OCTOBER 2022 VOLUME 7 ISSUE NO. 2

DePaul Biological Sciences

NICHE ALUMNI NEWSLETTER

FROM THE DESK OF THE CHAIR

This has been another exciting year for the Biology program as we have worked through the transition to the new normal of campus life. It has been a tough couple of years for us all but the resilience that the students, faculty and staff have shown has been nothing short of remarkable. Despite the numerous challenges, we have developed, launched and fostered the growth of several new initiatives, which include a BA degree that provides more flexibility of course options, new opportunities to engage in research experiences as well as courses that diversify the range of options available by incorporating non-traditional content, specifically art and music, into the curriculum.

One of the research initiatives we have been working on for a while, and especially in the last year, has been the development of course-based undergraduate research experiences (CURE courses). Over the last few years, we have developed three of these courses, which have focused on field-based experiences in aquatic biology both in the United States (South Carolina) and abroad (Cádiz, Spain). In the last year, we have launched two additional CURE courses that are offered on the DePaul campus in Lincoln Park. Dr. William Gilliland offered *Advanced Genetic Analysis*, which provided students with the opportunity to engage in original research. Students in the course learned how to annotate genes that had not been studied previously and worked in collaboration with the Genomics Education Partnership, which DePaul has recently joined. Dr. Windsor Aguirre offered a modified version of his course on *Molecular Methods in Ecology and Evolution*, which provided students with a hands-on experience detecting and analyzing molecular variation in nature so that students could gain competence employing molecular markers to answer a wide variety of questions in ecology and evolution. As we progress through the summer,
Dr. Joanna Brooke and Dr. Megan Schrementi are developing a CURE course in *Advanced Microbiology*, which will launch in the Winter Quarter 2023. These newer developments diversify the options for research experiences so that students can better explore a variety of interests. Research experiences such as these provide unique and valuable insights into the nature of scientific research that form the basis for our scientific knowledge.

In the last year, the faculty members in Biology once again distinguished themselves as exceptional scientists with productive research programs. The faculty and their students generated numerous publications in highly respected journals, presented their research at national and international conferences and obtained funding from federal agencies. These research programs provide invaluable opportunities for mentored research experiences to our students who often become coauthors on publications. In addition, the outstanding teaching, mentoring and research of faculty in the program was recognized with numerous nominations for teaching awards and awards being given to faculty members for both outstanding mentoring (Dr. Margaret Bell) and outstanding research (Dr. Jalene LaMontagne).

We look forward to maintaining the high standards we set for our students and for ourselves as we move into a new and exciting future.

TIMOTHY SPARKES
Chair of Biological Sciences

SALUTE TO STAN!

Dr. Stan Cohn was with the Biological Sciences Department from 1989-2019, serving as BIO Department Chair from 2001-2007, and again from 2008-2010, and as the original Editor of the Niche Alumni Newsletter.

The Niche started as an outcome of a departmental program review process where the department wanted to develop a way they could better reach out to alumni and let them know how we were doing, as well as give prospective families and visitors a taste of what the department was like. There had been faculty discussions about putting together a newsletter ever since Dr. Cohn got here in 1989, but it never came about until our department had an academic advisor who could act as a liaison between the faculty and students, and really knew everyone. So, our first Academic Advisor (Michelle Johnson) and Dr. Cohn talked to faculty, students, the alumni office and printing services to put together the very first Niche in 2011. Dr. Cohn worked on a total of 12 Niches (through Vol. 6 No. 2) over a period of seven years.

Dr. Cohn has no favorite issue, but says his favorite pieces were the ones where they asked students for advice or their interests, favorite places to hang out around Chicago, the articles where he got to know the students better. One article that came to mind was when he published some of his favorite (famous!) Frosty Friday ice cream recipes, which we have republished here for your own enjoyment!

From Niche V2, Issue 1 (summer 2012):

Are the summer months already starting to make you feel a little hot under the collar? The Niche has just the solution to your problem. If you were involved with summer research or classes, you may have been part of the Frosty Friday ice cream celebrations that have been held over the summer in the last decade or so. But whether you were there or not, no need to worry, we've got some of those tasty ice cream recipes from the Frosty Fridays that you can try out for yourself. Just take these mixtures and freeze them in any kind of ice cream freezer or cut the recipe in half and place it a bowl in the freezer and whip it up every 10 to 15 minutes or so, for a couple of hours until firm. So have some fun and try some out and don't forget to stay cool.

BASIC VANILLA
3 quarts half and half
2 1/2 to 3 cups sugar
1 tsp vanilla

BASIC STRAWBERRY
2 quarts half and half
1 quart strawberry puree
2 1/2 to 3 cups sugar
1 tsp vanilla

ORANGE MINT
2 large cans orange juice concentrate
2 quarts half and half
1/2 cup sugar
1 tsp vanilla
1 tsp mint extract

LEMMON'S LEMON SHERBET
2 quarts half and half
1 quart fresh squeezed lemon juice
1 quart sugar
1 tsp vanilla

BUMPY ROAD
3 quarts half and half
2 1/2 - 3 cups sugar
1/2 bag of small chocolate chips
(mixed in near end)
2 cup small marshmallows
(mixed in near end)
1 tsp vanilla

RICH CHOCOLATE MINT
3 quarts half and half
2 dark chocolate bars
(or one bag of dark chocolate chips)
3 1/2 cups sugar
1 tsp vanilla
1 tsp mint extract

Warm up 1 quart of the half and half.
Melt chocolate (carefully in microwave or over double boiler).
Mix melted chocolate into warmed half and half.
Cool half and half mixture, then add with other ingredients when making ice cream.

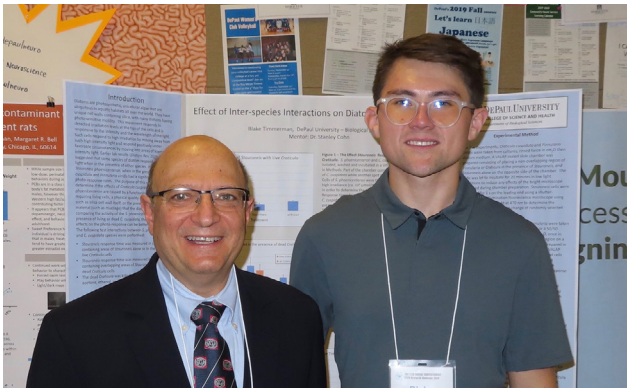
PINEAPPLE KIWI
1 can crushed pineapple or pineapple slices
4-5 fresh kiwis
blend kiwis and pineapple into a puree
(about 2 cups), add to
3 quarts half and half
3 cups sugar
1 tsp vanilla

CARROT CAKE (NON-DAIRY)
1 small can crushed pineapple
or pineapple slices (1 cup)
5-6 well cooked carrots (3 cup)
Blend carrots and pineapple into a puree
(about 4 cups total)
2 quarts almond milk
3 1/2 cups brown sugar
1 tsp vanilla
1 Tbs cinnamon
1/4 tsp allspice

Sara (1955-2021) and Stan Cohn

Dr. Cohn with Blue-footed Booby

Dr. Cohn and Students at Cell Biology Meeting



Dr. Cohn and Blake Timmerman ('21) at Research Showcase

MAGNIFIED LIFE: A GLIMPSE INTO THE BIO DEPARTMENT'S FRESH NEW LOOK

These are just a few of the magnified images BIO faculty submitted from some of their previous research to decorate the walls of the McGowan North Atrium. Next time you're on-campus, come take a look at these amazing magnifications of life!

DARWIN DAY SEMINAR: DR. YOEL STUART

This February, we celebrated what would have been Charles Darwin's 213th birthday. To honor Charles Darwin, we hosted a remarkable speaker over Zoom, Dr. Yoel Stuart, Assistant Professor at Chicago's Loyola University. Dr. Stuart earned his Ph.D. in Evolutionary Ecology and Adaptation at Harvard University. His seminar was titled "Understanding Evolution by Observing What Darwin Couldn't, or Wouldn't." It discussed the speed and repeatability of evolutionary change. How do organisms respond to environmental variation? How do populations respond? His lab tackles these questions by focusing on numerous species, including *Anolis* lizards, threespine stickleback (along with fossil stickleback), and *Daphnia* populations. Our annual Darwin Day talk was once more a wonderful success, and we are so happy Dr. Stuart could encourage and inspire us with his evolutionary knowledge.

DEPARTMENT NEWS, AWARDS AND PUBLICATIONS

Dr. Windsor Aguirre received the **CSH 2021 QIC Excellence in Teaching Award**. This was awarded to him by DePaul University's Quality of Instruction Council for excellence in instruction and learning.

Aguirre Lab Publications:

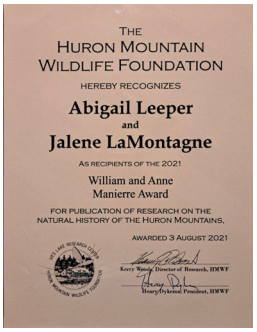
Santangelo, J.S. et al. 2022. Global urbanization drives adaptation in the plant white clover. Science 375:1275-1281. https://doi.org/10.1126/science.abk0989.

Cucalón, R.V., P. Jiménez-Prado, R. Navarrete-Amaya, J. Valdiviezo-Rivera, A. Torres-Noboa, N. Wierzal, K. Karpan, T. Borders, P. Calle, N. Lujan, and W.E. Aguirre. 2022. Phylogeography of the Chocó endemic Rainbow Characin (Teleostei: Rhoadsia). Ichthyology and Herpetology 110:138-155. https://doi.org/10.1643/i2020092

Dr. Margaret Bell received the **2022 Faculty Mentor of the Year Award** by the College of Science and Health. Dr. Bell is recognized for always going above and beyond her duties and responsibilities mentoring undergraduate students through challenging and preparing them inside and outside the classroom and lab for a future in the fields of science and health.

Dr. Dorothy Kozlowski is the co-founder of the *Illinois Coalition to Address Intimate Partner Violence-Induced Brain Injury*. For information on her up and coming research on brain injury and domestic violence please visit: Illinois Coalition to Address Intimate Partner Violence-Induced Brain Injury

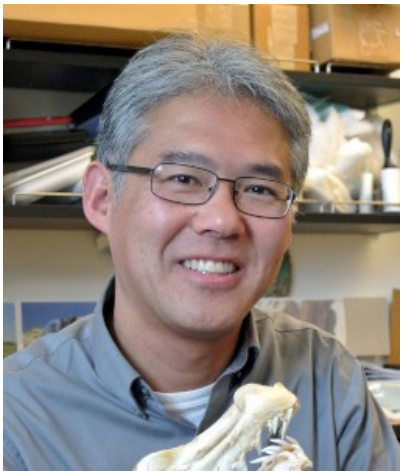
Jalene LaMontagne and Abigail Leeper


THE
HURON MOUNTAIN
WILDLIFE FOUNDATION
HEREBY RECOGNIZES
Abigail Leeper
and
Jalene LaMontagne
AS RECIPIENTS OF THE 2021
William and Anne
Manierre Award
FOR PUBLICATION OF RESEARCH ON THE
NATURAL HISTORY OF THE HURON MOUNTAINS,
AWARDED 3 AUGUST 2021

Dr. Jalene LaMontagne was awarded by the College of Science and Health the **2021 Mid-Career Excellence in Research Award** for making significant contributions to her area of research, in particular the work she has done on *Embracing Variability in Population Ecology – Opportunities for New Insights*.

Dr. LaMontagne was appointed as a Research Affiliate at The Morton Arboretum (2022) and was awarded a National Science Foundation - Research Experience for Undergraduates Grant to support a research experience for an undergraduate student (2022).

Along with alumna Abigail Leeper (DePaul BS 2017, MS 2020), they were jointly awarded the Manierre Award by the Huron Mountain Wildlife Foundation (August 2021). The award is presented in recognition of peer-reviewed publications reporting research conducted under the auspices of the Huron Mt. Wildlife Foundation.



Four years ago, **Dr. Kenshu Shimada** received a three-year NSF grant. The below projects are a result of this grant.

PBS documentary called *NOVA Alaskan Dinosaurs* (Season 48 Episode 21) with alumni Evan Johnson-Ransom (BS 2018).

Recent papers:

Trophic position of Otodus megalodon and great white sharks through time revealed by zinc isotopes

In an ancient shark showdown, 'Jaws' may have doomed 'The Meg'

Cenozoic megatooth sharks occupied extremely high trophic positions

Recent press releases:

Latest study reveals no one still knows what the Megalodon really looked like

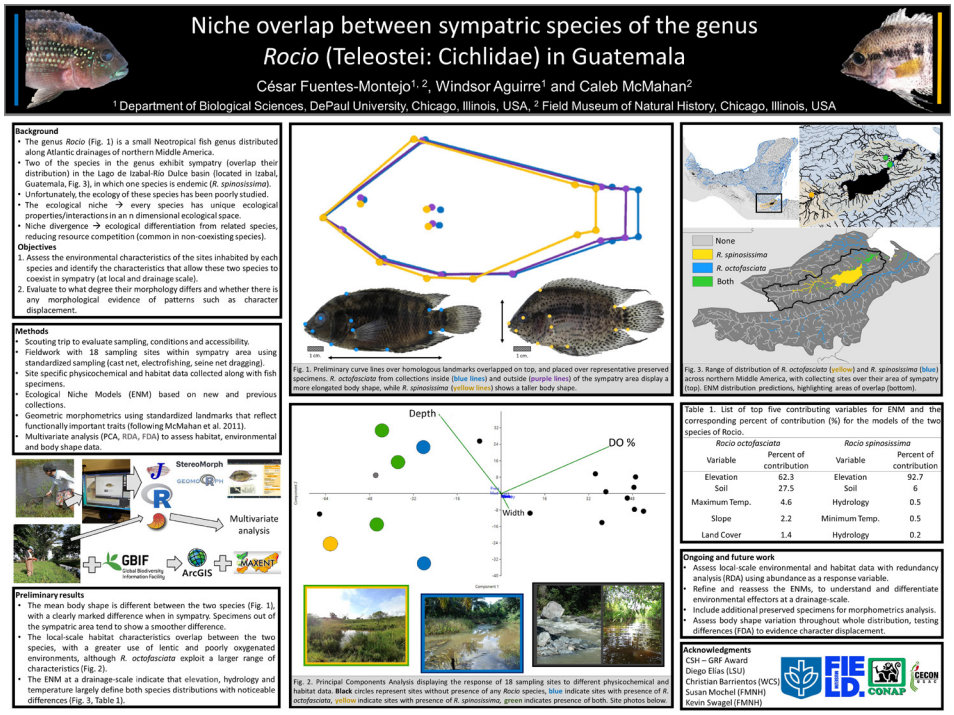
Cooler waters created larger Megalodon than warmer waters

Jaws: the importance of shark fossils for paleontology research

Great whites may have doomed the biggest shark that ever lived, fossil teeth reveal

A. Sofia Rivera had the opportunity to present a poster on ticks and tick-borne diseases at the Ecological Society of America and Canadian Society for Ecology and Evolution joint meeting in Montreal, Canada on August 18, 2022.

César Fuentes in Izabal, Guatemala conducting fieldwork to catch the focal fish species for his thesis work, Rocio spp., along with other local species in the area.



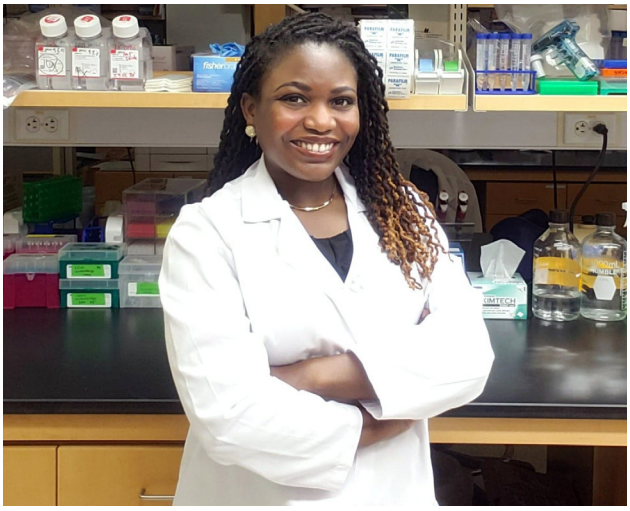
BIO MS STUDENT WINS "BEST TRADITIONAL POSTER" AT 2022 MIDWEST ECOLOGY & EVOLUTION CONFERENCE

César Fuentes was born and raised in Guatemala, where he completed his Bachelor of Science degree in biology at Universidad de San Carlos de Guatemala. He has always been amazed by aquatic ecosystems, visiting many while growing up, motivating him to begin a professional career to help preserve these environments. He developed his interest in the ecology and evolution of animals, especially fish, from many classes and field trips.

In 2020, César attended a workshop on freshwater fishes. The goal of this workshop was to assess the conservation status of these fishes. One of the main highlights of this workshop was that many species in the region required more work, particularly regarding the ecology of species. Subsequently, he began developing a research project to help fill in some of these gaps in knowledge. He was particularly interested in the genus *Rocio*, which was an exceptional fit as an animal model for his observations at the time, and it has also been proven useful for what is now his MS thesis research project in DePaul's Department of Biological Sciences.

César is being co-advised by Dr. Windsor Aguirre (DePaul University) and Dr. Caleb McMahan (Field Museum of Natural History), working particularly with fish that live in eastern Guatemala. Using fieldwork data, along with preserved specimens from both recent and historical collections, his thesis project aims to describe and compare the environmental characteristics of ecological sites inhabited by two species of the genus Rocio. He expects to identify the characteristics that allow the two species to coexist and is evaluating the degree to which their morphology differs. From this, he intends to uncover whether there is a pattern that indicates if the two species avoid competition to occupy the same ecological niche.

ALUMNI SPOTLIGHT: THE VOICE OF DR. RAMIAH JACKS



I graduated from DePaul University in 2013 with a Bachelor of Science in Biological Sciences and a Pre-Health concentration. I have always been fascinated with the intricate nature of cells, tissues, organs and organ systems within our body. To this end, I took Cell Biology, Developmental Biology and Vertebrate Physiology and thoroughly enjoyed each course. I also took Biotechnology, with the goal of learning about the vast applications of a degree in Biological Sciences. I knew from a young age that I did not want to attend Medical School, as I was more excited about asking questions and participating in the discovery aspects of science.

My experience at DePaul profoundly prepared me for my current career trajectory. During my time at DePaul, I had the opportunity to do research in Dr. Cathrine Southern's laboratory. This experience exposed me to how laboratory inquiry-based research was conducted and the joy of scientific discovery! Here, I learned many laboratory techniques that I use today, such as bacterial transformations and DNA gel electrophoresis. I also gained experience in communicating science and presenting my research at national conferences. These experiences, along with the support and encouragement from Dr. Southern, solidified my desire to continue to perform research and facilitated my sense of belonging in science. Further experiences that prepared me for my current career occurred during my time serving as the President of the Biotechnology Club. I invited representatives from local master's and doctoral Gradate Programs to speak to our club about the graduate school admission process, requirements, expectations, and the overall experience. Obtaining this knowledge, coupled with my experiences in Dr. Southern's lab, made it extremely easy for me to apply to and transition into graduate school and perform graduate level research after DePaul.

What I enjoyed most about my experience at DePaul was how excited and invested the professors are in the success of their students. While I was at DePaul, I requested to conduct informational interviews with several of my professors regarding their career journey and their experiences as researchers in academia. Everyone I asked eagerly accepted my request and provided me with valuable information that I used to direct my next career moves. I greatly appreciated how approachable and willing to help my professors were.

After I graduated from DePaul, I attended the Integrated Program in Biomedical Sciences at Loyola University in Chicago. Here, I had the opportunity to expand upon my deeply rooted scientific interests in understanding how our immune system keeps us protected against foreign pathogens and how it is regulated to prevent diseases such as cancer and various autoimmune diseases. I earned my PhD in Immunology from Loyola University in 2019.

Currently, I am a Postdoctoral Research Fellow at the University of Michigan. I was awarded the National Institutes of Health (NIH) K12 Institutional Research and Academic Career Development Award (IRACDA) and am an IRACDA fellow. The IRACDA program was designed for individuals who wish to pursue research and teaching careers in academia. Participation in the IRACDA program has afforded me the opportunity to perform meaningful research and develop my teaching skills at the college level. I am continuing to investigate my long-standing research interests of immune regulation in disease states, this time focusing on understanding the development of chronic inflammation in the obese state. I am also receiving training on evidence-based best practices to enhance student learning and retention in STEM. This training provides me with valuable instruction on inclusive teaching, which is incredibly important to me as an educator. I am intentional about ensuring my students from all backgrounds feel safe, included, and respected both in and outside of the classroom.

I am proud to serve on the NIH's Trans Nutrition Obesity Research Center (NORC) Working Group on Diversity, Equity, and Inclusion. The goal of this working group is to create and support an inclusive community of investigators while increasing the recruitment and retention of scientists from underrepresented backgrounds in academia. This goal aligns perfectly with my passions, and I am excited to be a part of such meaningful work. I plan on continuing to work with NORC to implement the ideas we brainstormed on supporting underrepresented groups in academia within the upcoming year. Upon completion of my postdoctoral training, my goal is to obtain a position as an independent researcher in academia. I am diligently working towards serving as a scientific leader, an encouraging educator and mentor, and a passionate agent for change by participating in practices that support underrepresented, minoritized students in science.

BIOLOGY SENIOR SYMPOSIUM

Each year, the Department of Biological Sciences gathers for our Senior Research Symposium and awards ceremony.

GRADUATING STUDENT OF THE YEAR: ZOE RYAN

Zoe is an exemplary student in the combined BS/MS program that has significantly enriched our department. She excelled in all of her undergraduate and graduate courses to earn a spot on the Dean's list each quarter. She exhibited a passion for biology and significant leadership abilities in Molecular Methods in Ecology and Evolution and presented a sophisticated research proposal in Plant Physiology. Zoe served three years as a Supplemental Instruction (SI) leader, supporting each General Biology course and Precalculus. As an undergraduate, Zoe began a summer research project at the Field Museum exploring the use of mapping and modelling tools to study the distribution of plant species. Since the partnership between DePaul and the Field Museum is relatively new, it took a significant amount of initiative to arrange this work. It has since developed into an MS thesis project with Dr. Matt von Konrat using ecological niche modeling to predict the distribution patterns of early land plants.

Zoe Ryan (research trip to the Nachusa Grasslands, summer 2022)

Luke Bench, Kristina Bell, Kelly McGowan

Kristina Bell: Kristina is an exceptional and engaged student, Chemistry SI leader, and researcher. She is independently motivated, organized, intellectually curious, and responsive to feedback. She plans to devote extra time after graduation to write up her data and is excited to see it published. She purposefully considers the application of her research and is an independent student of environmental justice and public health. She will begin medical school at Rosalind Franklin this fall.

Luke Bench: Luke was one of the most attentive students in his online Genetics class. He asked thoughtful questions and was respectful of his peers. He is now a TA for the course and has exceeded the standard set by previous graduate student TAs. He is reliable, prepared, and is a fantastic teacher who is always eager to help students with questions.

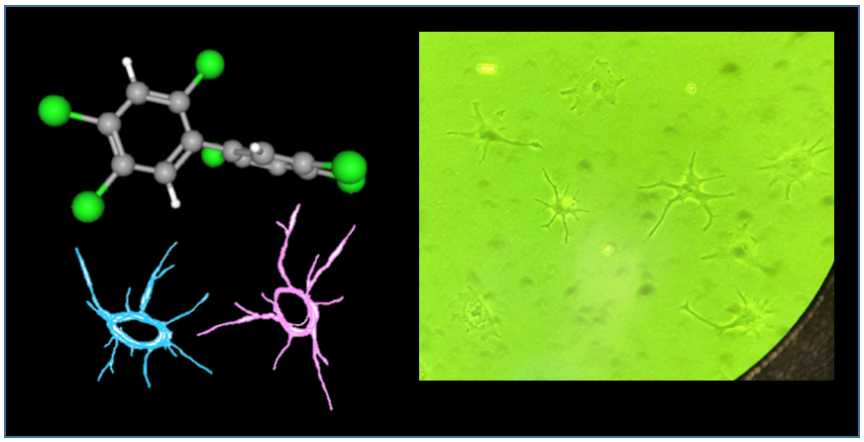
Kelly McGowan: Cellular Neurobiology presents challenges for many students. Kelly fostered a sense of community during the transition back to in-person by openly sharing her approach to course material. Her easygoing manner elevated discussions and helped the entire class improve their understanding. She communicated honestly about her own challenges, sought advice, and adapted her learning strategies to become the highest performer in class. Kelly plans to attend medical school and has a strong academic foundation to support her application.

Sophia Zygowski

Sophia Zygowski: Sophia has a keen interest in a research career. She completed an internship at Northwestern last summer and this year began an MS thesis in the Brooke lab. Her strong interpersonal skills allowed her to successfully support her fellow students as a Supplemental Instruction (SI) leader for Bio 191/193 and TA for Microbiology. Her impressive time management and organizational skills enable her to maintain excellent academic performance while balancing her work and mentoring roles.

RESEARCH IN ACTION: FEATURING DR. MARGARET BELL

WE ARE WHAT WE EAT? THE EFFECTS OF PCBS ON BRAIN DEVELOPMENT



On the top left is a diagram of a PCB molecule with some sketches of microglia below (drawn by Katherine Walker, Bell Lab). On the right side are microglia in culture (Bell Lab).

Science has long been interested in trying to understand what makes people tick—sure, it's nature (genetics) and nurture (what we learn), likely interacting. But what about that phrase 'we are what we eat'? And what if, instead of just referring to the food we eat purposefully, it also refers to other stuff that might be contaminating food and water accidentally? Could exposure to those compounds also be impacting our brain to shift our thoughts and feelings, and therefore behavior?

These questions are even more important when considering exposures during development. Because human behavior is so complex, our genome can't contain all the directions necessary to direct brain development. Instead, our brains are dependent on input from the environment to determine how its cells become connected into networks that best help that person navigate its unique social and physical environment. This sensitivity to environmental cues to flexibly shift the wiring of the brain gives us the diversity of personalities within and across our communities. It also makes us vulnerable to harmful environmental challenges during development, including psychological trauma and unintentional chemical exposures. And, because these are impacting the foundational organization of the brain, they are hard to un-do and can have long-lasting impacts on mental health and brain function

Almost everyone has been exposed to at least one environmental contaminant, including a class of oils called polychlorinated biphenyls (PCBs). Even though PCBs were banned in the US in 1977 after being discovered to be acutely toxic, PCBs are still all around us. The same chemical stability that made PCBs useful building components allows them to persist in the environment: they bio-accumulate in the food chain so that humans consume PCBs when they eat fatty meats and dairy, and are released in dust from aging building materials. As such, nursing infants and school-aged children are highly exposed. There is strong evidence that PCBs can alter the functions of a range of body systems, including reproductive, immune, and the brain.

Work in the Bell Lab studies the effects of PCB mixtures on brain development using a rat model, focusing on cells called microglia. Initially understood as immune cells that detect and defend against invading infections, scientists now know that microglia also organize neural networks during development to impact behavior and health. Microglial activity needs to be balanced; too little activity is associated with autism spectrum disorder and too much is associated with depression and neurodegeneration. The Bell Lab has demonstrated that early life exposure to PCBs changes how microglia respond to bacterial signals; critically the response depends on the stage of development, shifting between neonatal, adolescent and adult periods. The lab is actively studying how PCB exposure changes the response to alcohol during adolescence, another stimulus that can activate microglia. Finally, the lab was just awarded an R15 grant from National Institute of Environmental Health Sciences branch of NIH to fund work studying direct effects of PCBs on microglia cultured from neonatal and adolescent brains. The overarching hypothesis is that PCB effects on microglia might be one process by which exposure alters brain function and therefore behavior.

This information can be used in several different ways: By studying effects of exposures over development and between sexes, we can identify the most vulnerable populations for increased protection by environmental remediation. By understanding the cellular and molecular targets that PCBs are affecting, we can better guess how exposure might interact with other environmental challenges that impact the same processes. And finally, if we understand PCBs to be an example of how similar chemical contaminants could impact people, we could better direct future regulation to prevent exposure to other compounds actively still in use or yet to be created.

For more information on the Bell Lab's research, check out belllab.weebly.com

GIVING BACK TO STUDENT RESEARCH

Please donate to help support undergraduate research in biological sciences.

DONATE NOW

CLICK HERE to help support undergraduate research in biological sciences

> **SELECT** designation 'View all College of Science and Health Giving Opportunities'

> **SEARCH** for 'Fund for Biology'

THANK YOU DEPAUL ALUMNI!

ACKNOWLEDGMENTS

The Niche Team

Co-editors: Jaimie Engle and Claire Behrens