both in and on a living body, might affect our weight, play a role in health aging, and affect our immune responses. All plants and animals have microorganisms, too, and while much research has been directed to the medical and agricultural aspects of microbiome functions, much less has been done to understand how microorganisms shape life in the natural world. Newly arrived MCB Assistant Professor Sarah Hird seeks to address a part of this gap in our knowledge as she launches her research program to examine how a host’s microbiome affects the evolution of the host and how the host affects the evolution of its microbiome.

Hird’s background studying animal and bird diversification provides her with a unique perspective on studies of microbiome functions. Questions basic to studies of animal evolution have not been asked about microbial evolution. Hird wants to ask such questions. “What contribution does each specific bacterial group (phyla) in the guts of 59 species of birds. She used sophisticated statistical and bioinformatic tests of these data to determine which taxonomic and ecological properties of these birds had the largest influence on the distributions of those bacterial phyla in their guts. She wanted to “see whether all the microbiomes from a specific species (of bird) look most similar or do the microbiomes of birds collected at one specific place look more similar.” She also examined whether diet, foraging strategy, age and other characters had an effect on the microbiomes’ composition.

“The short answer was that bird species and the higher taxonomic orders like a bird order,” make their microbiome communities look most similar, according to Hird. However, at least in this study, “ecology of the bird also matters to structuring these communities. Geographic space does not seem to matter,” she says. “Diet seems to be important for structuring gut communities.” Hird says. “In birds, the effect of diet seems to be less than it is in mammals, perhaps because they don’t tend to restrict their diets to plant- or animal-based foods. Birds have lots of overlapping dietary components. Some eat seeds as well as insects, even hummingbirds eat some bugs to add more protein to their diet. Hird is looking to bring some of her research closer to home, to examine microbiomes in wild birds in Connecticut. There are potential practical applications for her work, too. The avian flu virus, for example, is common among wild ducks, but does not cause major disease in ducks, as it can in humans. The virus’ presence, however, correlates with a different bacterial microbiome from that of uninfected ducks, for unknown reasons. It could be that ducks Your body’s immune system stands guard against infectious invaders, but sometimes it fails to work in your body’s best interests. If you receive an organ transplant, your immune system will fight this foreign tissue. If your own cells become cancerous, your immune system may fail to adequately recognize and kill those cells. Chemicals have long been used to treat these conditions, but in recent years, successful treatments have been conducted by reducing or enhancing the function of the patient’s immune system, so that their bodies can better participate in its treatment. by Kenneth Noll, from MCB Notes

Charles Darwin came alive

Charles Darwin has been visiting Connecticut schools and making presentations on the UConn campus in the last year. Professor Kenneth Noll has taken to portraying Mr. Darwin in association with the Connecticut State Museum of Natural History. He has twice appeared as Mr. Darwin at state-wide BioBlitz programs. He has also started a regular series of presentations in the Biology Physics Building entitled “Morning Tea with Mr. Darwin.” The first was about Darwin’s voyage on the Beagle and the second about his family life. The third presentation will take place October 28 at 10 AM and is entitled “Morning Tea with Mr. Darwin: Big Man on Campus” and will concern Darwin’s years as a student. Future presentations will concern Darwin and religion, the development of his theory of natural selection and the social and cultural movements of his time and the effect of his work on those. Prof. Noll will also portray Darwin at the College of Liberal Arts and Science’s Science Salon for children this fall and a celebration of Darwin’s birthday February 12 as the state of Connecticut declares that date Darwin Day.

Biochemistry PhD students receive Beckman Coulter Award

Stephen Hessler and Tyler Daman were awarded Beckman Coulter Awards that enabled them to attend the prestigious Advanced Analytical Ultracentrifugation Workshop and Symposium in Danbury, CT on October 16-19, 2016. The AAUC workshop is a leading scientific event for promoting training, collaboration, and innovation in the field of protein interaction science and technology. The work of both candidates demonstrate the great potential for using analytical ultracentrifugation in their future research careers. Hessler is a PhD student in the lab of Prof. James Cole. His research examines the mechanism of activation of PKR, an important protein involved in the innate immune response and the body’s response to viral infection. Daman is a PhD student in the lab of Prof. Victoria Robinson investigating the intrinsically disordered features of Drosohila Nucleostemin using small-angle X-ray scattering and analytical ultracentrifugation.
Pharmaceuticals from an Ant’s Garden?

You do a lot of work in your garden. Prepare the soil, plant the seeds, fertilize, water, weed, fight off the animals that want to harvest your crops… The work never ends. Your plants do hard work, too. Besides growing, they attract good microbes to their roots and leaves, and fight off bad microbes and pests. To do these things they send out chemicals to attract beneficials and to repel adversaries. Professor Jonathan Klassen tends his laboratory gardens, too, only he is not the primary cultivator. His ants are. And they cultivate fungal gardens. These fungi send out chemicals, too. Klassen would like to know what these chemicals are, where they come from and what they do. He and his collaborators were recently awarded a $1.1 million National Science Foundation grant to find out.

Klassen studies the fungus-growing ant Trachymyrmex septentrionalis which cultivates the fungus Lecanicillum fimetarium underground throughout the southeastern US. He collects these balls of fungi with their ants and raises them in his lab. The ants feed and tend the fungi while Klassen feeds the ants grits. The fungi and ants harbor bacteria on their surfaces that help to fend off pathogens. Other bacteria within the fungal garden help in other ways, perhaps enhancing nutrient availability. The chemical communication among these community members is the focus of Klassen’s team effort.

Klassen is joined in this project by Professor Marcy Balunas, Associate Professor of Medicinal Chemistry at UConn and Professor Pieter Dorrestein at the Skaggs School of Pharmacy and Pharmaceutical Sciences, University of California-San Diego. Balunas is a pharmacological chemist with expertise in examining the pharmaceutical activities of compounds extracted from environmental samples, particularly those produced by microbes. Dorrestein has similar expertise and also develops computer algorithms to help connect such environmental molecules with the organisms that produce them, without having to isolate the organisms to do so.

“We are going to identify, in high-throughput, interactions between microbes that are mediated through secondary metabolites,” Klassen said. To do so, Klassen’s group will identify the members of the microbial community members by extracting the DNA of the entire community and sequencing the gene that encodes a ribosomal RNA from each member. Balunas’ lab will extract small molecules from the same sample. The DNA was extracted from and fed them for antimicrobial activity. Dorrestein will then apply his computer algorithms to determine which members of the microbial community likely produced these molecules by looking for correlations between the presence of particular microbes and the presence of the individual compounds. The team will “use co-occurrence rules to infer what interactions are happening and what molecules are mediating those interactions,” Klassen explained. Essentially, “Whose making it and who the target is,” he said.

Ant fungal garden collected from Fort Polk, Louisiana. The white pupae in the garden are tended by small brown Atta texana worker ants while the larger, black ant is the A. texana queen.

The fungi tries to prevent the growth of bacteria that will compete for the hemicelluloses, so Klassen expects that most fungus-derived antibiotics are at the top where the “tourist” microbes are introduced, that is, those that come in already on the leaves. In addition to the competing microbes, the fungus also has to keep the ants from eating all of the fungal ball, so the fungus might produce anti-repelling chemicals. Indeed, Klassen’s team may have already found such a compound. This compound repels the ants, so the fungus might be chasing the ants away, telling them to stop eating it where that compound is produced. “So that might have a different sort of spatial distribution [than the antimicrobials] where the parts of the fungus where it is actually growing its own biomass will have lots of that compound whereas the parts of the fungus where it is making itself accessible to the ants will have less of the compound,” he said.

Sometimes research such as this can yield pleasant surprises. Klassen told of one example. “One of the interesting things about small molecule chemistry is that you can identify [a compound] as having one activity and then it turns out it has a completely different activity. For example, one compound from the symbiosis is produced by the bacteria on the ants. It was originally discovered to be an antifungal agent, but was then found to have really hot anticancer activity.”

Clearly we have a lot to learn from these garden-tending ants and their crop, the fungal garden. They and their microbial partners are in constant communication with one another through potentially novel chemicals that we might be able to use for a host of unexpected purposes.

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The ants access the outside of the fungal garden to deposit the fungus’ growth substrate, leaves in nature, but corn grits in Klassen’s lab. This creates a vertical gradient of nutrients through the fungal ball. Easily consumed plant sugars called hemicelluloses are found at the top layer and more recalcitrant plant molecules called lignocellulose are found next below that.

Professor Klassen shows an A. texana queen ant collected at lear Creek Wildlife Management Area, Louisiana. MCB PhD student Sarah Goldstein looks on. Photo by Lee Deininger MCB MSc.

In addition to the fungal garden, Klassen and his collaborators have been introduced to another microbial world. Klassen is joined in this project by Professor Marcy Balunas, Associate Professor of Medicinal Chemistry at UConn and Professor Pieter Dorrestein at the Skaggs School of Pharmacy and Pharmaceutical Sciences, University of California-San Diego. Balunas is a pharmacological chemist with expertise in examining the pharmaceutical activities of compounds extracted from environmental samples, particularly those produced by microbes. Dorrestein has similar expertise and also develops computer algorithms to help connect such environmental molecules with the organisms that produce them, without having to isolate the organisms to do so.

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“Everybody says ‘kids don’t like science.’ That’s nonsense. Kids love science, because it’s discovering the world around you.” This observation by Dr. Mae C. Jemison, chemical engineer, physician, and first African-American woman in space, reflects the importance of promoting children’s natural interest in the adventure of discovery that science can provide. “I feel particularly strongly about the importance of scientists as strong models,” Dr. Jemison says as she promotes bringing scientists into classrooms to enhance the experience of both students and their teachers. This is a worthy goal, but it can be difficult to achieve given the paucity of active scientists relative to the number of schools and the absence of scientists in most communities. MCB PhD student Sarah McAnulty has created a program to address this problem.

One day, McAnulty, a PhD student in Professor Spencer Nyholm’s lab, was on Twitter with other scientists with interests in communicating science to the public. Someone in the group suggested that scientists should use Skype to talk with school children in their classrooms. “I don’t know who suggested Skypeing classrooms,” McAnulty said, “but I thought it was a good idea.” So she volunteered to put such a program together. She called it “Skype a Scientist.” Why did she do it? She noticed there is “a lot of mistrust of science going around that was disheartening,” so she thought this could be a way to counteract that. She set up the Skype a Scientist website (https://www.skypeascientist.com) that allows scientists to volunteer and provide information about their expertise, location and availability. She set up a comparable questionnaire for teachers interested in participating, asking them their location, their students’ grade level and what sort of scientist they were interested in connecting with.

In January she advertised the program to scientists via Twitter and Facebook. At first she got about 500 scientist volunteers. Teachers were slow to sign up until her program was mentioned at a teacher’s conference in Texas. Over 200 teachers signed up over one weekend, adding to the 80 who had signed up before. In the spring semester, 800 classrooms enrolled from 17 countries, and connected with over 500 scientists. This included scientists representing 47 states and classrooms from 43 states, reaching both rural and urban communities. As of this writing during the summer, she has 1,800 scientists and 1,908 classrooms enrolled for the fall semester. She expects the number of teachers to increase when the school resumes in the fall.

McAnulty has so far matched scientists and teachers by hand. An ever-increasing demand on her time. She recruited a friend in software development to create a program to do the matching. This leaves her time to oversee the process and publicize the program. The software matches teachers’ requests for the kind of scientist, the scientist’s background (some teachers request, for example, members of underrepresented minorities), and their time zones.

Feedback from participating teachers has been overwhelmingly positive. 100% of teachers reporting that the students enjoyed the session. 96% of teachers reported that they would recommend the program to other teachers, and she received many written reports of students being inspired by their contact with the scientists. The program has several strong features. It reaches classrooms anywhere, especially areas where students may not have access to science museums or local scientists. It also allows scientists to participate in outreach very easily without leaving their lab. Finally, by fulfilling requests for scientists who match the racial or ethnic composition of a classroom, students can talk with scientists who “look like them” allowing them to more easily see themselves pursuing a science career.

Managing Skype a Scientist is done solely by McAnulty. This labor of love has, in short time, become a major success and the program continues to grow. She is currently seeking outside financial support through public and private sources to allow it to reach more students and run more effectively. Her efforts are touching the lives of children around the world and will certainly open paths to future achievements that would otherwise have been impossible to imagine.
In 1859 Charles Darwin published his book *On the Origin of Species by Means of Natural Selection*. In 1963 the famous evolution researcher Ernst Mayr wrote, “It is not nearly so widely recognized that Darwin failed to solve the problem indicated by the title of his work.” So how do species form? How does the process work at the level of molecules? Professor Rachel O’Neill has joined with Dr. Lucia Carbone at the Oregon Health and Science University in a $999,999 NSF-funded study to investigate the speciation question using gibbons as their experimental model.

Gibbons are small apes found in southeast Asian tropical forests. They occupy an important place in evolution as their lineage branched off the lineage of great apes before the gorilla, orangutan, chimpanzee and human lineages about 17 million years ago. Thus they can help reveal characteristics that make apes different than those of other primates.

Since branching off, the gibbon lineage underwent rather rapid diversification into a number of genera about 5 million years ago. Recent work by Carbone’s laboratory revealed that this was accompanied by an extraordinary rate of rearrangement of fragments of their chromosomes, a rate not seen in other apes or most animals. These rearrangements seem to correlate with their diversification into different genera, that is, perhaps accounting for the creation of new species. This is where O’Neill comes in. After learning of Carbone’s work, O’Neill joined with her, bringing her experience examining the molecular mechanisms of gene rearrangements in wallabies.

Carbone’s study revealed that these rearrangements are largely caused by fragments of DNA called LAV A retroelements. Retroelements are regions of DNA that can move to other locations in chromosomes, a kind of transposon. They do so by going through an RNA intermediate during the translocation process. Retroelements are found in all eukaryote genomes, but LAVA retroelements are unique to gibbons. Carbone found that LAVA retroelements likely originated when the gibbon lineage evolved from the ape/human lineage.

LAVA elements are largely found between genes and many of those genes are undergoing more rapid evolution than other genes. Interestingly those rapidly-evolving genes include those that are specific to gibbons and related to their lifestyle traits. This includes genes responsible for their longer arms and more powerful arm and shoulder muscles. LAVA elements are also found in the centromeres of gibbon chromosomes. Centromeres are the regions of chromosomes to which fibers attach to draw each copy of newly duplicated chromosomes to their respective new cells. Gibbon centromeres are undergoing extensive restructuring, meaning that their sequences, location and organization are quite different from one another. This extreme diversity among an organism’s centromeres is unique to gibbons.

O’Neill suspects that LAVA elements play a role in this massive restructuring involving centromeres. “For some centromere [movements] it is like Lego blocks, that you can put them back together in different orders,” she explained. Gene order, or synteny, within the blocks can stay the same. “The breakpoints are active, dynamic portions of the genome,” she said. “These breakpoints are of interest because they still carry some signal of fragility and they are also hotspots for cancers.” Consequently, these studies could have use in understanding some human cancers, too. “These syntenic blocks tend to rearrange and the breakpoints between them tend to be hotspots,” O’Neill said.

Genome restructuring could create different chromosome types in gibbon populations. Breeding between these populations could then create hybrid offspring, which could manifest new characteristics. If such characteristics are beneficial, then transmission of those to subsequent generations could result in speciation. This phenomenon has been observed in the marsupials that O’Neill studies, consequently she is very interested in determining if a similar mechanism is at work in gibbon speciation.

Because gibbons are endangered species, experiments must be done in the lab using cell lines derived from gibbons. Before doing this, foundational studies must be done, and that is the purpose of this NSF funding. The sequences of the diverse array of centromeres must be obtained. Those with retroelements should be easier to sequence, based on O’Neill’s experience with similar marsupial centromeres.

In the future O’Neill would like to identify regions of the gibbon genome that are active as the result of the influence of the LAVA elements. By activating gene activity, they may play a role in genome rearrangements and speciation. “Being able to pinpoint recent emerging transposable elements is key to genome restructuring,” she said.
Drink with a Scientist

The Tiniest Parasites

Bacteria are the smallest organisms that scientists agree are alive. But there are even smaller things that parasitize bacteria. UConn microbiologists have been studying a single gene that is a parasite of bacteria, and in the July 26 issue of the Proceedings of the National Academy of Sciences, they report that while it can hamper individual bacteria, it may help a bacterial population as a whole.

Inteins are parasitic genes that actively invade single-celled organisms, including bacteria, archaea, and yeasts. Once an intein is inside a cell, it deploys a special chemical ‘sword’ that homes in on the cell’s DNA, finds exactly the right spot, and slices it open. Then the intein slips inside and cellular DNA repair machinery stitches the DNA back together as if it was supposed to be there in the first place. The intein doesn’t perform any useful function, at least initially. It just lurks there, getting replicated by the cell’s DNA machinery and passed on when the organism reproduces.

UConn microbiologists Peter Gogarten and Shannon Soucy, a recent Ph.D. in molecular and cell biology, were curious to find out whether inteins took a toll on the host cells they hijack, or whether they provide any benefit.

“You can have a selfish gene, or a domesticated gene. But what happens in between? How does that transition from selfish to domesticated happen?” asks Soucy.

Soucy and Gogarten, along with former UConn undergraduate Anna Green ’13 (CLAS) and colleagues at Tel Aviv University in Israel, decided to look at a specific intein that commonly infects salt-tolerant archaea, but not ubiquitous – only 10 percent of salt-tolerant archaea. The intein is common in salt-tolerant archaea, but not ubiquitous – only 10 percent of salt-tolerant archaea. It manages to sneak itself into the DNA of its archaea hosts’ offspring about 80 percent of the time. A normal gene’s inheritance rate is 50 percent.

The researchers wondered, if the intein is really so successful at getting inherited, why isn’t it everywhere? Perhaps it is a selfish gene that costs the host, making it less likely to reproduce. But if the intein makes its host less likely to reproduce, why is it still so common?

To figure out why, the researchers decided to break the problem into pieces. First they tried to find out whether the intein actually incurs a cost on the archaea it infects, making them less likely to reproduce.

The researchers also noticed something else. In these mixed populations, where some archaea were infected with the intein and some were not, the archaea engaged in sexual recombination – in which two archaea fuse, mix up their chromosones, and then split into two organisms again – more often than they did in intein-free groups. This is obviously good for the intein, as more sexual recombination increases its opportunities to spread. But it’s also good for the archaea, as more recombination leads to faster evolution and a more diverse population that can potentially handle more diverse, and more stressful, environments.

But it still doesn’t explain exactly why, if the intein is so good at getting inherited, it and encourages sexual reproduction, why doesn’t every single salt-tolerant archaeon end up infected within a few generations?

“It’s a complicated dynamic, even in the limited ecosystem of a single species’ genome. Gogarten is philosophical about the process. “Things happen in nature that are not really beneficial for the organism. Humans are full of remnants of genetic invaders we still carry around. Sometimes they pick up a function like the introns [pieces of DNA] that disrupt our genes and have to be removed when the gene is expressed into a protein. Some of these introns have become important in regulation and allow for alternative splicing, increasing the number of different proteins our genome encodes,” he says.

By investigating this smallest of parasites in our smallest of cousins, we might better understand how a few of our ancient enemies, encoded into our genes, became our friends. By Kim Krieger, UConn Communications, from UConn Today
MCB Graduate Students

Summer Fellowship Awards

Claire M. Berg Graduate Fellowship in Genetics
Alicia Liu, Genetics and Genomics, M. O'Neill laboratory
Kate DiVito, Genetics, R.O'Neill laboratory

Arthur Chovnick Graduate Fellowship in Genetics
Juliana Crivello, Genetics and Genomics, R.O'Neill laboratory

Richard C. Crain, Jr. Memorial Fellowship
Cassie Zerbe, Biochemistry, Cole laboratory

Cross-Disciplinary Fellowships in MCB and Pharmaceutical Sciences
Andrea Suria, Microbiology, Nyholm laboratory

Jean Lucas-Lenard Special Summer Fellowship in Biochemistry
Rebecca Newcomer, Cell Biology, Alexandrescu laboratory
Andrea Suria, Microbiology, Nyholm laboratory

The Dr. Edward A. Khairallah and Dr. Lamia H. Khairallah Fellowships
Samantha Gromek, Medicinal Chemistry (Pharmaceutical Sciences)
Ziyao Zhao, Cell Biology, Zweifach laboratory

Philip I. Marcus Graduate Student Fellowship in Virology
Stephen Hesler, Biochemistry, Cole laboratory, Balunas laboratory

Pfizer Summer Fellowships in Molecular and Cell Biology
Rebecca Bova-Seliga, Microbiology, Benson laboratory
Glenn Milton, Genetics and Genomics, M. O'Neill laboratory

Antonio H. & Marjorie J. Romano Graduate Education Fellowship
Danielle Lesperance, Microbiology, Broderick laboratory
Michael Stephens, Microbiology, Gage laboratory

Testing trout in Idaho for fish pathogens, as part of a USDA grant using next generation sequencing to detect low abundant pathogens. From left to right - Dr. Joerg Graf, Professor MCB and Director, M.S. Microbial Systems Analysis program, Lidia Beka, MCB Ph.D. student, and Erin Breaker, M.S. Microbial Systems Analysis program.

Microbiology grad student McAnulty awarded Research Fellowship and Grant
Sarah McAnulty, Microbiology PhD student in the laboratory of Prof. Spencer Nyholm, was selected for an American Society for Microbiology Student Research Fellowship. Fellowship funds provide summer support for research projects involving microscopy, 2 fellowships of $1000 each are awarded annually nationally. McAnulty was also awarded a Lerner-Gray Grant for Marine Research from the American Museum of Natural History, New York City. The grant provides financial assistance to highly qualified persons starting careers in marine zoology for projects dealing with systematics, evolution, ecology and field-oriented behavioral studies of marine animals. The grants made are between $1000 and $2,500 and are meant to act as seed money for new researchers.

Graduate Degrees Conferred

MCB Ph.D. student Meghan Monroy, M.S., Molecular and Cell Biology

News

The winners of the 2017 MCB Graduate Student Teaching Excellence Award were Kavitha Kannan, Genetics and Genomics, Zhang laboratory and Jeffrey Tamucci, Structural Biology, Biochemistry and Biophysics, May laboratory.

Sarah McAnulty, Microbiology PhD student in the laboratory of Prof. Spencer Nyholm, received the “Best Short Talk” award at the 2017 Pioneer Valley Microbiology Symposium and was runner up for “Best Student Talk” for the Division of Invertebrate Zoology at the 2017 annual meeting of the Society for Integrative and Comparative Biology.

August 2016

Bansal, Prakhar, MS, Molecular and Cell Biology
Cohn, Rachel Lynn, MS, Applied Genomics
Colston, Sophie M., PhD, Microbiology
Conroy, Scott, MS, Applied Genomics
Deoss, Dister Joseph, MS, Applied Microbiology
Hansen, Christian P., MS, Applied Genomics
Olis, Chelsea Rose, MS, Applied Genomics
Pingle, Srinadh Reddi, MS, Molecular and Cell Biology
Ram Mohan, Nikhil, PhD, Genetics and Genomics
Smalec, Brendan Michael, MS, Molecular and Cell Biology
Soucy, Shannon L., PhD, Molecular and Cell Biology
Veerabhadrappa Surugihalli, Chaitra, MS, Molecular and Cell Biology

December 2016

Chen, Chin-Chi, PhD, Genetics and Genomics
Hesse, Andrew Neil, MS, Applied Genomics
Nguyen, Nhat Quang, MS, Applied Genomics
Omer, Selia, PhD, Genetics and Genomics
Prego, Matthew, MS, Applied Genomics
Rickman, Jayme, MS, Applied Genomics
Ryan, Gerard, MS, Applied Microbiology

May 2017

Bova, Rebecca Ann, MS, Molecular and Cell Biology
Coscia, Adrian, MS, Molecular and Cell Biology
Dick, Amanda April, PhD, Genetics and Genomics
Lei, David, MS, Molecular and Cell Biology
Mclaughlin, Kimberly Ann, MS, Applied Genomics
Monroy, Meghan Fernanda, MS, Molecular and Cell Biology
Nicholas, Sarah-Anne, MS, Molecular and Cell Biology
O’Brien, Jeffrey Michael, MS, Molecular and Cell Biology
Oszcan, Didem, MS, Applied Genomics
Rodriguez, Kiefer Eric, MS, Applied Microbiology
Sathappa, Murugappan, PhD, Biochemistry
Singh, Supriya Kumari, PhD, Molecular and Cell Biology
Stas, Eric, MS, Applied Genomics
White, Heather Marie, MS, Molecular and Cell Biology
Wobrock, Jennifer, MS, Applied Genomics

News

Renee Silvis (BS ‘09 MCB), has been promoted to Director of Enterprise Analytics at Connecticut Children’s Medical Center. Renee has played an integral role in strategic planning leading several projects for the organization including their pursuit of US News & World Report recognition. She began her formal career at Connecticut Children’s as a research assistant in the Emergency Department and later her research role moved to Pediatric Urology. During this time, Renee earned her Master of Science degree from Brandeis University in Health and Medical Informatics and was recruited as an informaticist for a medical terminology software company, where she consulted for Children’s Hospital Association, EBSCO Health, and state health.

Meghan Monroy (MS ’17 MCB), is working as a research biologist at a start up company called IsoPlexis.

MCB Alumni

Kavitha Kannan, Genetics and Genomics, Zhang laboratory
Jeffrey Tamucci, Structural Biology, Biochemistry and Biophysics, May laboratory

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Meghan Monroy (MS ’17 MCB), is working as a research biologist at a start up company called IsoPlexis.
**Recent Internships**

**Applied Genomics Program**

**Fall 2016**

Jayme Rickman, Reinhard Laubenbacher Laboratory, Department of Molecular Biology and Biophysics, UConn Health, Farmington, Analysis cancer cell line microarray data

**Spring 2017**

Didem Ozcan, LambdaVision – UConn-TIP, Farmington, CT Innovations Funding Tech Talent Award Internship

Eric Stas, Craig Nelson Laboratory, MCB, UConn, Genomic networking of mouse embryos

Shannon Sullivan, ImmunoGen, Inc., Walling, MA, Cell Biology Group

**Summer 2017**

Gabriela Aquino, UMass Medical School, Department of Ophthalmology, Neurobiology & Gene Therapy Center

Jennifer Huang, Yale New Haven Health, Department of Pathology, YNHH Tumor Profiling Laboratory, Bioinformatics

**Microbial Systems Analysis Program**

**Summer 2017**

Ethan Cope, Oral Fluid Dynamics, LLC. – UConn-TIP, Farmington

Alexander Gojmerac, Azitra, UConn-TIP, Farmington, UConn-TIP Bioscience, Entrepreneurship & STEM Summer Intern

Fengjun Dong, AstraZeneca, Guangzhou City, China, Marketing Assistant

Daniel Spitzer, JAX-GM, Farmington, Clinical Laboratory

**Recent Employment**

2016-2017 MCB PSM graduates found employment at AxioMx (an Abcam company), CDC, Jackson Laboratories-GM, LambdaVision, Inc, Mount Sinai Health System, Pfizer, Inc., St. Francis Hospital/CLS, Thermo Fisher, UConn, UConn Health Center, and Vencore, Inc.

**Applied Genomics Graduates**

Scott Conroy (M.S. Applied Genomics, Su 2016) – Mindlance, Pfizer, Biomarker Assay Scientist, New Haven, CT

Christian Hansen (M.S. Applied Genomics, Su 2016) – Mount Sinai Health System, Laboratory Coordinator II, NY.

Andrew Hesse (M.S. Applied Genomics, F 2016) – Clinical Data Analytics & Reporting, Manager, JAX-GM, Farmington, CT.

Didem Ozcan (M.S. Applied Genomics, S 2017) – LambdaVision, Farmington, CT.
MCB Undergraduates

Awards

University Scholars

The following undergraduates who work with MCB professors were named 2017 University Scholars (of 23 total Scholars). University Scholars is a prestigious UConn undergraduate program in which students design and pursue an in-depth research project and craft individualized plans of study during their final 3 semesters.

Marisa Boch, Chemical and Biomolecular Engineering/Molecular and Cell Biology

Project Title: Effect of Silk-Based Hydrogel Topography on Intestinal Epithelial Cell Morphology and Wound Healing in Vitro; Committee: Kelly Burke, Chemical Engineering (chair), Juliet Lee, Molecular and Cell Biology, Charles Giardina, Molecular and Cell Biology

Ryan Englander, Molecular and Cell Biology

Project Title: Selective Insertion of Inducible Murine Bax into Cancer Using CRISPR/Cas9; Committee: Pramod Srivastava, UConn Health (chair), David Daggett, Molecular and Cell Biology, J. Peter Gogarten, Molecular and Cell Biology

Maneesh Koneru, Structural Biology/Biophysics and Chemistry

Project Title: Fluorescent Lipophilic Prodrugs as Ligands of the BTN3A1 Receptor; Committee: Andrew Wiener, Pharmaceutical Sciences (chair), Olga Vinogradova, Pharm. Sci., Adam Zweifach, Molecular and Cell Biology, Jose Gascon, Chemistry

Soumya Kundu, Computer Science and Engineering

Project Title: Characterizing the Accuracy of Gene Tree Rooting Methods Using a Simulation Framework; Committee: Mukul S. Bansal, Computer Science and Engineering (chair), J. Peter Gogarten, Molecular and Cell Biology, Ion Mandiou, Computer Science and Engineering

Caroline Liu, Molecular and Cell Biology

Project Title: Fluorescent Lipophilic Prodrugs as Ligands of the BTN3A1 Receptor; Committee: Andrew Wiener, Pharmaceutical Sciences (chair), Olga Vinogradova, Pharm. Sci., Adam Zweifach, Molecular and Cell Biology, Jose Gascon, Chemistry

Alyssa Mathiowetz, Molecular and Cell Biology

Project Title: Autoophagy in Development and Disease: From Model Organisms to Clinical Samples; Committee: Kenneth Campellone, Molecular and Cell Biology (chair), Nathan Adler, Molecular and Cell Biology, David Daggett, Molecular and Cell Biology

Brendan Stewart, Molecular and Cell Biology

Project Title: Identification of Novel Secondary Metabolites from the Trachymyrmex septentrionalis Symbiotic Community; Committee: Marcy Balunas, Pharmaceutical Science (chair), Spencer Nyholm, Molecular and Cell Biology, Jonathan Klassen, Molecular and Cell Biology

Sklar Wright, Biological Sciences

Project Title: Structural Variations in Circulating Lipopolysaccharide May Increase Severity of Exercise-Induced Heat Illness; Committee: Elaine C. Lee, Kinesiology (chair), Nichole Broderick, Molecular and Cell Biology, Carol Pilbeam, Biological Sciences

Xiuyi Yang, Molecular and Cell Biology

Project Title: A Novel Application of FRET Based Biosensors in High-Throughput Screening for Modulators of PKC Signaling; Committee: Adam Zweifach, Molecular and Cell Biology (chair), Charles Giardina, Molecular and Cell Biology, David Knecht, Molecular and Cell Biology

Lt. Paul Drotch Memorial Scholarship

MCB major Leena Kader

Todd M. Schuster Award

Brianna Woodbury, MCB, Research supervisor Prof. Carol Teschke

Biological Undergraduate Research Colloquium Awards

Awards were presented for talks given during the 34rd Annual Biology Undergraduate Research Colloquium

Outstanding Senior in EEB Award - Michael Stankov; Research supervisor: Christopher Elphick; “Can extinction likelihood be predicted by physical and behavioral characters of wetland bird species?”

Outstanding Senior in MCB Award - Isabel Nip; Research supervisor: Kenneth Campellone; “Investigating roles for autophagy and the actin cytoskeleton in promoting α-synuclein clearance in Parkinson’s disease”

Outstanding Senior in PNB Award (2) - Colin Cleary; Research supervisor: Daniel Mulkey; “Purinergic regulation of vascular tone in the retrotrapezoid nucleus is specialized to support the drive to breathe”

Claire Berg Award - Spoonith Sampath, MCB, Research supervisor: Joerg Graf, MCB; “Characterization of four TSSS VgrG proteins in Aeromonas veronii Hm21”

Connecticut Museum of Natural History Award - Diler Haji, EEB & Journalism; Research supervisor: Chris Simon, EEB

Margaret F. Ertman Award (co-Awardees) - Dinah Parker, Biology; Research supervisor: Bernard Goffinet, EEB; “One fungus-two lichens: Dendroiscocaulon intricatulum is the cyanomorph of the Eastern North American endemic Ricasolia quercizans (Lobariaeaceae)”

Brock Chimeski, PNB & MCB; Research supervisor: Alexander Jackson, PNB. “The neurochemical phenotype of lateral hypo-thalamic Hcrt/Ox and MCH neurons identified through single cell gene expression profiling”

Excellence in Applied Genetics and Technology Award - Sean Gosselin, MCB; Research supervisor: J. Peter Gogarten; “An average nucleotide identity-derived distance approach for constructing phylogenies”

Honors Award in Life Sciences - Ashley Hines, PNB & MCB; Research supervisor: Deborah Kendal, Pharm. Sc.; “Characterization of novel cannabinoid receptor 2-Selective agonists at the biochemical and cellular levels: Leads for therapeutic agents”

IDEA Grant Awardee

The UConn IDEA Grant program awards funding to support student-designed and student-led projects, including creative endeavors, community service initiatives, entrepreneurial ventures, research projects, and other original and innovative projects. Awards can be up to $4,000 per student.

Raven Vella. Molecular and Cell Biology, Project title: Development of Molecular Probes to Dissect the Role of Clathrin in Mitosis; Using affinity chromatography, fluorescent polarization, and x-ray crystallography, Raven aims to investigate the role of clathrin in mitosis, particularly clathrin binding patterns with novel compound MB6.

Phi Beta Kappa Inductees

Congratulations go out to those of our majors in Molecular and Cell Biology, Structural Biology and Biophysics, and Biological Sciences for their election to Phi Beta Kappa in 2017!

Molecular and Cell Biology

Accurso, Mary Teresa

Achilles, Tyler William

Ahuja, Dinkar

Bhatt, Jishnu Jainini

Boch, Marisa Emily

Brighton, Tessa Beth

Chatterton, Bryan David

Chaudhary, Zaeeem Shahzad

Dinicu, Andreea Ioana

Francis, Kathryn Theresa

Ghajar, Daniel Jali

Harrington, Cameron Albert

Jiang, Christina

Lee, Grace

Mudatsari, Suraj Reddy

Owusu, Akua Konadu

Park, Jee In

Phadke, Manali Avinash

Qureshi, Miam Mamashid

Ramajothi, Ateena Naesser

Rajagopalan, Rahul

Ramsdell, Amanda Nicole

Sampath, Spoonith

Singhaviranon, Summit

Srirangam, Srinivas Rao

Stewart, Brendan Patrick

Tedeschi, Alexander Paul

Xu, Curtis Xiaoduo

Yang, Xiuyi Alexander

Elected as juniors:

Davis, Thomas

Lockwood, Kyle

Mendonca, Craig Allen

Redenti, Benjamin Joseph

Woodbury, Brianna Marie

Structural Biology and Biophysics

Massucci, Daniel Charles

Biological Sciences

Allocco, Jennifer Brianne

Biedermann, Sarah

Elizabeth

Cavalante, James

Alexander

Decater, Tess Andrea

Desai, Alisha

Flynn, James Robert

Josen, Guineet Singh

Million, Wyatt Christopher

Nelson, Rebecca Ward

Papale, Anthony James

Roy, Nikita

Schwarz, Rebecca Paige

Wanner, Cortinian Nicklas

Wright, Skyler Sharleen

Zeng, Francine Roberta

Elected as juniors:

Brych, Ganna

Serino, Jonathan Michael

Expression 2016-2017
Your contributions to MCB are appreciated. Visit www.mcb.uconn.edu/giving-2/