

RUTGERS
School of Arts and Sciences

Spring 2019

IN THIS ISSUE

A Message from the Chair

Welcome to the Spring issue of Department of Cell Biology and Neuroscience (CBN) newsletter. In this newsletter, you will find a feature on our newest faculty member, Brian Daniels, who rounds out the CBN faculty with his expertise in infection and inflammation in the central nervous system. Read about his path to Rutgers! We also highlight the research going on in one of our labs, as well as the accomplishments of our students. Nine of our students were named Henry Rutgers Scholars this year. We were also especially excited to close out the school year with our CBN graduation celebration – a big congratulations to the CBN class of 2019!

With warm regards,

A handwritten signature in black ink, appearing to read "Michael J. G.".



Faculty Feature: Dr. Brian Daniels

CBN welcomed new Assistant Professor Brian Daniels to the department on January 1, 2019.



Congratulations to the Class of 2019!

The Class of 2019 graduated on May 19, 2019 and the department held a celebration on May 16, 2019.

Congratulations to the CBN Class of 2019!



On Sunday, May 19th, 164 students graduated with degrees in Cell Biology and Neuroscience at the 253rd University Commencement. A departmental celebration on May 16th was held, where students gathered together with faculty to share a dinner, and listened to remarks by their fellow classmates, Ansley Kunnath and Charles Morse. Personalized engraved medallions were also presented to the graduates. Following tradition, the backs of all the medallions were emblazoned with a special image – this year's was designed by Charles Morse and Christine Sheng.

Students were also recognized at the celebration. Started in 2017, the Academic Achievement Award for CBN seniors graduating with an exemplary academic record, was presented to four students – Charles Morse, Long Mui, Manan Parekh, and Srikanth Kalahasti. These four students graduated with an impressive cumulative GPA of 4.0. Two students, Mona Moshet and Nora Laine Herzog, received the Best Honors Poster Award from the Honors Colloquium. Daniyal Aikal, a 2017 alum, also attended to present the CBN Alumni Award, which he funded himself, to recognize two CBN seniors who have engaged or will engage in humanitarian activities during their undergraduate or postgraduate gap year – a great example of paying it forward and investing in our students. The celebration was capped off with the customary group picture.

Congratulations, Class of 2019!

CBN Awards Fund

The CBN Awards Fund will support academic awards and scholarships for CBN students' education, particularly those with distinguished academic records, as well as awards

recognizing exemplary research accomplishments. The Academic Achievement award is the first benefit of the CBN Awards Fund. Recipients this year are as follows: Charles Morse, Long Mui, and Manan Parekh. These four students graduated with an impressive cumulative GPA of 4.0.



Recipients: (from left) Charles Morse, Long Mui, Manan Parekh.
(Not pictured: Srikanth Kalahasti)

COVER PAGE: PHOTO CREDIT TO KWAN LAB; BIPOlar IMMORTALIZED MULTIPOTENT OTIC PROGENITORS. NEURONAL PROCESSES AND CELL BODY LABELED IN GREEN WITH NUCLEI IN MAGENTA

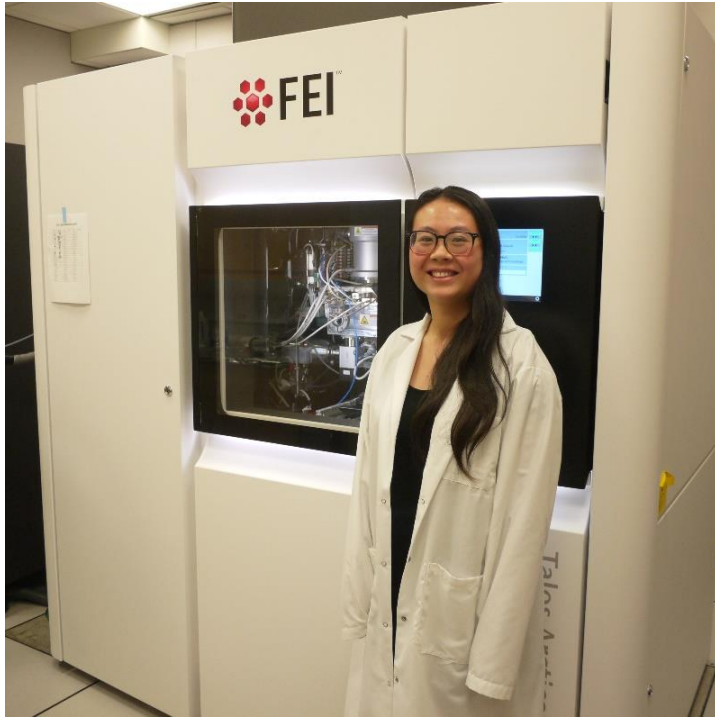
Your gift will help recognize our outstanding students, support them in their research and educational endeavors, and fund leading biomedical research accomplishments. **Every gift goes a long way.** Click on the link below to give now!



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Ms. Jennifer Jiang Receives the Best Young Research Talk Prize!



Jennifer Jiang, an undergraduate student in Dr. Wei Dai's group, received the Best Young Research Talk (sponsored by Agrisera) for her presentation on "Structural and Functional Analyses of Photosynthetic Protein Complexes in Thylakoid Membranes of a Marine Diatom" at the 36th Eastern Regional Photosynthesis Conference. The ERPC is one of the longest-running regional conference on photosynthesis in the United States. It is held at the Marine Biology laboratory in Woods Hole, MA during the beginning of Spring. The conference consists of researchers from the East Coast and Canada who join to engage in scientific exchange.

As an undergraduate, Jennifer had to compete with all graduate students and postdocs to win this prize. For two years, she has been working in the Dai Laboratory, using cryo-electron tomography, proteomics and biophysical tools to study the structural architecture and spatial distribution of photosynthetic protein complexes embedded in thylakoid membranes. The primary objective is to gain insight into the molecular machinery responsible for supporting robust photophysiology in photosynthetic organisms. Congratulations Jennifer and best wishes as she begins her PhD this fall at Rutgers!

Rutgers Scientists Discover New Role for Sensory Signals in the Brain

By Todd Bates; *This article was previously featured in Rutgers Today*

Learning how to tie a shoe or shoot a basketball isn't easy, but the brain somehow integrates sensory signals that are critical to coordinating movements so you can get it right.

Now, Rutgers scientists have discovered that sensory signals in the brain's cerebral cortex, which plays a key role in controlling movement and other functions, have a different pattern of connections between nerve cells and different effects on behavior than motor signals. The motor area of the cortex sends signals to stimulate muscles.

The research on neural signals, [published in the journal *Current Biology*](#), could help lead to new treatments for movement disorders such as Parkinson's disease and Huntington's disease or psychiatric conditions such as obsessive compulsive disorder.

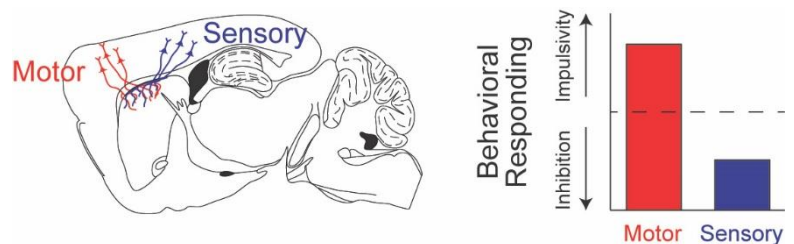
Scientists at [Rutgers University–New Brunswick](#) and [Rutgers–Newark](#) investigated a brain region called the striatum in mice. The striatum, which integrates signals from the sensory and motor areas of the cerebral cortex, is severely compromised in diseases such as Parkinson's and Huntington's.

"We found that stimulation of sensory cortex signals caused mice to stop their actions during a behavioral task, but motor cortex signals caused them to perform the task more impulsively," said senior author [David J. Margolis](#), an assistant professor in the [Department of Cell Biology and Neuroscience](#) in the [School of Arts and Sciences](#) at Rutgers–New Brunswick.

Future research will investigate the patterns of signaling between the cerebral cortex and striatum during different types of learning

paradigms in mice to understand nerve cell connection mechanisms. The ultimate goal is to understand how abnormal cortex-striatum signaling is involved in neurological and psychiatric disorders.

The lead author is Christian R. Lee in the Department of Cell Biology and Neuroscience. Co-authors include Alex J. Yonk, Joost Wiskerke and Kenneth G. Paradiso in that department and [James M. Tepper](#), a Distinguished Professor in the [Center for Molecular and Behavioral Neuroscience](#) at Rutgers–Newark. The research was funded by the Rutgers Brain Health Institute Pilot Grant Program, National Institutes of Health and National Science Foundation.



Left: A diagram showing connections between the motor and sensory areas of the cerebral cortex to the striatum. Right: A schematic of the opposite behavioral outcomes of stimulating the motor and sensory pathways to the striatum, resulting in decreased or increased impulsivity. *Image: Alex Yonk*

Faculty Feature:

Brian Daniels, PhD



Tell me about yourself: I grew up in Greenville, SC and went to a small liberal arts college there. I was a first-generation college student, and I really worked hard to take in everything college had to offer. I took so many classes that I ended up graduating with separate degrees in behavioral biology and English, and while I obviously went on to become a scientist, I still have a great fondness for the humanities (and sometimes daydream about doing a second PhD in English after I retire). After graduation, I moved to the Midwest, where I completed a PhD in neuroscience at Washington University in St. Louis.

I then did my postdoctoral work at the University of Washington in Seattle. I started my lab here at Rutgers in January 2019, and it's been a very exciting time getting started!

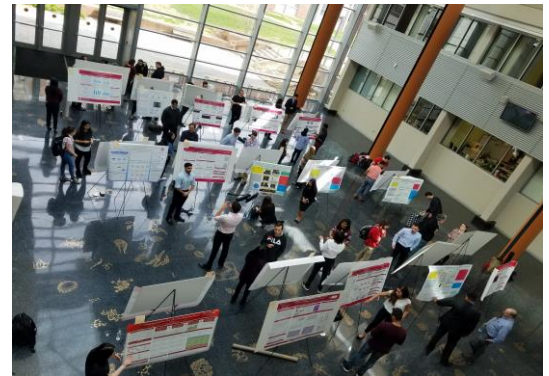
How did you become interested in science? Like many kids, I was fascinated by dinosaurs as a child and went through a long phase of wanting to be a paleontologist. In middle school, I found a copy of Michael Crichton's novel *Jurassic Park* in a thrift store, and I was truly awed by its fairly technical discussion of genetic engineering, evolution, and bioethics. I ended up reading nearly every one of Crichton's novels after this, which were really formative in the development of my interests and thinking as a scientist. While I was initially interested in paleontology and ecology, I quickly discovered that field work (and being outside, in general) were not for me. I maintained a strong interest in biology, however, which ultimately evolved over the years into my current interests in the nervous and immune systems.

As a student, did you do undergraduate research? Yes! Going to a small liberal arts college, there were not a lot of options or resources for research. However, with some creativity and support from my mentor, I wrote and received a small grant as an undergraduate that funded a project examining the behavioral consequences of chronic infection with the neurotropic parasite *Toxoplasma gondii*. Going through the process of designing a project and securing my own funding so early in my training was really formative. Participating in research really transforms one's way of thinking about science. My undergraduate research experience was great preparation for everything I've done professionally since.

What are you researching? My lab studies cellular and molecular mechanisms that regulate inflammation in the brain and spinal cord. To do this, we use tissue culture and mouse models of several neuroinflammatory disease states, including viral encephalitis, traumatic injury, and neurodegeneration. We are particularly interested in how immune responses vary across distinct cell types and anatomical regions of the nervous system. Our first projects in the lab are focused on astrocytes and how their activation during disease can serve either protective or pathologic functions, depending on the nature of the inflammatory insult. These studies are really exciting because they cross traditional disciplinary boundaries between neuroscience, immunology, and microbiology. These basic, preclinical studies in my lab ultimately aim to inform therapeutic strategies for neuroinflammatory diseases, which are a growing burden on public health and for which very few effective treatments currently exist.

What do you like about being at Rutgers? I was thrilled to come to Rutgers for many reasons, a primary one being the diversity of the student body. My college years were a transformative time in my life, and my career has been deeply impacted by caring and committed mentors at every stage of my training. I'm excited to be in a position to pay that forward to first generation, LGBT, and other students from diverse backgrounds here at Rutgers. I also really love my colleagues in the Department of Cell Biology and Neuroscience, who are not only brilliant scientists, but also incredibly supportive and kind. Overall, I'm very happy to be here!

SEMESTER HIGHLIGHTS



CBN Honors Colloquium

CBN Honors students presented their research at the 2019 Honors Colloquium on April 12, 2019, a poster session where fellow students, faculty mentors, and other CBN faculty gathered to learn about the research they have been conducting in laboratories across campus.

9 CBN Students Named 2019 Henry Rutgers Scholars

The Henry Rutgers Scholar Award recognizes the School of Arts and Sciences graduating seniors who have completed outstanding research projects. These awards are offered across all departments of the School of Arts and Sciences, and so represent only the very finest achievements of students.

Kusuma Ananth, Role of Orexin On Binge Eating Behavior Studied Through Pharmacogenetic Modulation

Erin Kelly, Characterizing the Endogenous Neuronal Distribution of Vinculin for an Investigation of the Forces that Transduce Mechanical Cues in Neurons

Ansley Kunnath, Sex-Specific Effects of Antipsychotics and D-Serine on Rat Cortical Neurons

Charles Morse, Multiple Action Potential Thresholds Characterize the Responses of Spiral Ganglion Neurons to Dynamic Stimuli

Meher Pandher, Total Leukocyte Quantification by Linear Smear Detects Gender Differences in Immune Response to Spinal Cord Injury

Manan Parekh, Addressing a Novel Mechanism of Neuronal Trash Extrusion in *C. elegans* and Developing a High Throughput Unbiased Genetic Screen Protocol

Riya Patel, Establishing a Knockdown of Chd4 in Order to Determine its Role in Neuronal Differentiation

Avina Rami, Isolation of Exosomes from Human Umbilical Cord for the Development of Exosome-Rich Plasma

Fady Soliman, Exploring the Role of Exosomal Netrin-1 in Pre-Metastatic Niche Development for PDAC



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