

The Hillock

where efforts summate to actions

Newsletter of the Department of Neurobiology and Anatomy
Drexel University College of Medicine

Volume 4 (December 2020)



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We extend special thanks to the Drexel University College of Medicine Marketing and Communications Department for their assistance with the preparation of this newsletter.

On the Cover:

Front — *Scratch assay for axonal regeneration by Ankita Patil (Baas Lab)* | A scratch made across a dense layer of hippocampal neurons creates an in vitro model of axonal regeneration. In my study, I am looking at the role of kinesin-1, a microtubule-associated motor protein, in promoting axonal outgrowth after injury. In control conditions (pictured here), 24 hours after the scratch is made, axons are seen growing into the blank area. These images will be compared to similarly treated neuronal cultures where kinesin-1 has been previously depleted using siRNA. These data give us insights into how motor proteins, and specifically kinesin-1, contribute to microtubule organization in different contexts in the neuron's lifetime. (Tiled image of hippocampal neurons, stained for microtubules in orange, actin in dark blue, and nuclei in light blue)

Back — *Electroporated Cortex by Sadie Bennison (Toyooka Lab)* | Dr. Kazuhito Toyooka performed in utero electroporation on mice embryos on day 15 of gestation to introduce a Venus fluorophore into newborn neurons. We are interested in neurite formation which occurs on the day of birth (P0) in neurons that migrate to layer 2/3. This is a photo of the mouse cortex at P0, and you can see that neurons are still migrating and reaching their final destinations in the cortical plate. For this experiment I was analyzing whether knockdown of activity-dependent neuroprotective protein, a frequently mutated gene in autism spectrum disorder, lead to any neuronal migration defects. We found no differences in neuronal migration between control and knockdown brains at P0, but we found large differences in neurite formation once the cells completed migration! Stages of brain development are additive, with each sequential step relying on the fidelity of previous stages. This data allowed us to pinpoint neurite formation as the primary change in the developing mouse brain due to loss of ADNP, and not an additive defect due to changes in neuronal migration.



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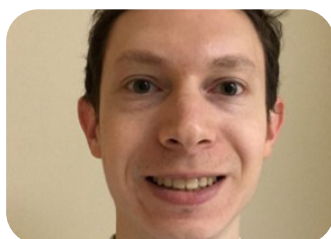
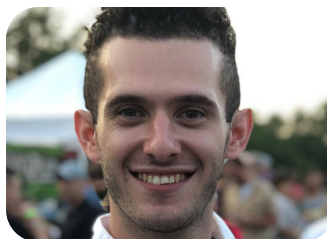
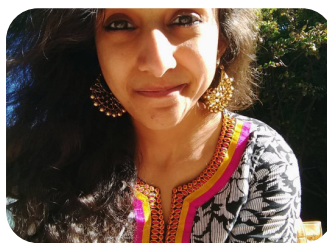
College of
Medicine

Department of Neurobiology and Anatomy

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Letter From The Editors



We are delighted to bring you the fourth issue of *The Hillock* in the face of the unprecedented challenges that have accompanied the year 2020. *The Hillock* was created to document the history of our department, highlight accomplishments and successes, and, most importantly, celebrate our shared humanity. We believe that this mission was necessary this year more so than ever.

In this shortened issue, we continue to remember the history of our department, this time from Dr. John Houle. Dr. Houle had first set his eyes on our department while still a graduate student; however, a long journey stood ahead of him before he joined. At each step of his journey Dr. Houle not only reflects on advancements in the research field, but also on interpersonal relationships that we dearly cherish in our department. Dr. Houle reminds us that building friendly, supporting¹ and positive relationships is one key to the success we enjoy in our department today. The contents of this edition, such as the feature story on the Neuroscience Graduate Students for Diversity (NGSD) Group, grants and awards, and the acknowledgement of a new incoming class of graduate students, highlight the astonishing ability of our departmental members to not only persist, but flourish despite the COVID-19 pandemic severely disrupting both our work and personal lives. The creativity of the department is highlighted in both the creative submission and the ways in which our department members have continued to participate in outreach in virtual formats. Back by popular demand, our scientist support animals are featured again in this edition, and we welcome all the new companions that have joined your lives since the start of the pandemic.

Finally, we wish to dedicate this issue to those who have lost their lives to the COVID-19 pandemic, to those who are missing their families, and those that we are missing from our department (Shasha Yang) due to travel restrictions.

The Editorial Team

Andrey Borisyuk, Ankita Patil, Ashley Opalka, Jani Bilchak, Jeremy Weinberger, Nancy Mack, Philip Yates, Sadie Bennison and Shrobona Guha



A View From the Chair

This has been a very challenging year with the COVID-19 epidemic disrupting our personal lives and affecting our research and teaching activities in an unprecedented manner. In my own memories, even the bankruptcy of 1999 did not have the same devastating effects

because once we had a resolution we could and did move ahead and felt in control of the recovery. Now the rules are coming from the state, the city and the University relative to the severity of the pandemic, with no end soon. Early this year we were in an almost complete shut-down, losing precious resources of essential animals and stopping long-term experiments. And yet we prevailed, with a gradual return to the labs in a carefully constructed plan that emphasized safety. By November we moved to 40 hour a week in an expanded work schedule and shifts that allowed distancing and increased productivity.

Amazingly, the pause in lab research resulted in a flood of productivity in publications and, most remarkably, in 36 new grants. As you will see in the award section of the Newsletter, in 2020 so far, we received 11 new R01s as well R21, F31, DoD and foundation grants adding up to \$3-4M/year for a total of about \$20M. Importantly, it allowed Jessica Ausborn and Simon Danner to move to tenure-track positions; Oscar Qiang will join their ranks once his award is finalized. Marie Pascale-Côté solidified her funding with several new grants, Ilya Rybak had a multi-PI R01 grant, Peter Baas received NIH and DoD funding to continue his record of excellence, Veronica Tom got her third R01, Ramesh Raghupathi had his R01 with an astounding score of 2nd percentile, and altogether the department is on the way for a grant portfolio of over \$10M/year. Other outstanding accomplishments are reflected in the Goldberger/Murray awards for students, faculty and staff, also included in this newsletter.

We had to make adjustments with virtual rotations for first-year graduate students and remote classes using Zoom, but the momentum provided by the new funding and new faculty will help us catch up with experiments and effective expansion of our research enterprise. I am pleased that we were also able to continue our other academic activities. We continued for the second year a systematic postdoctoral review, including comments by the Faculty Development Committee. No other department at the University has established such a review process despite tentative plans and the realization that such a review is essential. Our students responded to the crisis with a remarkable sense of community service and particularly an awareness of racial inequalities. They formed Neuroscience Graduate Student for Diversity (NGSD) and

initiated various activities, they continued to participate in the Taste of Science in Philadelphia, and they were determined to get this 2020 newsletter (#4) published.

Our educators also had to make major adjustments to medical education and remote teaching including Gross Anatomy, by purchasing and learning new dissection software (Complete Anatomy). To help with increased complexity of hybrid teaching and the increased need for prosectioned cadavers, we hired Brandon (Doug) Whitmire, who has also become our yoga and meditation guru. At the same time, Caitlin Howe conducted the summer Gross Anatomy course for Arcadia University (generating considerable income for the department) as well as, with others, continuing the online remediation courses (more income) and the Neuroscience Summer Camp. As we get ready for the opening the Reading campus, Haviva Goldman spearheaded the recruitment of three new educators (Medical Neuroscience, Histology and Gross Anatomy), evaluating dozens of applicants and organizing interviews, which all came to a successful conclusion with three new faculty – Jenna Wilcox, PhD (Gross Anatomy), Kelly Brenan, MD (Histology and Pathology) and Dana Peterson, PhD (Medical Neuroscience). The challenge was to get our faculty at Reading with sufficient overlap in anatomical sciences to work as a team, and fortunately, one with seniority (Dana coming as professor) to provide leadership. They will integrate with all department academic activities and develop their own scholarship.

As far as personnel changes, we have three of our faculty who moved or will be moving to tenure track (Jessica, Simon, Oscar), three new teaching faculty for the Reading campus (Jenna, Kelly, Dana), one who left (Manuel Castro) and one retired (Bruce Hirsch, whose legacy of artistic anatomy and bowties will always be remembered). As far as promotions, Michael Lane, Rodrigo España and Kim Dougherty were promoted to associate professor and Veronica Tom to full professor, with pending promotion for Marie. I started to worry that with this rate of promotions we will end up having only senior faculty, but with the transition of three of our faculty to tenure-track positions we are sure to have a continuous pool of young talent. In particular, I want to mention the Computational Neuroscience group that, under the leadership of Ilya Rybak, is now composed of five investigators with an international reputation of excellence and innovation. There was a change of guard in the spinal cord research center, with Simon Giszter and Veronica taking over as directors, and with the challenge of keeping the legacy and accomplishments of Marion Murray and John Houle. We are also resurrecting the joint Neuroengineering program with Biomedical Engineering, where Katie von Reyn and Vikas Bhandawat serve as excellent partners. Finally, I want to thank our office staff: Lisa, who has been dealing with two crises a day relentlessly... Joy, who was present in the office throughout the pandemic... Anna, who watched our expenses to keep us in compliance...and Kathy, who keeps me going even after five Zoom meetings.

Itzhak Fischer, PhD
Professor and Chair



Working hard at a spinal cord injury (SCI) conference in Las Vegas in the late 1990s.

People from L to R: Simon Giszter, John Houle, Marion Murray, Justin Snow, Alan Tessler (kneeling), Yi Liu (MD/PhD) and Kenny Simansky.

The History of the Department of Neurobiology and Anatomy

CHAPTER 4:

The Spinal Cord Research Center in the 21st Century

by John Houle, PhD

Professor in the Department of Neurobiology & Anatomy at Drexel University College of Medicine, and director of the Spinal Cord Research Center.

Working my way to Philadelphia

It was a long journey, but in 2005 I finally made it to the place I had been dreaming of being since my graduate student days in the late 1970s when I first starting reading papers by Goldberger and Murray (or Murray and Goldberger) about plasticity in the injured spinal cord. For a short scientific perspective, at the time I was a PhD student in the lab of Dr. Gopal Das at Purdue University, who was the first to demonstrate that transplants of fetal neural tissue into the brains of adult rats would survive, differentiate into specific types of neurons and form synaptic contacts with host neurons. It also was a time when Sam David and Albert Aguayo in Montreal demonstrated for the first time that adult mammalian axons would regenerate if provided a supportive environment, such as a graft of peripheral nerve.

At my 1978 SfN poster presentation, I met Barbara Bregman, who was Michael Goldberger's PhD student, and quickly we became close friends. Barbara introduced me to Michael and Marion and the Medical College of Pennsylvania (MCP) culture, and immediately I knew that it was a place I had to try to go to. I interviewed for a postdoctoral position with Michael and Marion in February 1981 and discussed the possibility of doing fetal transplants to promote recovery after spinal cord injury. At that time no one had managed to do this in an adult animal, and it was an exciting possibility to do this with the MCP group. On that visit I met Theresa Connors, Hazel Murphy, Tim Cunningham and Alan Tessler (who would later become a good friend and collaborator). The only hang-up was finding funding for my position, and unfortunately having two young children meant that I could not wait long before having to make the decision to accept



Itzhak Fischer with John Houle in a meeting (mid 90s).

an offer elsewhere. The timing was just bad, but I felt certain that at some point there would be another opportunity to be part of the MCP experience.

After spending several years in Canada working on astrocyte lineages and the glial reaction to injury, Barbara informed me that her former postdoc advisor, Dr. Paul Reier, was establishing a spinal cord research group at the University of Florida and was looking for someone to run his new laboratory. Barbara and Paul had been transplanting fetal spinal cord tissue into neonatal spinal cord injured rats and Paul was now ready to move this into adults. I jumped at the chance to get back into the transplant field and went to join Paul in 1984. During my time there (1984-'87) I began my own studies on the potential for chronically injured neurons to regenerate and performed experiments with intraspinal peripheral nerve grafts. I also started collaborating with Alan Tessler, who had come to UF to learn the art of intraspinal transplantation to promote dorsal root regeneration. That was also when I first became acquainted with Dr. Tim Himes, then a graduate student with Alan. Together we did some groundbreaking work involving the demonstration of synaptic evoked potentials from regenerating dorsal root axons and their extension beyond the transplant back into the host spinal cord. Alan and I also published a top-five cited review ("Repair of Chronic Spinal Cord Injury") in *Experimental Neurology* for five years in a row.

When it was time to start my own laboratory I found a department chair (Dr. Shirley Gilmore) at the University of Arkansas for Medical Sciences who reminded me very much of Marion Murray. Shirley was a leader in her field of spinal cord development, she was the first woman to serve as department chair at the medical school and was a no-nonsense leader who stood up for her faculty when appropriate and admonished us when necessary. Shirley was the mentor I needed as a new assistant professor, and she gave me the support and encouragement to withstand the disappointment of some less than favorable early reviews. I have tried to impart these features in my mentoring of students and faculty throughout my academic career. Interestingly, I find many of the qualities that I admired in Dr. Gilmore in Dr. Fischer, and they make him such a pleasure to work with both professionally and personally.

Highlights of my time in Arkansas as they relate to Drexel

I was fortunate to establish collaboration with two groups in Arkansas that helped my work move forward: locomotion physiologists and muscle biologists. Together we started to explore electrophysiological parameters of regenerated axons and their ability to promote some measure of functional recovery, and to develop rehabilitation approaches to train reestablished neuromuscular circuits after SCI. This included the building of motorized exercise bikes for spinalized rats that we later shared with colleagues at Drexel, University of Florida, University of Louisville and University of British Columbia.

As my research program on regeneration began to gain some notoriety I received an inquiry about postdoctoral research possibilities from a talented PhD candidate at the University of Hong Kong. In 1998 I welcomed Dr. Ying Jin to my lab to begin a productive two years of training. Ying worked tirelessly (as she still does) examining the neuronal response to injury and the beneficial effects of neurotrophic factors in reducing axonal dieback. Ying was instrumental in performing the experiments of a new collaboration with Dr. Itzhak Fischer, who had genetically modified fibroblasts to release the neurotrophic factor BDNF. Soon after completing this study, Ying left for a position at the University of Kentucky, but little did we know that we would be working together again in Philadelphia about eight years later. It is interesting to see how many of our paths cross at different times in different places.

A few years after Ying moved to Kentucky she was joined there by a bright young postdoctoral fellow from China, Dr. Shaoping Hou. Shaoping had contacted me in 2004 about a possible postdoctoral position in my lab, but I was being recruited for the position at Drexel at the time and was unsure of whether I could provide for additional personnel right away. I suggested that he contact a close friend and colleague, Dr. Sasha Rabchevsky, at the University of Kentucky about a position. I had great confidence in Sasha as a possible mentor for Shaoping because of my connection with Sasha during his graduate work with Paul Reier in Florida. I think what this starts to illustrate is how the influx of new investigators helps new spinal cord centers become established, allowing the field to expand in scope; yet we

remain strongly bonded and interconnected by a common goal of improving the quality of life of individuals with a spinal cord injury.

My pre-Drexel period ended in 2004 with two very happy events. Early in the year Dr. Veronica Tom joined the lab after finishing her PhD work with Dr. Jerry Silver at Case Western University. Her *in vitro* work with extracellular matrix molecules and chondroitinase to promote axonal growth had led the way for some *in vivo* experiments that I was working on with Jerry's assistance. I was fortunate to entice Veronica to come to Arkansas for postdoctoral training, and together we finished a study demonstrating recovery of forelimb use due to regeneration of axons through an intraspinal peripheral nerve graft. Right away I felt comfortable with our scientific relationship and knew that she had great potential for stardom. I just needed to stay out of her way! Around this time Itzhak contacted me about coming to Drexel to give a seminar and to talk about the position of director of the Spinal Cord Research Center. Certainly I was interested, because it was the place I always wanted to be; the people at Drexel were some of my closest friends and colleagues, and professionally it was the right time to consider a move.

The major consideration not to move was that my wife Katherine had lived most of her life in Little Rock, and all of her family lived there, including our three grandchildren. Nevertheless, she agreed to visit Philadelphia for a long weekend with me. I believe destiny finally caught up with me because Katherine had a great time on the trip, meeting Itzhak and Gloria Fischer, Alan and Dee Tessler, Marion Murray and Justin Snow, and touring parts of Philadelphia. Katherine was so supportive of my making this move that we even found a house in Chestnut Hill that we wanted to buy before I had accepted an official offer. The last step was to convince Veronica to make a second major move within a year's time, but I feel she was pretty easily swayed once she visited Drexel and appreciated the possibilities for scientific growth and collaboration at Queen Lane. I couldn't have picked a better new boss than Itzhak. Everything we discussed about the position came to fruition, he was honest and up-front with his expectations and I believe we have shared an unrivaled 15-year period of productivity and growth because of our mutual interest in the development of young investigators.

Spinal Cord Research Center, 2005-2020

The research strengths of the Spinal Cord Research Center in 2005 were transplantation to promote regeneration (Drs. Itzhak Fischer, Alan Tessler, Tim Himes, Marion Murray), robotic and treadmill training to promote functional recovery (Drs. Simon Giszter and Michel Lemay) and restoration of neuromuscular circuitry (Drs. Young Jin Son and Tony Burns). A core facility led by Dr. Jed Shumsky was developing behavioral assessments to detect sensory-motor recovery, and one of the important outcomes of this work was publication of a rat forelimb locomotor scale (FLS) to evaluate recovery of arm and forepaw use, which was analogous to the famous BBB scale used to evaluate hindlimb use after SCI. Assisting Jed on this project was Harra Sandrow, who later became the first PhD graduate student to join my lab. Theresa Connors was (and remains) the mainstay of the day-to-day operation of the center. The MCP/Hahneemann/Allegheny/Drexel spinal cord research group had long been known for their collaborative work and NIH support in the form of a program project grant, and it was a major goal of mine to continue this tradition.

With everyone's input we designed a proposal around three PIs (Fischer, Houle, Lemay) and four core facilities (behavior, surgery, microscopy/histology and tissue culture) with directors from the group. Marion served as senior advisor for the project. Our first attempt received encouraging reviews but, not unexpectedly, it needed some revisions. With another great team effort, we were successful with the resubmission and funding of the P01 entitled "Spinal Cord Injury, Plasticity and Transplant Mediated Repair" began in April 2008. At that time, we were the only NIH funded program project for spinal cord injury research, and that remained the case for the full five years of the grant. There were larger and perhaps more prestigious institutions in the U.S. involved in SCI research, but to be the only P01 meant that we were held in high esteem by our peers. I felt our group worked hard every day to maintain their professional respect.

Starting a P01 with new colleagues was a really exciting time for me because it opened up many research possibilities and facilitated recruitment of high-quality graduate students and postdoctoral fellows, which had been difficult during my tenure at the University of Arkansas for Medical Sciences. Getting settled in the lab with Veronica, adding Harra to my group and working daily with Alan and Itzhak was like a dream come true. I learned so much from everyone over the first couple of years and had such great, stimulating conversations that it was like being at SfN every day. The center members always worked as a team. We expanded the range of techniques and training available within each of the core facilities, had some wonderful summer trainees and visiting PIs, and managed to have some fun along the way. There were many occasions for celebration: invited international talks, new grants, promotions, additions of new personnel. Here are a few highlights during the first five years of the P01: Ying Jin joined the Fischer lab, Veronica was promoted to assistant professor, Dr. Marie Côté joined my lab as a postdoctoral fellow (we got Julien as a bonus signee in that deal), Dr. Megan Detloff joined my lab as a postdoctoral fellow (interestingly her PhD advisor, Dr. Michelle Basso, was a postdoctoral fellow with Michael Goldberger at MCP), and Shaoping Hou joined Veronica's lab as a research associate.

Another momentous occasion was the official retirement of Marion in 2013. Fortunately for us she continued reviewing our manuscripts and grant proposals, but her research career was complete with the thesis defense of Dr. Laura Krisa (now associate professor, Department of Physical Therapy, Thomas Jefferson University). Sadly, there were two valuable members of my lab who lost their battle with cancer within a few years of each other. Dr. Gang Liu was instrumental in moving my research into more molecular-based approaches, concentrating on changes in micro-RNAs associated with the PTEN-mTOR pathway after SCI. Dr. Vicki Zhukareva was an extraordinary protein biochemist whose protocols for tissue preparation and Western blot analysis are used routinely in many labs in the department. They were dedicated scientists and truly wonderful people and have been missed every day.

For the P01 competing renewal, one of the innovations we proposed was to embark on a five-year expansion program of the Spinal Cord Research Center whereby we would actively seek the best and brightest young SCI investigators to bolster our existing expertise and

expand into new research areas. Already we had kept one of the best and brightest in Dr. Tom and realized we should do that again with Dr. Côté based on her work on post-SCI spasticity and importance of potassium-chloride co-transporters. We then went outside the department and pursued two extremely talented individuals. We were fortunate to secure the services of Dr. Michael Lane, knowing that he would be an ideal candidate to lead studies of secondary complications after injury, concentrating on respiratory dysfunction. Michael's connection with my former mentor, Paul Reier at UF, only positively influenced my judgement. When looking to expand our research portfolio in the area of interneurons and motor control, the input from Dr. Rybak was critical in leading us to the recruitment of Dr. Kim Dougherty from her postdoctoral position in Sweden. For the final two positions we chose two individuals who had demonstrated great success in securing research funding in areas that were highly significant for our center program and had strong potential to run an independent program: Dr. Shaoping Hou for his interest in autonomic control of bladder and cardiac function after SCI, and Dr. Megan Detloff for her work on neuropathic pain, inflammation and exercise. While this major expansion was supported in small part by the renewal of the program project, the success of this five-year growth plan was due primarily to Dr. Fischer's negotiating skills with Dean Schidlow and his willingness to use departmental funds to back people who we had complete faith in as new investigators.

Growth within the center was not yet finished, though. Over the last few years Dr. Rybak has attracted some outstanding postdoctoral fellows to his computational neuroscience research program. First with the addition of Dr. Simon Danner and then Dr. Jessica Ausborn, there now was a critical mass of young investigators in Ilya's group. These talented individuals followed a familiar formula of publishing outstanding papers, submitting grant proposals and securing NIH funding for their independent research. Given our proven success with 'in-house' promotions, Dr. Fischer worked his charm again with the new dean and secured tenure-track positions for both Simon and Jessica to begin in 2020. Not everything about this year of the pandemic has been awful!

While quite accomplished in their own areas of SCI research, each of these seven new faculty appointees had to have one thing in common – the understanding and desire to be part of a special culture where research ideas are shared freely in a collegial atmosphere. This has been part of the core principle of the SCI group since it was established by Michael and Marion at MCP over 40 years ago, and it is an important part of our identity. It has been so rewarding to see how each of them has matured professionally and grown their individual research programs while developing collaborations within the center that could lead to future programmatic funding.

In September 2018, Marion Murray, one of the founders of the spinal cord research group at MCP, died. This was a deeply felt loss of a friend and colleague for everyone in the department, if you had been here for 40 years or for 40 days. In a memorial ceremony at Queen Lane held a few months later, there was an outpouring of appreciation for what Marion had contributed to each individual in the room. During the opening remarks I was grateful to be able to announce Drexel's official naming of the Marion Murray Spinal Cord Research Center. Every day that I pass the lettering at the end

of the corridor proclaiming it her center I think back on what it was like at the beginning when few people believed in the plasticity and regeneration work that she started, and how I so much wanted to be part of it. I then realize how lucky I am to have been a part of the group for the last 15 years.

As I was finishing this perspective there was an announcement of the 2020 Daniel V. Schidlow, MD, Transformational Leadership Award, and I wanted to recognize Dr. Fischer as the first recipient of this award, because it reflects what his contribution has been to the Marion Murray Spinal Cord Research Center for over 25 years. "This award is presented to a faculty member who exhibits substantial leadership to transform and make change through example and articulates an energizing vision. This faculty member encourages, inspires, mentors and sponsors a diverse, inclusive and equitable next generation of clinicians, scientists, educators and staff. This transformational faculty leader motivates members of the institution to innovate and create change that will help grow and shape the future success of the institution." •

Neuroscience Graduate Students for Diversity: Moving Science and Academia Forward



Founding Story

The Neuroscience Graduate Students for Diversity (NGSD) group was founded by a small group of students wishing to make a long-lasting change following the murders of George Floyd and Breonna Taylor. The Department of Neurobiology & Anatomy at DUCOM prides itself on its inclusive, welcoming and collaborative environment. Building on this, the primary goal of NGSD is to ensure that this environment is inclusive and mindful of trainees and staff of diverse backgrounds. Moreover, NGSD seeks to provide a safe and inclusive environment for supporting diverse staff and trainees. The purpose of this group is to increase the sense of community, belonging and support that encompasses the intersectional experiences of diverse staff, trainees and their peers through open and honest conversation and to discuss and promote diversity in all aspects of their experience. When we say "diversity", we mean people of all genders, race, ethnicities, sexual orientations, backgrounds and neurodiversity; however, our immediate goal is to foster Black representation in neuroscience. NGSD works closely with department faculty to ensure that concrete steps are taken to: 1) increase diversity within the department and the Neuroscience graduate program; and 2) foster a safe and welcoming environment for members of the department, as well as provide appropriate resources for education, research and outreach for diverse students and staff.

Leadership



President: Sadie Bennison

Following the murders of Breonna Taylor and George Floyd, the students realized that there is no better time than now to make a positive change. A group of students led by the women who later founded NGSD, came up with a list of actionable items to move science and academia forward. However, we felt it unfair to ask for change from the administration without working for it ourselves. We first needed to re-educate ourselves on the intersection between science, racism and society. Next, we needed to come up with creative solutions for recruiting and retaining historically excluded minorities to our program. Most importantly, we also needed to assess the supportiveness of our environment for diverse populations. NGSD was created to hold our department accountable for actionable items, and to provide educational content for ourselves, our peers and faculty members. As a white senior graduate student with a good relationship with many faculty members, I realized that I had the privilege necessary to get a group like this off the ground. Through NGSD we have already made concrete changes, had difficult but necessary discussions, and performed successful community outreach. I am consistently blown away by the amazing work of fellow NGSD leaders! Scientists cannot shed their identities when they enter academic spaces, and we hope that with NGSD's work, scientists will be comfortable and celebrated for being their most authentic selves.



Vice President: Taylor McCorkle

This group is extremely special to me as the senseless murders of countless Black individuals in this country hits too close to home. I want to do my part in demanding justice and uplifting the Black community. Through this group, we are able to provide accessibility to resources that are otherwise not provided in marginalized communities. We will bring awareness and create opportunity in STEM fields and hopefully inspire the future of BIPOC youth. For me, this group is the definition of "be the change you want to see in the world."



**PR & Communications
Director:
Micaela O'Reilly**

I am a passionate advocate for antiracism in STEM and society as a whole. As countless Black lives have been lost and communities continue to be terrorized and marginalized, now is the time to stand up and actively work to enact meaningful change

in society—in whichever way we can. My fellow founders and I sought to form a group that would bring awareness, education and career opportunities in STEM to underrepresented and marginalized communities in the local Philadelphia area. However, it is my hope that NGSD will remain a permanent fixture at Drexel and in the community, inspiring others to explore careers in STEM and creating an accepting and socially conscious environment for students to flourish. Hopefully, after reading this, you too will find a way that you can "pay it forward" and continue this mission.



**Treasurer:
Nancy Mack**

I am passionate about mental health research, science communication, community engagement, and most importantly, the intersection of these avenues with anti-racism work. I believe that our ability to answer the tough questions with innovative approaches requires participation from a diverse pool of researchers who hold unique experiences and

perspectives. Higher education, like many other institutions in our country, has historically been exclusive to white males. I am grateful that barriers for women have started to be addressed, and I am passionate about using my privilege as a scientist and participant in academia to lift additional barriers for others. This led me to be a co-founder of NGSD, and I feel very fortunate to work with an awesome group of women to provide educational opportunities to instill long-lasting changes within our department. As the current treasurer, I am dedicated to ensuring our group has appropriate funds to make the greatest impact in our local community and beyond.



**Former Secretary:
Cassandra
Alexandropoulos**

I came to the United States to do my master's in neuroscience at Drexel in 2017. After I finished my master's, I worked as a research assistant in a neuro-engineering lab. Currently, I have transitioned from a career in academia to a new position in industry in the Infectious Diseases Department of Regeneron

Pharmaceuticals. I am very excited that prior to leaving Drexel University, I had the opportunity to be a founding member of NGSD and assume the leadership role of secretary. I truly believe NGSD will enact real,

meaningful change at Drexel University, and I am honored to have been a part of that while at Drexel. I am excited to continue being involved in NGSD, even in a limited capacity, when I transition to my new position.



**Secretary:
Candace Rizzi-Wise**

I helped found NGSD because, as I am one of the few minorities currently in the program, it is important to me to increase representation of Black students in neuroscience. I hope that the efforts of our group raise awareness and provide an outlet for Black and other underrepresented students to

find passion and seek higher education opportunities in all areas of science.



**Outreach Chair:
Ashley Opalka**

When our NGSD team started to develop the group, I thought that one way to increase BIPOC representation in neuroscience/STEM was to show local young students that anyone can identify as and become a scientist, regardless of race, gender, sexual orientation, neurodiversity, or whether you

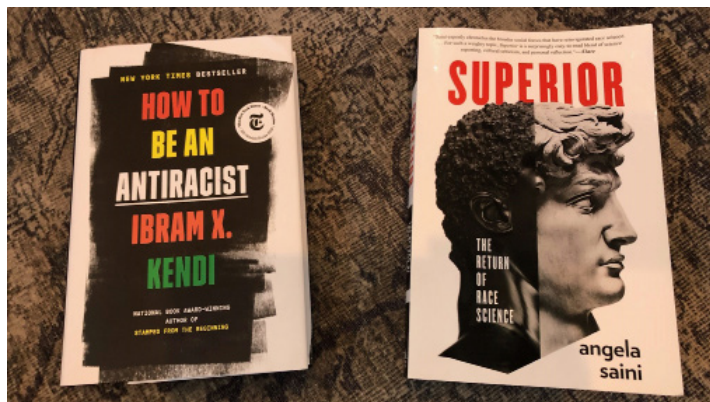
personally know a scientist. By having graduate students from various backgrounds provide information sessions, educational outreach and resources, we hope that young students can relate to our volunteers, while gaining an understanding of what research is and how to become a research scientist. We also hope to create an open environment for mentorship, as navigating higher education can be intimidating, so everyone feels welcome [and excited!] in this collaborative field.



**Web Content
Designer:
Kayla Socarras**

I joined the group not long after the senseless and cruel murders George Floyd and Breonna Taylor this summer. I am passionate about social justice and the treatment of disadvantaged groups. While there are numerous ways to help, I believe that communication

is key. In an age in which there is an abundance of information and misinformation, I wanted to use my abilities in graphic design to give others a platform and connect them to the resources they need.



Book Club

One important facet of NGSD is our monthly book club, which is run by Vice President Taylor McCorkle. The purpose of this book club is to promote education and dialogue on the intersection of science and society with racism, gender expression, neurodiversity, etc. "To me, it serves as an essential stepping stone to further impacting marginalized communities. As a group that intends on creating real change in our community, NGSD must be committed to learning what problems exist in society and how to take actionable steps to combat these issues" said Taylor. On the last Thursday of every month, both members and non-members of NGSD join via Zoom to participate in a rich discussion on the assigned chapters for the book of the month. Book club first met in August and since that time, vivid conversations about Dr. Ibram X. Kendi's "How To Be Antiracist" and Angela Saini's "Superior: The Return of Race Science" have taken place. The success of the book club thus far is largely owed to Taylor, who takes time each month to come up with thoughtful discussion questions that have promoted open and honest dialogues among the group. These monthly dialogues help to create new knowledge and understanding between students of different backgrounds. Taylor explained, "our book club meetings are a safe space where we can cultivate antiracist ideals and unlearn unintentionally harmful behaviors. We talk about uncomfortable topics and truly dive into the ways in which systemic racism has plagued the systems of our current society. It is through this process of constant learning and unlearning that I believe NGSD will have the greatest impact." The education that Taylor provides her fellow students through facilitation of book club discussions is invaluable to their growth as well-rounded scientists and members of society. "We have truly developed in our understanding of policies and practices that hinder historically excluded minorities and it is our mission to break these walls down," says Taylor. Currently, the book club is reading "The Immortal Life of Henrietta Lacks" by Rebecca Skloot.

Outreach

Outreach is another important component of the NGSD group, and Ashley Opalka serves as the chair of NGSD's outreach operations. In order to partake in outreach with NGSD, volunteers must be in regular attendance at NGSD's meetings. This requirement is in place to ensure that volunteers are well versed in issues of race and diversity before entering diverse communities to provide educational material. This academic year, the mission of the outreach portion of NGSD is fostering Black representation in neuroscience within

our local community. This initiative was kicked off with NGSD's "Real Talk" series that took place as virtual webinars this November. The Real Talk series was designed to spread awareness of science careers, graduate school and research opportunities to traditionally excluded minority undergraduate students and increase representation of Black students and students of color in STEM. The success of the Real Talk initiative is largely due to the hard work of our departmental members of NGSD that assist with outreach. These panels generated fruitful discussion, drawing participation from many undergraduates from numerous local schools who asked extremely thoughtful questions. Support from departmental faculty Dr. Ramesh Ragupathi and Theresa Connors has allowed the outreach portion of NGSD to blossom. These outreach activities will continue into the spring through an extension of the "Real Talk" panels, which will be geared toward college students and discuss mental health in academia. In addition, through collaboration with the Office of Community Engagement, "Drexel Med Mentors" talks will allow medical students to engage in discussions that inform high school students and their parents about current health topics. In addition, several NGSD volunteers partnered with Big Brothers and Big Sisters through an already established collaboration with Drexel University. This opportunity allows our NGSD volunteers to further support local students by providing mentorship to middle and high school students on a regular basis. "As scientists, it is crucial for us to not only educate our local community, but also train the next generation of scientists. Being a part of NGSD has taught me that we [graduate students] can make positive change in academia, especially by advocating for inclusivity and showing local students of all ages that anyone can become a successful, passionate scientist!" said outreach chair, Ashley Opalka. •

**NGSD Real Talk
Fall Series**

Panel 1: Graduate School in STEM and Beyond
Panel 2: Application 101—Applying to STEM Graduate School
Panel 3: Gaining Research in STEM

@ngsd_drexel

Creations



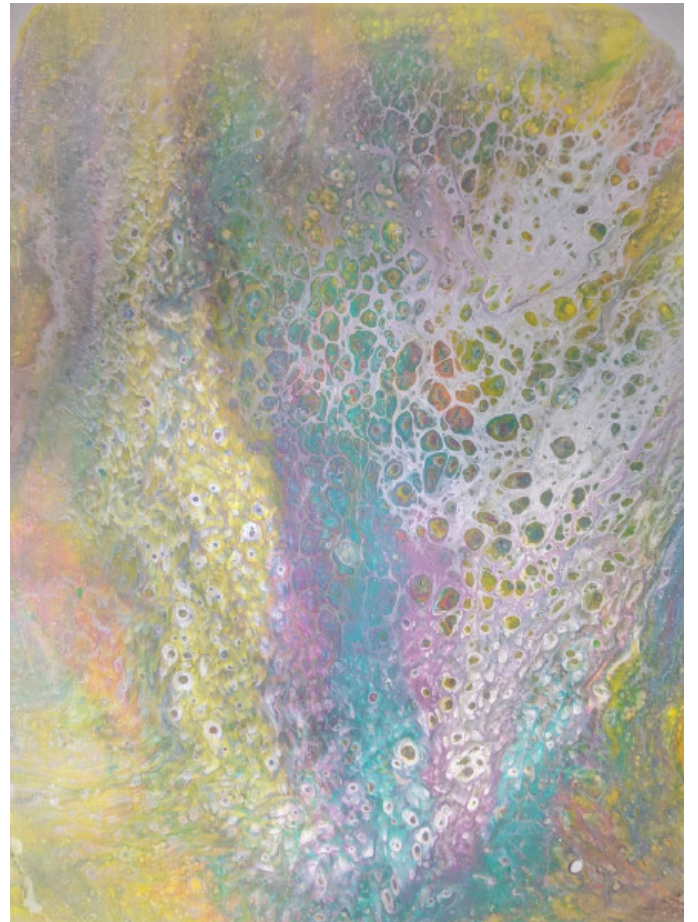
A Bird
Jani Bilchak



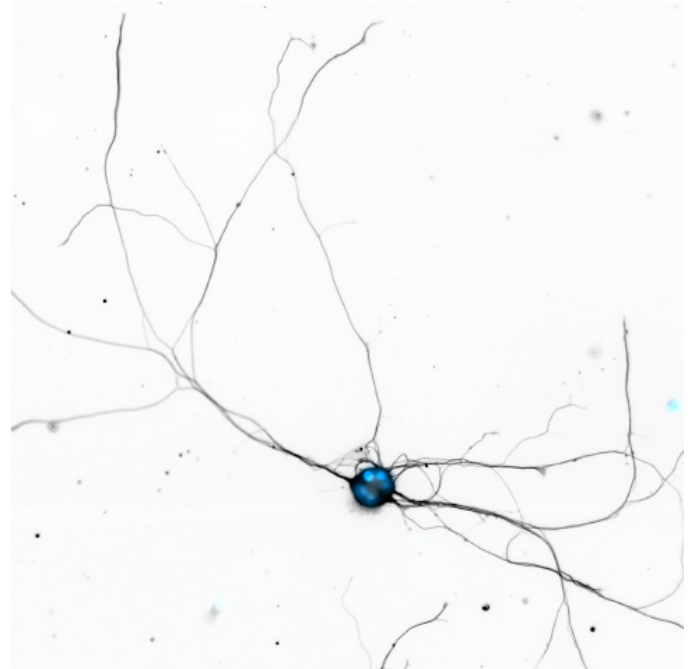
Election Night
Jani Bilchak



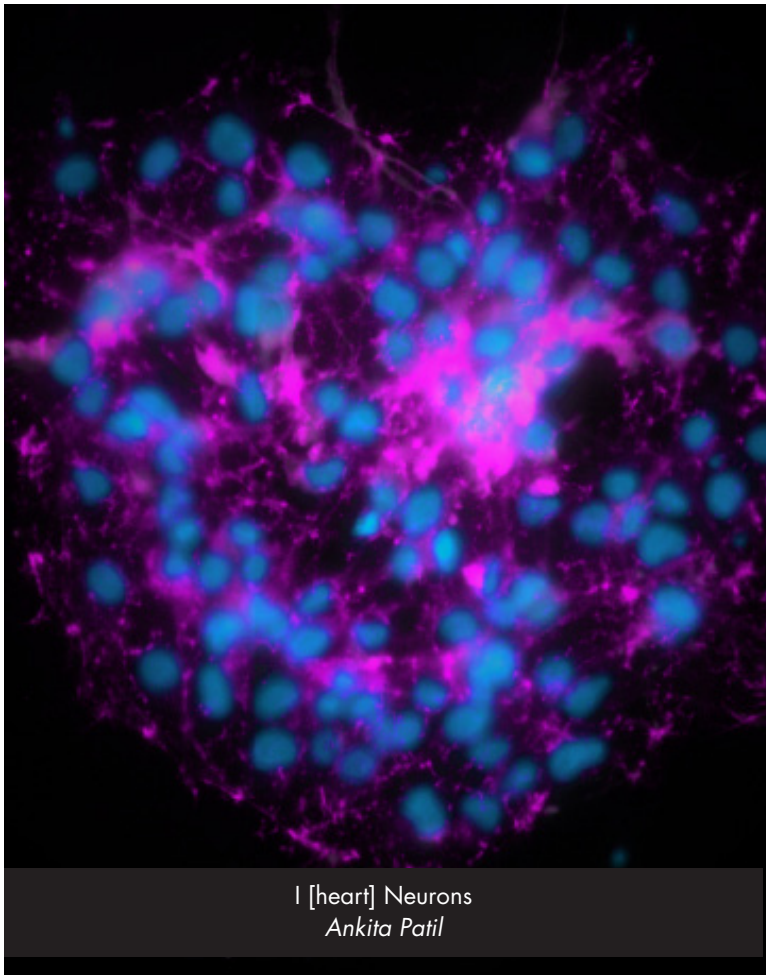
Multifunctional Hobby That is Great for Stress Relief & Gifts!
Candace Rizzi-Wise



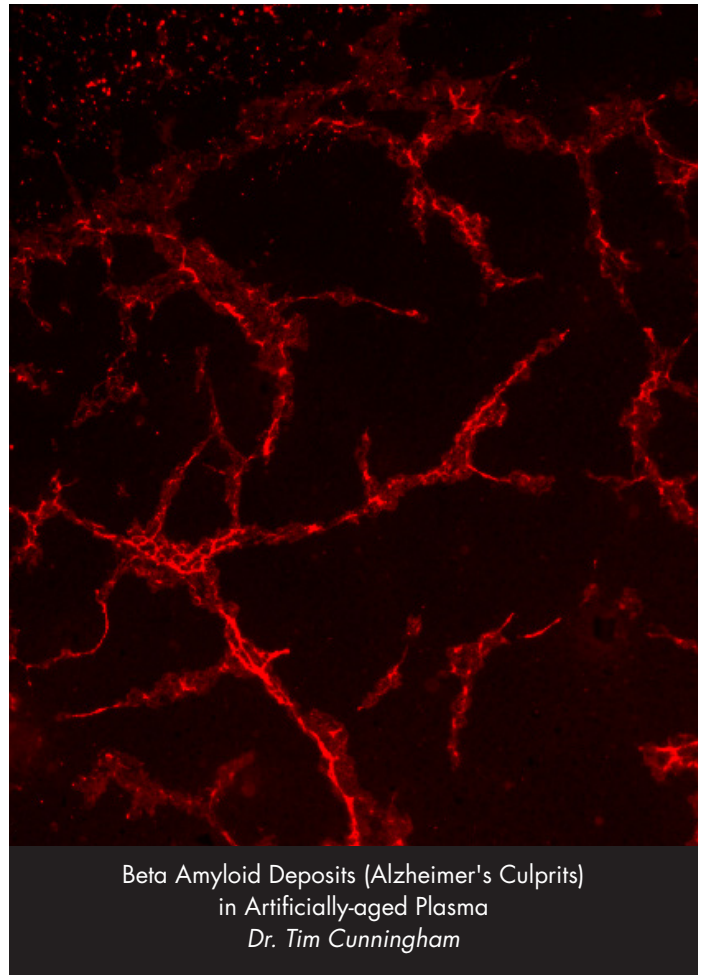
Tried Pour-painting for the First Time
Shrobona Guha



Magnemite, the Pokemon,
or a Cluster of SCGs
Ankita Patil



I [heart] Neurons
Ankita Patil



Beta Amyloid Deposits (Alzheimer's Culprits)
in Artificially-aged Plasma
Dr. Tim Cunningham



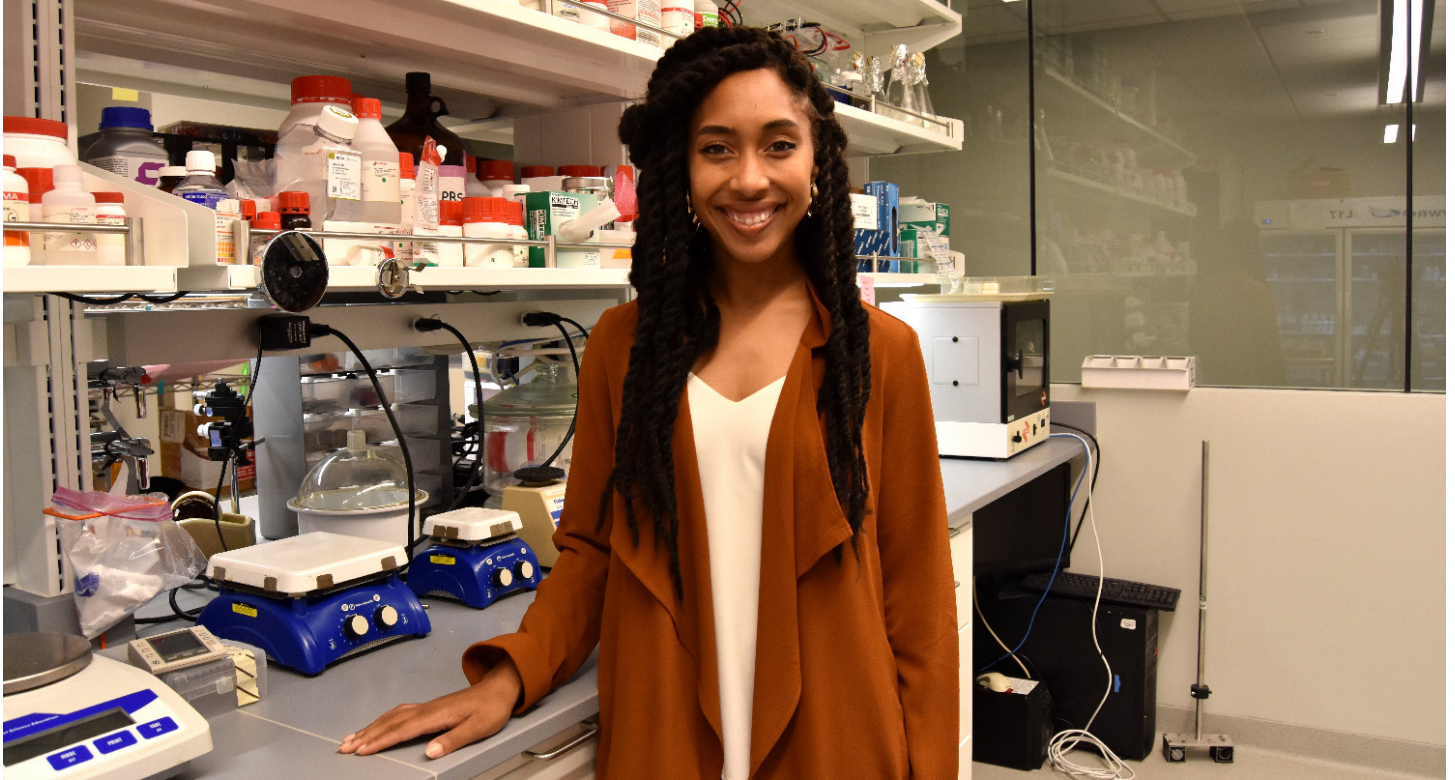
Rocky Seas and
We're All in the Same Boat Now
Shrobona Guha



Radial Glial Cells & My Favorite Protein
(or Most Hated, Depending on the Day)
Sara Blazejewski

Alumni in the Spotlight

Brielle Ferguson, PhD: #BlackInNeuro



An alumna of the Neuroscience program and former graduate student of Dr. Wen-Jun Gao, Brielle Ferguson, PhD, was named to *Forbes* magazine's list of "30 Under 30" to watch in science, which highlights young innovators on the brink of making it big.

Brielle graduated with a degree in Neuroscience from Drexel in 2017 and joined the laboratory of Dr. John Huganard at Stanford University as a postdoctoral fellow, where she now conducts National Institute of Mental Health-funded research on attentional impairments in a genetic mouse model of absence epilepsy.

The "30 Under 30" list was not the first time Brielle appeared in the international business magazine this year. Brielle's science advocacy was earlier recognized by *Forbes* magazine in their article highlighting the new #BlackInNeuro campaign. As a co-founder of Black In Neuro, Brielle created an online platform with fellow neuroscientists to

highlight and support Black voices in neuroscience. Black Americans are currently largely underrepresented in science and can often feel isolated, as they lack peers and mentors with shared experiences. Black In Neuro seeks to correct this by building a supportive network of Black neuroscientists and conducting outreach. The campaign quickly gained thousands of supporters and has recently held a virtual scientific conference as an opportunity for trainees to present their research.

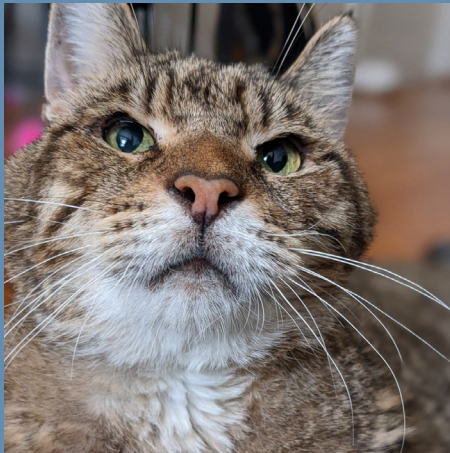
Currently, Brielle serves on the board of Black In Neuro as the director of programs. Check out the Black In Neuro website to see the amazing platform Brielle has been contributing to: blackinneuro.com.



Scientist Support Animals

Due to the pandemic, we all began spending a lot more time at home this year. Some of us used that as an opportunity to add new furry friends to our families...

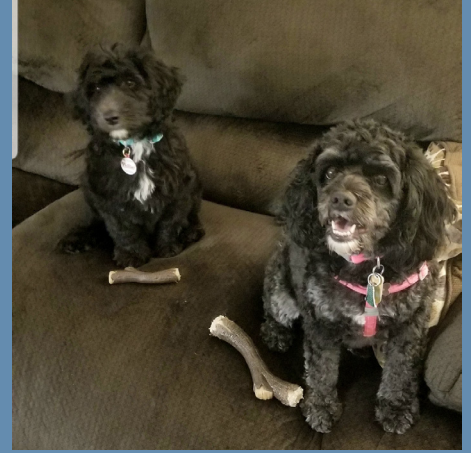
Meet the Pandemic Pets!



Chomchom
Shrobona Guha



Comet
Emily Black



Echo & Luna
Sara Blazejewski



Fuzi
Beanie Sun



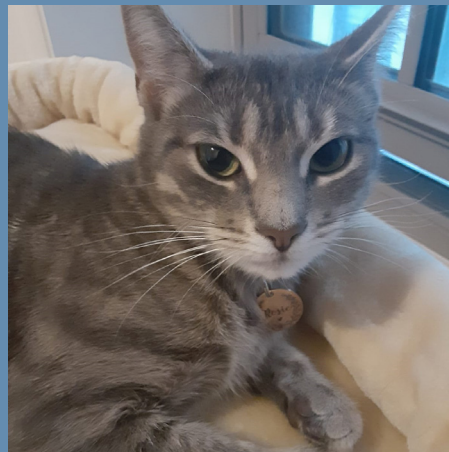
Hazel
Ashley Opalka & Kyle Samson



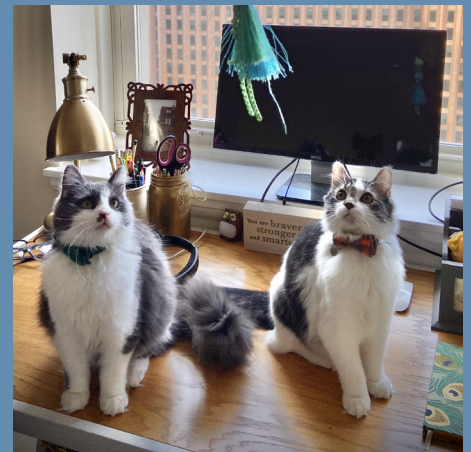
Moka
Dr. Cote & Julien Bouyer



Sass
Dr. Smith



Rosie
Philip Yates

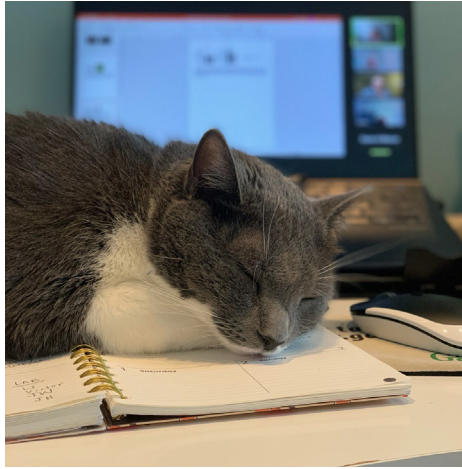


Tullamore Dew (Tully) & Smithwicks (Smitty)
John Walker

Scientist Support Animals, *cont.*



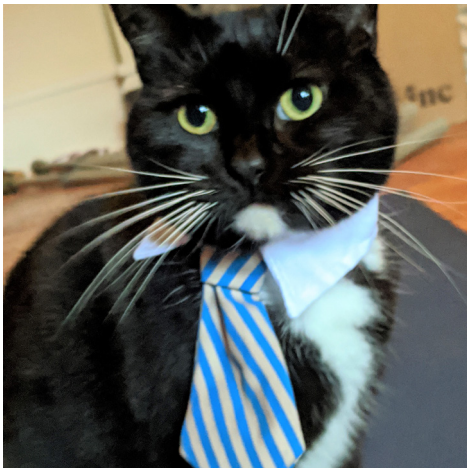
Bella
Nancy Mack



Fritz
Dr. Detloff



Max
Dr. Barson



Robin
Ankita Patil



Stevie & Jack
Dr. Shumsky



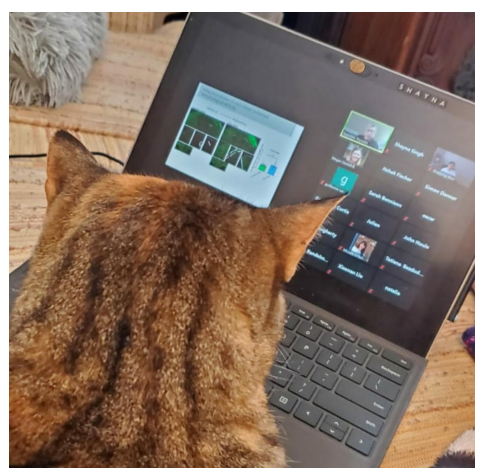
Winter
Jani Bilchak



Nemo & Lilly
Dr. Fischer



Mazie
Sadie Bennison



Paris (learning about neuronal migration from Dr. Tooyoka)
Shayna Singh

Graduates of 2020

Linda Chamberlin, PhD

Adviser: Wen-Jun Gao, MD, PhD

Thesis Title: Targeting prefrontal parvalbumin cells to rescue cognitive deficits in a rodent model for Schizophrenia

Defense Date: April 17, 2020

Current Position: 3rd year medical student at Drexel University College of Medicine

Erik Li, PhD

Adviser: Kimberly Dougherty, PhD, and Catherine Von Reyn, PhD

Thesis Title: Modulation of spinal Shox2 interneurons by synaptic input from sensory afferents and local locomotor circuits

Defense Date: April 24, 2020

Current Position: 3rd year medical student at Drexel University College of Medicine

Shunyi Zhao, MS

Adviser: Shaoping Hou, PhD

Thesis Title: Alterations of DA-related transcripts in A11 diencephalospinal pathways after spinal cord injury

Defense Date: July 31, 2020

Current Position: Research assistant in LongJun Wu's lab at Mayo Clinic

Hemalatha Muralidharan, PhD

Adviser: Peter Baas, PhD

Thesis Title: The role of mitotic motor forces of KIFC1 on microtubule array during development

Defense Date: December 3, 2020

Current Position: Postdoctoral fellow with Jeffery Haines at Regeneron

Neurobiology and Anatomy master's students who transitioned into the PhD program:

Taylor McCorkle

Breanne Pirino

John Walker

Samuel Wechsler

First Years of 2020



PhD Students:

Kendra Case
 Christina Curran-Alfaro
 Adam Hall
 Arron Hall
 Andrew Lockhart
 Joya Maser
 Jenna McGrath



MD/PhD Student:

Joseph Arena

Master's Students:

Brody Carpenter
 Amber Hilbish
 Abby Keith

Priscilla Santos Acevedo
 Mariah Wulf

2020 Awards & Grants



discovery 2020 Event Highlights

| | |
|---|---|
| <p>Jason Wickman <i>Outstanding Junior Graduate Student Poster</i> 1st Place Mentor: Seena Ajit</p> | <p>Sarah "Sadie" Bennison <i>Outstanding Senior Graduate Student Poster</i> 2nd Place Mentor: Kazuhito Toyooka</p> |
| <p>Ashley Opalka <i>Outstanding Junior Graduate Student Poster</i> Honorable Mention Mentor: Dong Wang</p> | <p>Emanuela Piermarini, PhD <i>Outstanding Postdoctoral Fellow Poster</i> 1st Place Mentor: Peter W. Baas</p> |

F31 Fellowship

Sara Blazejewski, mentored by Dr. Kazuhito Toyooka

Graduate Student Excellence Awards

Graduate College Winners Teaching Assistant Excellence Award

Nancy Mack, mentored by Dr. Wen-Jun Gao

Research Excellence Award (pre-candidacy)

Ashley Opalka, mentored by Dr. Dong Wang

College of Medicine Finalists Research Excellence Award (post-candidacy)

Genevieve Curtis, mentored by Dr. Jessica Barson

Outstanding Mentorship Award

Sara Blazejewski, mentored by Dr. Kazuhito Toyooka

Most Original and Creative Work Award

Hemalatha Muralidharan, PhD, mentored by Dr. Peter Baas

Outstanding Dissertation Award

Eugene Mironets, PhD, mentored by Dr. Veronica Tom

Faculty Awards

Daniel V. Schidlow, MD,
Transformational Leadership Award,
Drexel University College of Medicine
Itzhak Fischer, PhD

Julian Marsh Faculty Scholar Award,
Drexel University College of Medicine
Veronica Tom, PhD

External Awards

Runner-up Award for Best Graduate Student Poster at Society for Neuroscience Philadelphia Chapter

Taylor McCorkle, mentored by Dr. Ramesh Raghupathi

Honorable Mention for National Science Foundation Graduate Research Fellowship Program

Ashley Opalka, mentored by Dr. Dong Wang

Faculty Grants 2020

Jessica Ausborn, PhD

NIH

Peter Baas, PhD

NIH

Department of Defense

Jessica Barson, PhD

NIH

Marie Pascale-Côté, PhD

NIH

Craig H. Nielsen Foundation

Department of Defense

Office of Research & Innovation 2020 Scholarly Materials and Equipment Award

Simon Danner, PhD

NIH

Megan Detloff, PhD

NIH

Kimberly Dougherty, PhD

NIH

Wen-Jun Gao, MD, PhD

NIH

Commonwealth of Pennsylvania (CURE)

Shaoping Hou, PhD

NIH

Commonwealth of Pennsylvania (CURE)

John Houle, PhD

NIH

Liang (Oscar) Qiang, MD, PhD

NIH

Moseley Foundation

Commonwealth of Pennsylvania (CURE)

Ilya Rybak, PhD

NIH

Veronica Tom, PhD

NIH

Craig H. Nielsen Foundation

Ramesh Raghupathi, PhD

NIH

Rowan University School of Osteopathic Medicine

Office of Research & Innovation 2020 Racial Equity Rapid Response Research Awards

Commonwealth of Pennsylvania (CURE)

Dr. Kazuhito Toyooka, PhD

Commonwealth of Pennsylvania (CURE)

Tatiana Bezdudnaya, PhD

Paralyzed Veterans of America

Michael Lane, PhD

Craig H. Nielsen Foundation

Rodrigo España, PhD

Commonwealth of Pennsylvania (CURE)

Dong Wang, PhD

Commonwealth of Pennsylvania (CURE)

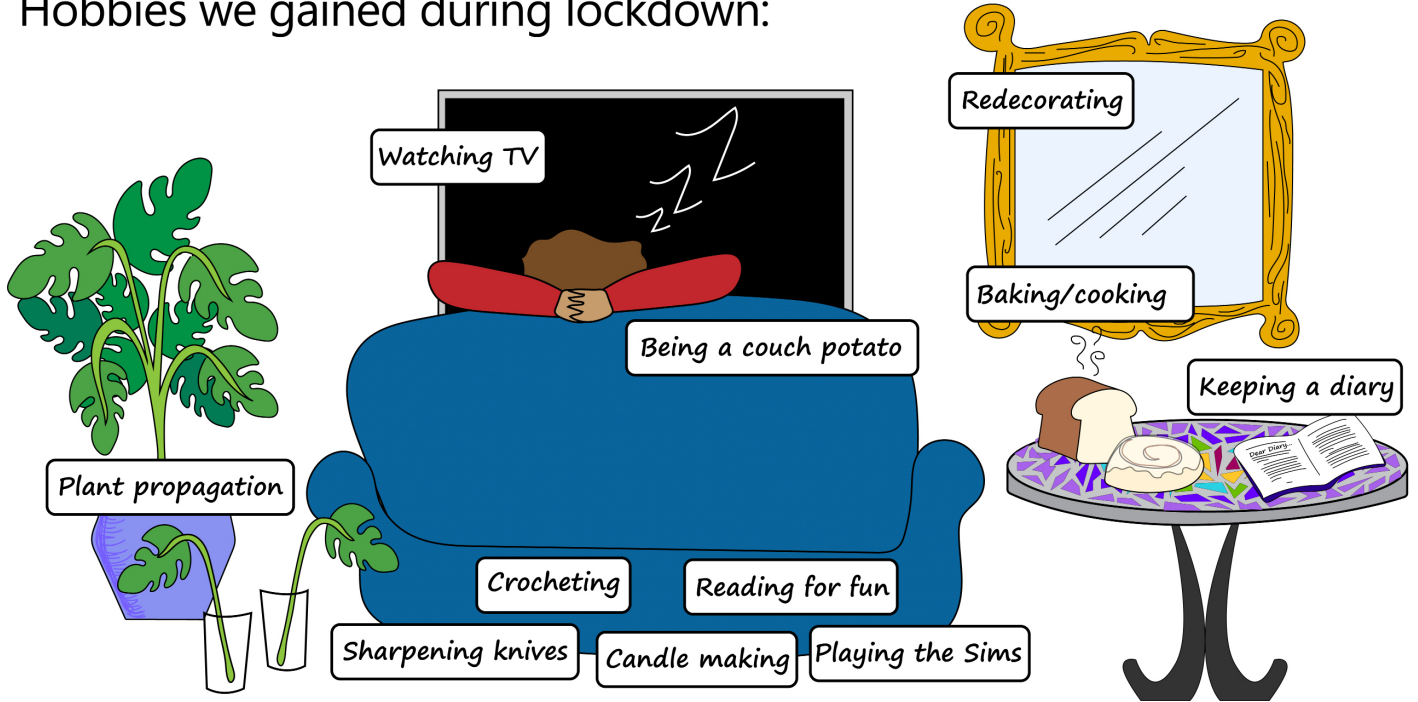
Claudio Torres, PhD

Commonwealth of Pennsylvania (CURE)

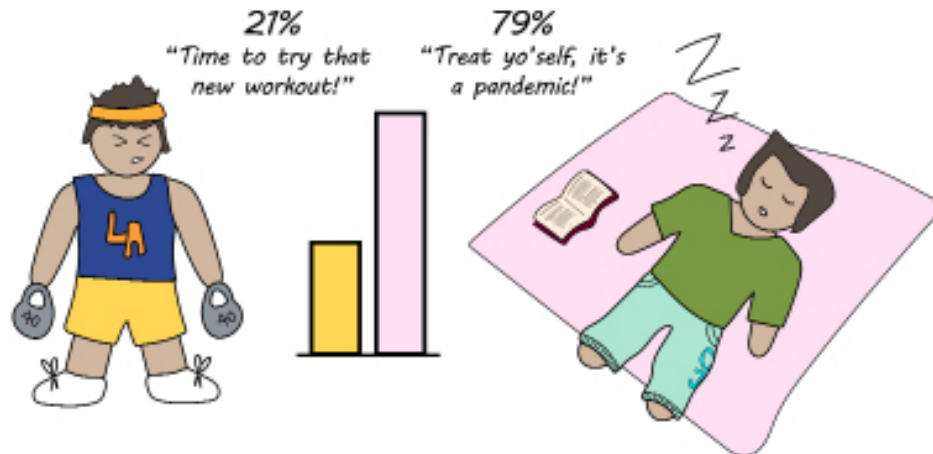
Culture

Illustrations by Ankita Patil

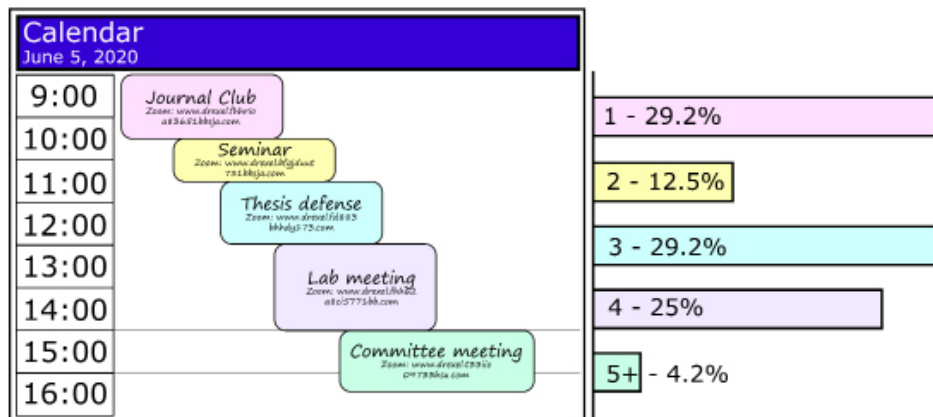
Hobbies we gained during lockdown:



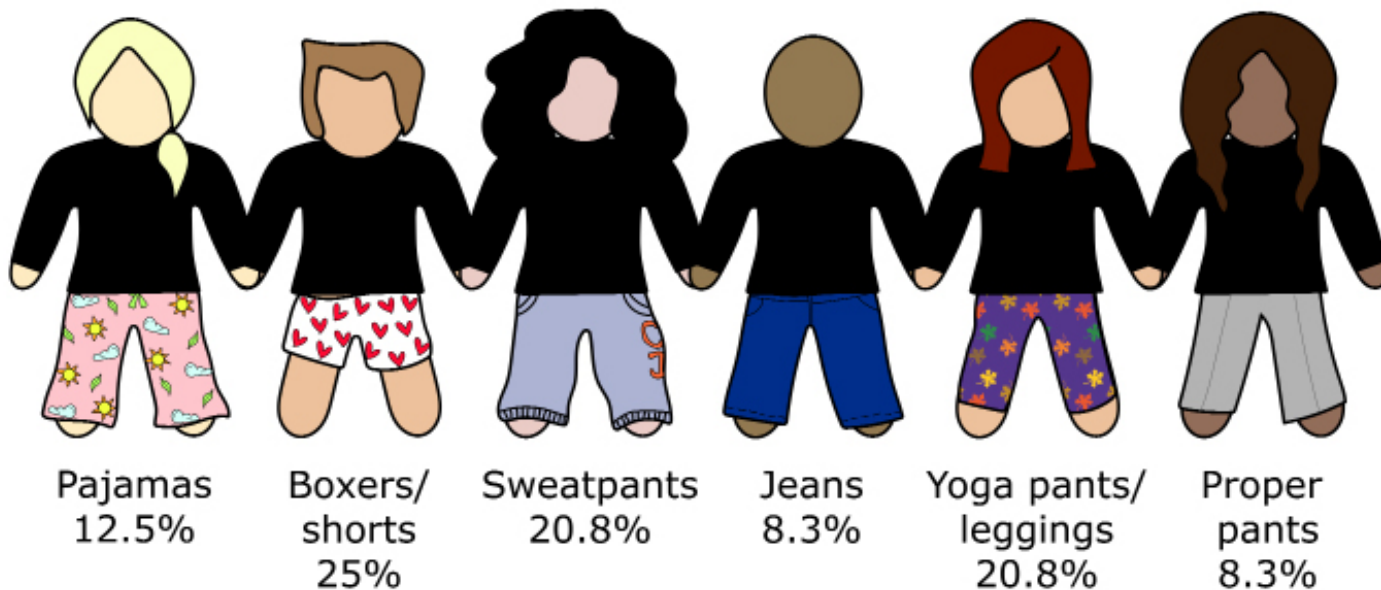
Pandemic lifestyle:
'Meeting your fitness goals' or 'Setting new cookie records?'



How many Zoom calls in a day before you drop?



What's on your bottom half during Zoom calls?



Activities & Outreach



2019 Departmental Holiday Party speech from Dr. Dong Wang



BSGSA 2019 Board Members at the Holiday Bowling Party



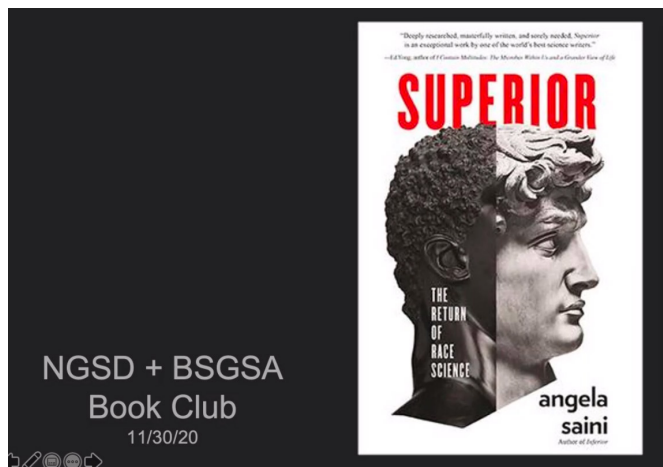
BSGSA Holiday Bowling Party back in January



Systems Multi-lab Meetings - November 2019, January 2020 and February 2020 - matching outfits!



BSGSA Formal in March 2020



BSGSA-NGSD combined bookclub!



Donations by the department to CampOutForHunger, organized by NGSD and DUCOM



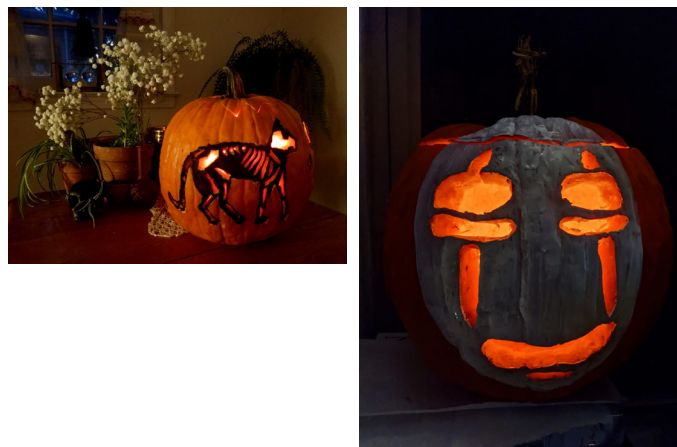
Cooper's Hawk by Dr. Baird who has combined casual birding and photography into a pandemic hobby



Cooper's Hawk, as imaged by Dr. Douglas Baird



PPE donated by DUCOM to health care workers and hospitals during the COVID-19 pandemic



BSGSA Virtual Pumpkin Carving
Left: Jani's pumpkin | Right: Shrobona's pumpkin

Publications

Jessica Ausborn, PhD

Song J#, Pallucchi I#, Ausborn J#, Ampatzis K#, Bertuzzi M, Fontanel P, Picton LD, El Manira A, (2020) Multiple Rhythm-Generating Circuits Act in Tandem with Pacemaker Properties to Control the Start and Speed of Locomotion.

Neuron 105,1048-1061.e4.

equal contributions

Peter Baas, PhD

Baas PW. (2020)

The Community of Neuronal Cytoskeletal Researchers Finds a Home.

Cytoskeleton (Hoboken). 2020 Mar;77(3-4):39. doi: 10.1002/cm.21584.

PMID: 32259406

Fischer, I Baas PW (2020)

Resurrecting the Mysteries of Big Tau.

Trends Neurosci. 2020 Jul;43(7):493-504. Doi: 10.1016/j.tins.2020.04.007. Epub 2020 May 17.

PMID: 324664. Review

Jessica Barson, PhD

Pandey S & Barson JR (2020)

Heightened exploratory behavior following chronic excessive drinking: Mediation by neurotensin receptor type 2 in the anterior paraventricular thalamus.

Alcohol Clin Exp Res, Online ahead of print.

Lengel D, Huh JW, Barson JR & Raghupathi R (2020)

Progesterone treatment following traumatic brain injury in the 11-day-old rat attenuates cognitive deficits and neuronal hyperexcitability in adolescence.

Exp Neurol. 330:113329.

Gargiulo AT, Pirino BE, Curtis GR & Barson JR (2020).

Effects of pituitary adenylate cyclase-activating polypeptide (PACAP) isoforms in nucleus accumbens subregions on ethanol drinking.

Addict Biol, Online ahead of print.

Barson JR, Mack NR, Gao WJ (2020)

The Paraventricular Nucleus of the Thalamus is an Important Node in the Emotional Processing Network.

Front Behav Neurosci, In Press.

Pirino BE, Spodnick MB, Gargiulo AT, Curtis GR, Barson JR & Karkhanis AN (2020).

Kappa-opioid receptor-dependent changes in dopamine and anxiety-like or approach-avoidance behavior occur differentially across the nucleus accumbens shell rostro-caudal axis.

Neuropharmacology, 181:108341.

Barson JR, Morganstern I & Leibowitz (2020)

Predicting and Classifying Rats Prone to Overeating Fat.

In: Animal Models of Eating Disorders. Neuromethods. 2 ed. Avena NM, editor. New York, NY: Humana. Chapter 5; p.79-93. 383p.

Gargiulo AT, Curtis GR & Barson JR (2019).

Pleiotropic pituitary adenylate cyclase-activating polypeptide (PACAP): Novel insights into the role of PACAP in eating and drug intake.

Brain Res, 1729:146626.

Barson JR (2020).

Editorial: The role of neuropeptides in drug and ethanol use: Medication targets for drug and alcohol use disorders.

Brain Res, 1740:146876.

Tatiana Bezdudnaya, PhD

Bezdudnaya T, Lane MA, Marchenko V. (2020)

Pharmacological disinhibition enhances paced breathing following complete spinal cord injury in rats.

Respiratory Physiology & Neurobiology, 282:103514; DOI: 10.1016/j.resp.2020.103514

Marie-Pascale Côté, PhD

Bilchak JN, Yeakle KC, Caron G, Malloy DC, Côté M.-P. (2020)

Enhancing KCC2 activity decreases hyperreflexia and spasticity after chronic spinal cord injury.

Exp. Neurology, In press

Caron G, Bilchak JN, Côté M.-P. (2020)

Direct evidence for decreased presynaptic inhibition evoked by PBST afferents after chronic SCI and recovery with step-training in the rat.

J. Physiol. 2020 Jul 28. doi: 10.1113/JP280070. Online ahead of print. PMID: 32721039.

Jeffrey-Gauthier R, Bouyer J, Piché M, Côté M-P, Leblond H. (2020)

Locomotor deficits induced by lumbar muscle inflammation involve spinal microglia and are independent of KCC2 expression in a mouse model of complete spinal transection.

Exp Neurol, In press.

Côté M.-P. (2020)

Chapter 18: The role of chloride transporters in spasticity and neuropathic pain after spinal cord injury.

In: Neuronal Chloride Transporters in Health and Disease. Tang X. (Ed). Elsevier. pps 650.

Simon Danner, PhD

Latash EM, Lecomte C, Danner SM, Frigon A, Rybak IA and Molkov YI. (2020).

On the organization of the locomotor CPG: insights from split-belt locomotion and mathematical modeling.

Frontiers in Neuroscience, 14, 598888. doi: 10.3389/fnins.2020.598888.

Danner* SM, Zhang* H, Shevtsova* NA, Borowska-Fielding J, Deska-Gauthier D, Rybak IA, Zhang Y (2019)

Modeling spinal V3 interneurons and left-right coordination in mammalian locomotion.

Frontiers in Cellular Neuroscience 13:516. doi: 10.3389/fncel.2019.00516 (* - equal contribution)

Kim Dougherty, PhD

Shevtsova, N.A., Ha, N.T., Rybak, I.A., and Dougherty, K.J. (2020).

Neural interactions in developing rhythmogenic spinal networks: Insights from computational modeling

Frontiers in Neural Circuits. 14:614615.

Rodrigo España, PhD

Brodnik ZD, Xu W, Batra A, Lewandowski SI, Ruiz CM, Mortensen OV, Kortagere S, Mahler SV, España RA. (2020)

Chemogenetic Manipulation of Dopamine Neurons Dictates Cocaine Potency at Distal Dopamine Transporters.

J Neurosci. 2020 Nov 4;40(45):8767-8779. doi: 10.1523/JNEUROSCI.0894-20.2020. Epub 2020 Oct 12. PMID: 33046544

Alonso IP, Pino JA, Kortagere S, Torres GE, España RA (2020)

Dopamine transporter function fluctuates across sleep/wake state: potential impact for addiction.

Neuropsychopharmacology. 2020 Oct 8. doi: 10.1038/s41386-020-00879-2. Online ahead of print.

PMID: 33032296

Black EM, España RA (2020)

D-amphetamine maintenance treatment goes a long way: lasting therapeutic effects on cocaine behavioral effects and cocaine potency at the dopamine transporter.

Neuropsychopharmacology. 2020 Aug 28. doi: 10.1038/s41386-020-00825-2. Online ahead of print.

PMID: 32859997

Valeska Cid-Jofré, Macarena Gárate-Pérez, Philip J Clark, Viviana Valero-Jara, Rodrigo A España, Ramón Sotomayor-Zárate, Gonzalo Cruz, Georgina Renard (2020)

Chronic modafinil administration to preadolescent rats impairs social play behavior and dopaminergic system

Neuropharmacology In press

Brodnik ZD, Alonso IP, Xu W, Zhang Y, Kortagere S, España RA (2020)

Hypocretin receptor 1 involvement in cocaine-associated behavior: Therapeutic potential and novel mechanistic insights.

Brain Res. 2020 Mar 15;1731:145894. doi: 10.1016/j.brainres.2018.07.027. PMID: 30071195

Hidalgo S, Fuenzalida-Urbe N, Molina-Mateo D, Escobar AP, Oliva C, España RA, Andrés ME, Campusano JM. (2020)

Study of the release of endogenous amines in Drosophila brain in vivo in response to stimuli linked to aversive olfactory conditioning.

J Neurochem. 2020 Jun 28. doi: 10.1111/jnc.15109. Online ahead of print. PMID: 32596813

Brodnik ZD, Black EM, España RA (2020)

Accelerated development of cocaine-associated dopamine transients and cocaine use vulnerability following traumatic stress.

Neuropsychopharmacology. 2020 Feb;45(3):472-481. doi:

10.1038/s41386-019-0526-1. Epub 2019 Sep 20.

PMID: 31539899

Itzhak Fischer, PhD

Tran KA, Partyk PP, JinY, Bouyer J, Fischer I, Galie PA (2020)

Vascularization of self-assembled peptide scaffolds for spinal cord injury repair.

Acta Biomaterialia. PMID 31904559 DOI: 10.1016/j.

actbio.2019.12.033

Fischer I, Baas PW (2020)

Resurrecting the mysteries of Big Tau.

Trends in Neurosciences. DOI:https://doi.org/10.1016/j.

tins.2020.04.007

Fischer I, Dulin JN, Lane MA (2020)

Transplanting neural progenitor cells to restore connectivity after spinal cord injury.

Nature Reviews 21, 366–383. PMID 32518349 DOI: 10.1038/

s41583-020-0314-2

Wen-Jun Gao, MD, PhD

Yan-Chun Li, Priyalakshmi Panikker, Bo Xing, Sha-Sha Yang,

Cassandra Alexandropoulos, Erin P McEachern, Rita Akumuo,

Elise Zhao, Yelena Gulchina, Mikhail V. Pletnikov, Nikhil M.

Urs, Marc G. Caron, Felice Elefant, and Wen-Jun Gao(2020)

Deletion of GSK-3 β in D2R-expressing neurons ameliorates cognitive impairment via NMDAR-dependent synaptic plasticity.

Biological Psychiatry. 87:745-755. pii: S0006-3223(19)31828-1.

doi: 10.1016/j.biopsych.2019.10.025. [Epub ahead of print] PMID: 31892408

*Commentary: Michael F. Jackson. Epigenetic Mechanism

Links NMDA Receptor Hypofunction and Cognitive Deficits in Schizophrenia to D2 Receptors. DOI: https://doi.org/10.1016/j.

biopsych.2020.01.024

Monaco SA, Matamoros AJ, Gao WJ. (2020) Conditional GSK3 β deletion in parvalbumin-expressing interneurons potentiates excitatory synaptic function and learning in adult mice. Prog

Neuropsychopharmacol Biol Psychiatry. 2020 Jun 8;100:109901. doi: 10.1016/j.pnpbp.2020.109901. Epub 2020 Feb 27.

Erin P. McEachern, Austin A. Coley, Sha-Sha Yang, Wen-Jun

Gao (2020) PSD-95 deficiency alters GABAergic inhibition in the prefrontal cortex. Neuropharmacology, available online 18 August 2020, 108277.

Bo Xing, Nancy R. Mack, Kai-Ming Guo, Yu-Xiang Zhang, Billy Ramirez, Sha-Sha Yang, Li Lin, Dong V. Wang, Yan-Chun Li, and Wen-Jun Gao (2020) A subpopulation of prefrontal cortical neurons is required for social memory. *Biological Psychiatry* (in press).

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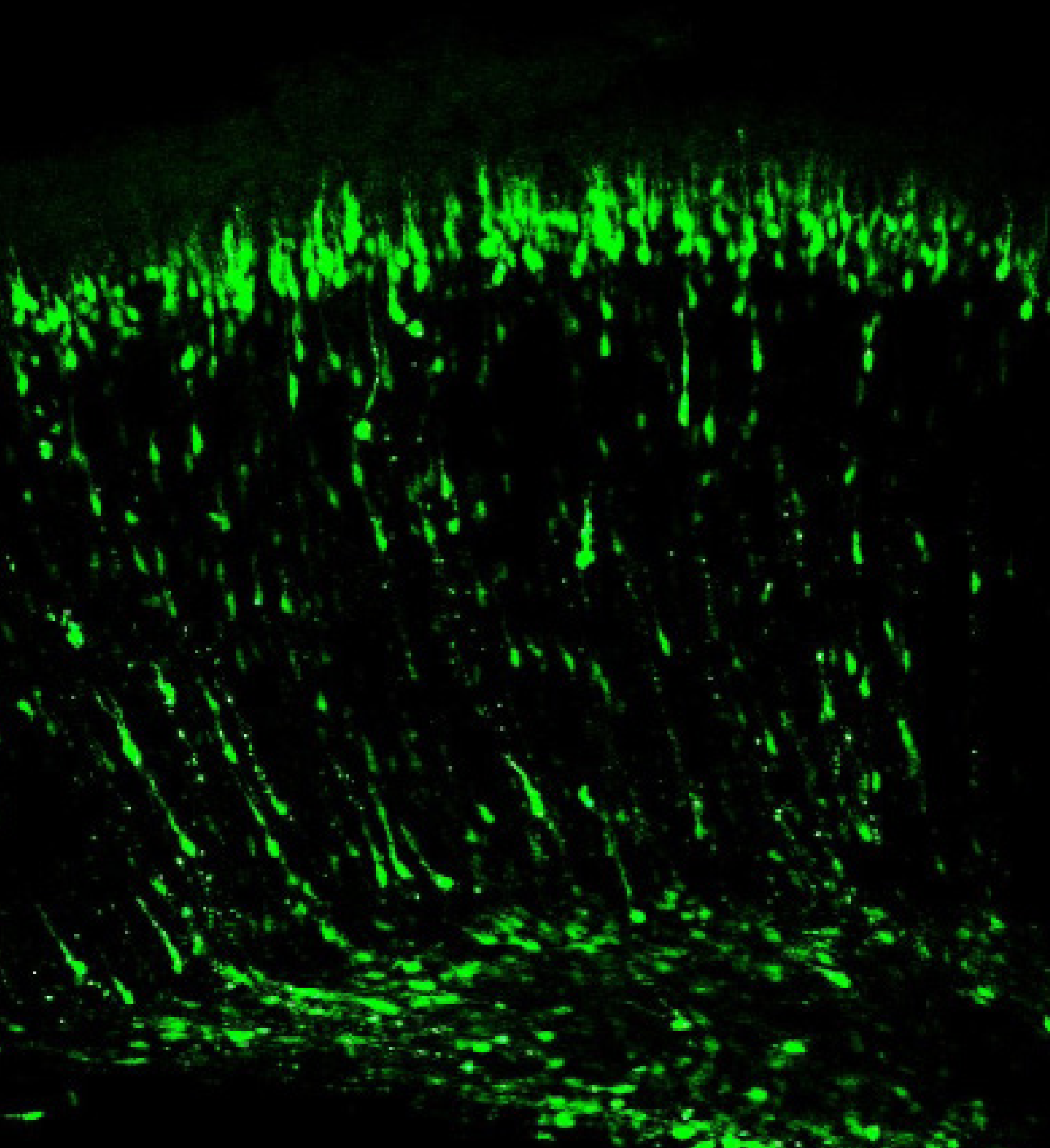
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