



Animal Behavior Bulletin

2019

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Dear CISAB Community,

2019 was an exciting year for CISAB, and I'm so happy to share some of the highlights of the year in this newsletter.

In the following pages, you will read about the accomplishments of our graduate students, including those who recently completed PhDs, and 2019's CISAB fellowship recipients. CISAB graduate students and postdocs organized an outstanding 2019 Animal Behavior Conference, which, in addition to talks and posters by undergraduates, graduate students, and postdocs, featured plenary speaker and 2019 Exemplar Awardee Hans Hofmann and keynote speaker Ellen Ketterson.

With 122 undergraduate Animal Behavior majors as of Fall 2019, we are growing our curriculum accordingly: our latest new course, ABEH-A 101, will introduce our students to the science of animal behavior early in their undergraduate careers. Our undergraduates continue to seek out new learning experiences tailored to their interests through internships and summer research, honors thesis research, and more. We are thrilled to be able to support some of their efforts through our Summer Scholarship Program.

This year, we highlight some of the accomplishments of our alumni, both graduate and undergraduate.

New developments in the CISAB Mechanisms of Behavior Lab include a partnership with the Environmental Research Institute to acquire a new quantitative thermocycler, and faculty success in securing CTSI pilot funding for research to be performed in our Core Facility.

Last summer, eleven undergraduates from across the U.S. participated in our NSF-funded Research Experiences for Undergraduates, engaging in an intensive experience in mentored research, plus professional development workshops, and community-building outings. The NIH-funded training grant Common Themes in Reproductive Diversity appointed four predoctoral trainees and two postdoctoral fellows, and continued to provide a venue for fertile exchange of research ideas.

Finally, I sadly note the loss of CISAB founding member and original co-Director Bill Timberlake. Those of us who knew Bill appreciate him as a colleague and friend and mourn his passing. But we all—including CISAB faculty and students who may never have met him—owe Bill a debt of gratitude for his vision and drive in establishing CISAB and in ensuring that it would grow into one of the pre-eminent Animal Behavior programs in the country.

Finally, thank you all for your contributions to the CISAB community. CISAB thrives on the strength of its engaged faculty and student members, both past and present.

Cheers,



Welcome New CISAB Faculty

Christena Nippert-Eng

Professor of Informatics

Director of Computing, Culture and Society

Adjunct Professor of Sociology

Christena Nippert-Eng is a sociologist and Professor of Informatics at IUB. Her scholarly interests include cognition, culture, gender, privacy, time, space, everyday life, ethnography, user-centered design and, most recently, the social behavior of nonhuman animals, especially the rest of the great apes.



Dr. Nippert-Eng's work has been featured extensively in the media, ranging from NPR's "Talk of the Nation" and programs on PBS and MSNBC to the New York Times, Wall Street Journal, Newsweek, Working Mother and Fast Company. She has served as a consultant to a number of companies including HP, Motorola, Gillette, Steelcase, and Hilton Hotels.

Nippert-Eng's published books include *Home and Work: Negotiating Boundaries Through Everyday Life* and *Islands of Privacy: Disclosure and Concealment in Everyday Life*, both with the University of Chicago Press. Her newest book, *Watching Closely: A Guide to Ethnographic Observation* (October 2015 Oxford University Press) is an exercise-based approach to learning the skills of direct observation, featuring the work of former students in design, architecture and the social sciences.

Justin N Wood

Associate Professor of Informatics

Dr. Wood's lab studies the origins of intelligence, using a two-pronged approach. First, they perform controlled-rearing experiments in newborn chicks. Raising chicks in strictly controlled virtual worlds, they record their behavior continuously as they learn to perceive and understand their environment. Using interactive video game engines, they can explore how core cognitive abilities emerge in newborn brains. Second, they perform parallel experiments on autonomous artificial agents, using virtual controlled-rearing chambers. By raising newborn chicks and artificial agents in the same environments, they can test whether they develop the same abilities when given the same experiences. The agents' brains can be equipped with different biologically-inspired learning mechanisms (e.g., deep reinforcement learning, curiosity-driven learning), so by comparing the animals and agents, they can test which learning mechanisms are needed to model the development of intelligence. During his career, Dr. Wood has studied the psychological abilities of a range of populations, including human adults, infants, chimpanzees, wild monkeys, and birds.



Congratulations CISAB and CTRD Fellowship Recipients

CISAB Fellowship Recipients 2019-2020



Kayleigh Hood
Hurley Lab



Misty Proffitt
Smith Lab



Ashwini Ramesh
Bashey-Visser Lab &
Hall Lab

CTRD Predoctoral Fellows 2019-2020



Megan Freiler
Smith Lab



Kara Million
Lively Lab



Kat Munley
Demas Lab



Sarah Wolf
Rosvall Lab

CTRD Postdoctoral Fellows

Left: Jessica A. Cusick
Demas Lab & Wellman Lab

Right: Alexandra Bentz
Rosvall Lab



Congratulations CISAB Members

PhDs Awarded to CISAB Graduate Students 2018-2019



Left to right:

Dr. Amrita Bhattacharya, Bashey-Visser Lab & Lively Lab: THE EVOLUTION OF ANTAGONISTIC SOCIAL INTERACTIONS IN BACTERIA: AN INVESTIGATION OF SPITE, COMPETITION, AND VIRULENCE IN XENORHABDUS SPP.

Dr. Abigail Kimmitt, Ketterson Lab: PHYSIOLOGICAL AND BEHAVIORAL MECHANISMS OF POPULATION DIVERGENCE IN SEASONAL SYMPATRY

Dr. Kelly Moench, Wellman Lab: SEX-SPECIFIC EFFECTS OF TWO-HIT STRESS ON THE STRUCTURE AND FUNCTION OF RAT MEDIAL PREFRONTAL CORTEX

Dr. Christopher Petersen, Hurley Lab, FUNCTIONAL ANATOMY OF SEROTONIN RELEASE IN THE INFERIOR COLLICULUS

2019 Animal Behavior Graduates



In May, CISAB hosted a reception for our 2019 Animal Behavior graduates

Graduates attending, top to bottom:

Row 1- Shawn Mahoney, Kathryn Tafoya, Alexander Ebernth

Row 2- Miriah Leiberling, Sommer Dean, Alec Iruri-Tucker, Morgan Galovic,

Row 3- Eden Long, Martha Horowitz, Sydney Jacob

Row 4- Christina Sluka, Yun Ju Snedden

Row 5- Kennedy Reynolds, Erin Willkie Habig, Caroline Fischer

CISAB Alumni

Animal Behavior Graduate Receives NSF Graduate Research Fellowship

Christina Sluka, a 2019 Animal Behavior major who completed her honors thesis with Jon Crystal, was awarded an NSF Graduate Research Fellowship. She's now a graduate student in the University of Wyoming's Zoology and Physiology PhD program, where she continues her research on wild and captive raccoons to better understand their cognitive abilities and why they are so adaptable to urban environments.

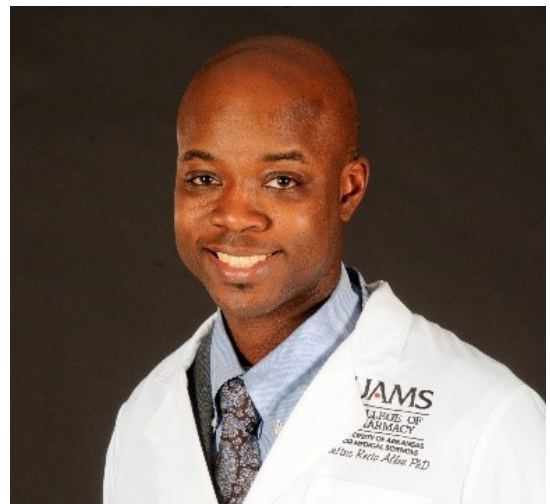


CISAB Member Returns as the Inaugural Speaker in Biology's Minority Alumni Speaker Series

Dr. Antiño Allen received his MA and PhD from the IU Biology Department (Troy Smith, P.I.), and is currently an Assistant Professor at the University of Arkansas for Medical Sciences with a focus on neuroscience research.

On April 17, 2019 Dr. Allen gave a talk titled *Effects of Space Radiation on Cognition: Implications for Future Trips to Mars*.

Dr. Allen's primary objective is to understand the neurobiological cascade of events following trauma, with the goal of identifying mechanisms underlying cognitive impairment. Using genetic models and pharmacological approaches, his work examines how the changes in the neuronal microenvironment (e.g. inflammation, oxidative stress) affect neurogenesis and cognitive function after exposure to particulate irradiation, x-rays, and traumatic brain injury.



News from the Mechanisms of Behavior Lab

From Lab Director David Sinkiewicz

The CISAB Mechanisms of Behavior Lab, operating as a recharge center has allowed us to provide services and techniques on a per-sample basis keeping the cost to each lab manageable. This allows the facility to thrive as a place labs can perform molecular techniques and receive consultation on developing and troubleshooting these techniques.

Working with the Environmental Resilience Institute, the CISAB Lab has been able to expand our available equipment. With their help, we have added a microbalance allowing us to measure mass to one-hundredth of a milligram. Additionally, we were able to add a multi-channel pipetting robot. This robot can help with any plate based assay (96- or 384-well) increasing pipetting accuracy and reducing both time and physical strain. Finally, we added a QuantStudio 6 Flex quantitative thermocycler. This allows our users to perform quantitative PCR within our lab space. This instrument also accepts both 96- and 384-well plates.

The Maxwell instrument continues to be a popular and effective tool for extracting nucleic acids. Combining the Maxwell with the pipetting robot and the QuantStudio allows our users to perform the entire workflow for qPCR within the lab and offers the opportunity to go from tissue to gene expression within a single day!

We again had a successful CTSI funding cycle for work within the lab with Dr. Daniella Chusyd. Dr. Chusyd will be measuring hormones and hormone metabolites from elephant populations exposed to or isolated from early life stress.

Once again the A501 Techniques in Reproductive Diversity course has utilized the CISAB Lab space, providing junior graduate students with a hands-on experience with techniques used by active research labs associated with CISAB. The CISAB Lab is excited and motivated to continue working with the CTSI, ERI, and CTRD to provide our users with the space and resources to continue performing and innovating their research goals.



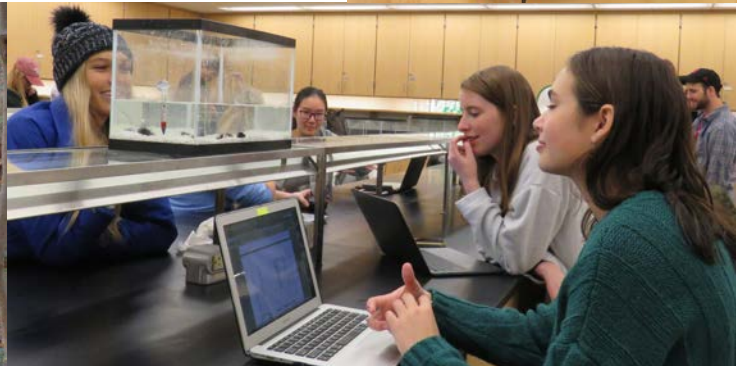
Top to bottom: David Sinkiewicz; A501 Techniques in Reproductive Diversity class; QuantStudio 6 Flex quantitative thermocycler

News from the Animal Behavior Major

By Animal Behavior Lecturer Dr. Adam Smith

This is another busy year for the Animal Behavior major, with changes to our course offering schedule to give the students more choice when scheduling their classes. The behavior lab course was again offered this fall, and will be offered yearly in the future. The lab class also includes new exercises, such as a trip to the IU Research and Teaching Preserve to learn about wild animal tracking and a greater variety of resources for independent group projects. The new Introduction to Animal Behavior (A101) course will be offered in coming Spring 2020, and we are excited that it has been approved as a science general-education option for students across IU. We hope that this will not only help expose younger students to CISAB and the major, but that it will also help future generations of artists, authors, entrepreneurs and people from all walks of life come to appreciate the importance of understanding animal behavior and the role of animals in the world around them.

Clockwise from top: Dr. Adam Smith; small animal burrow in tall grass; black short spined sea urchin; AB lab group studying how different ambient light environments affect the time it took for urchins to resume normal behavior after a minor annoyance; AB lab in front of fallen tree, its base was a sort of waystation for traveling animals. There was sign of deer, raccoon, rabbit, and squirrel all in one small area, and the students were learning to discriminate among those signs.



Internship News

Featured Internship: Yasmin Lord at the Potawatomi Zoo in South Bend, IN

As an intern during the Summer of 2019, I worked with hoof stock, primates, amphibians, reptiles, domestics, many bird species, raptors, and many others. This internship taught me a lot about the importance of zoos for conservation and education. I participated in vet checkups and worked with some of the breeding programs at the zoo. This internship has been helpful to me in understanding the zoology field and working with many different species of animals. I worked on diets, husbandry, enrichment, and learning proper care for the animal. Throughout my time at the zoo, I learned a lot of information about many different species. I feel confident in this field moving forward having interned in marine and the zoo fields.



Yasmin Lord feeding Ringtail Lemurs at the Potawatomi Zoo

Internship News (continued)

Featured Internships: Dorothy Daulton at Girl Scouts of America and Marble Hill Farm

Girl Scouts of America Camp Gallahue Barn Manager

In the summer of 2019, I interned as a barn manager and head horseback riding instructor for the Girl Scouts of America. During this internship, I managed a small team of employees to ensure the proper care and husbandry of 50 horses, goats, rabbits, and donkeys at Camp Gallahue in Morgantown, IN. Through this internship, I learned important managerial skills and gained a comprehensive understanding of the expertise necessary to manage employees and a medium-sized equestrian operation. For my independent project, I applied my knowledge of operant conditioning and positive reinforcement training to clicker train a donkey and write a research paper on the experiment! As donkeys are notoriously difficult to work with, I was interested in seeing whether clicker training could be an impactful way of improving donkey handling and husbandry. The experiment ran for seven weeks, and by the end of it, the donkey was clicker trained perfectly!

Marble Hill Farm Agricultural Sciences Intern

My internship during the fall of 2019 was as an agricultural sciences intern working for Marble Hill Farm in Bloomington, IN. The focus of this internship was on sustainable agricultural practices. I worked with Angus cattle, Shetland sheep, and a variety of poultry, in addition to gaining experience with sustainable crop production. My primary scientific interest is in the intersection between sustainable agriculture and conservation biology, and this internship was perfectly suited to my professional and academic goals. I had the opportunity to work with the USDA Natural Resource Conservation Service (NRCS) and the Monroe County Soil and Water Conservation District (MCSWCD) to help the farm achieve their conservation and stewardship goals.

Dorothy with a now well-trained donkey at Camp Gallahue; Dorothy with Shetland sheep at Marble Hill Farm



Animal Behavior Majors: Where are They Now?

Meet Brigit Rooney, Animal Behavior Major, Class of 2016:

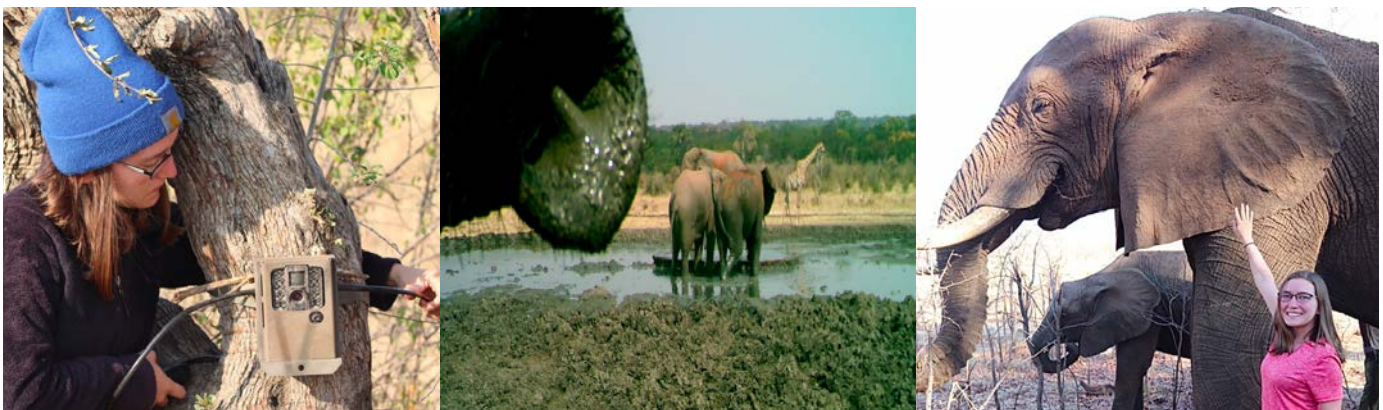
When I began classes at IU in Fall 2012, I already knew what I wanted to study: Animal Behavior. At that time, there were less than 10 universities in the US offering an Animal Behavior major and IU was not one of them. However, the presence of CISAB and the flexibility of the Individualized Major Program convinced me to attend anyway and create my own Animal Behavior program. Much to my surprise (and gratitude!), the Animal Behavior major became a reality toward the end of my junior year in 2015. I was excited about the wide variety of ecology and animal-related courses available and took as many as possible, spanning Vertebrate Zoology to Entomology. Since my area of focus is mammal behavior, I was surprised when Entomology, taught by Dr. Armin Moczek, quickly became my favorite course. Without these opportunities, I would certainly not have the breadth of knowledge I have now.

I loved almost every course I took, but it was the internship requirement that helped me find my passion. The summer after my junior year, I interned at Greenwood Wildlife Rehabilitation Center in Colorado. That experience led me to intern at WildCare and then WonderLab in Bloomington. Although I applied for these programs to get animal-handling experience, I soon realized that I most enjoyed educating the public on safe and positive ways to interact with wildlife. This newfound interest was encouraged by the Animal Behavior Workshop course I took in my last semester, with Dr. Adam Smith. I realized that the human-wildlife interface is an important area of study and a viable career path.

Upon graduation in 2016, I began to explore work and graduate opportunities in the field of human-wildlife interactions. During my gap year, I gained experience through volunteer work with the Forest Service and temporary work as a Conservation Aide with Montana FWP. These experiences cemented my passion for research on human-wildlife interaction. With this in mind, I found a MS in Biology program that enabled me to study the effect of tourism on African elephants in a national park in Zimbabwe. During my 14 weeks of fieldwork, I used in-person observations and camera traps to study elephant and tourist behaviors and movements. I successfully defended my thesis based on this research in July 2019 and graduated with my MS in Biology a month later.

I am extremely grateful to the IU Animal Behavior Program and its associated professors for guiding me on this path and continuing to support my work. Within the last year, I have returned twice to the campus, as an invited speaker and as a speaker at the annual IU Animal Behavior conference. I am eager to continue pursuing opportunities in this field and hope to soon find more excuses to return to Indiana University.

Left to right: Brigit attaches a field camera; elephants recorded on field camera; Brigit with a research subject.



CISAB Summer Scholarship Experiences

Kaylen Ohlwine participated in a field course on Grand Cayman Island.

Marine ecosystems were the main focus of this course. I became SCUBA certified during Tropical Biology 433 allowing me to experience the gorgeous and biodiverse coral reefs surrounding the island. As an animal behavior major, I absolutely loved seeing aquatic creatures in their natural habitat, interacting with their environment and one another, as well as with the divers (on one dive I was followed by a huge red snapper). I observed sea turtles, stingrays, squid, crustaceans, corals, mollusks, and a multitude of fish. I took this course after taking Claudia Johnson's Natural History of Coral Reefs course, so being able to apply what I learned about reefs and identify 20+ species of coral was amazing. In addition to ocean inhabitants, we also studied terrestrial animals. The entire island is infested with wild green iguanas that are an invasive, nonnative species introduced through the pet trade. There are also native blue iguanas competing for resources. We toured a blue iguana conservation facility where we were lucky enough to see some mating behavior of this endangered species! In addition, we visited a sea turtle farm, where the huge turtles are bred for conservation purposes. Overall the experience was priceless, and extremely beneficial to my career in the field of animal husbandry and conservation.



Tara Empson spent her summer working with the Rosvall Lab in Bloomington, helping to catch and study free living tree swallows.



It's an experience that has opened the doors to research for me. I got to see up close what kind of work goes into a PhD program while making my own small contributions. My main tasks were banding unidentified adult birds and banding 12 day old chicks. I gained skills I never thought I would need: sneaking up on a box to capture an incubating bird off the nest, patience to wait for hours for a certain bird to go into a box, how to set a nest box trap, how to make the best of any situation (when your field site becomes a lake—see below), and how to work quickly and gently with wild animals. My summer was full of exciting days with amazing mentors, all of which has helped spark my love for field research. I got to be outside every day doing actual science while working with animals. It was my favorite part of the summer.

Counterclockwise from top left: Tara Empson holds a tree swallow; nestling tree swallow; flooded field site



CISAB Summer Scholarship Experiences (continued)

Kat Tafoya spent her summer in Colorado working with wild horses and burros.

The CISAB summer scholarship supported my research endeavors as I completed my honors thesis in animal behavior and simultaneously worked for Colorado State University and the U.S. Geological Survey as a wild horse and burro field technician. This experience gave me the opportunity to collect behavioral and demographic data on radio-collared feral burros in the Sinbad Herd Management Area near Green River, Utah. My field days consisted of using radio telemetry to locate the collared individuals, assess the quality of their welfare, and then follow and record behaviors of the herd. These data are now used by USGS and the Bureau of Land Management to inform wildlife management strategies. During my off days, I wrote my thesis and successfully defended remotely to my committee. Recently, I revised “A portfolio of conservation strategies predicts forest conversion, primate species richness, and encounter rate across regions of Costa Rica” for submission to PLoS One with fingers crossed!



Clockwise: Kat Tafoya at her field site, radio-collared burro; herd of burros; burros viewed through a telescope



Check Out Two New Student Organizations Started by Animal Behavior Majors in 2019:

SAB
Students for Animal Behavior
Get in contact with us!
sabatiu@indiana.edu

IU Reptile Club
Field Trips Hiking
Learn to identify Indiana natives
Volunteering Fun!
Contact Kaylen Ohlwine at kohlwine@gmail.com

2019 Research Experiences for Undergraduates (REU) Program

By Colleen Friedly

CISAB welcomed 11 undergraduate students into the 2019 summer REU in Animal Behavior program. Over the course of our ten weeks together, we travelled to the Exotic Feline Rescue Center, the Indianapolis Zoo, and IU's own Kent Farm. These three field trips provided opportunities to see animal behavior researchers and animal welfare specialists in action outside of the lab settings in which most of our REU students work.

Throughout the 10-week program, the REUs worked closely with graduate student, postdoctoral, and faculty mentors as well as their undergraduate peers. Several of the 2019 graduate mentors participated in a panel discussion about life in graduate school, and we once again welcomed a representative from the Emissaries for Graduate Student Diversity who discussed life in and out of academia and how to find campus resources and networks of support.

We continuously adapt our program to the needs of the participants. This year, we used a new format for the REU students to present their research. At the end of the program, the students presented their research projects via a poster session at the Indiana Memorial Union. With the new format and location, the REUs were able to present to more faculty, students, staff, and community members, which has increased the impact and scope of our REU program and its outreach potential.

During their time at IU, the REUs formed a close bond and were often together to celebrate birthdays, to teach one another new skills (like coding), and to support each other. IU's REU in Animal Behavior program has been going strong for 24 years and will hopefully continue well into the future. To find out more about the 2020 REU program as well as past research completed by REUs, check out animalbehavior.indiana.edu/research/reu.

Left to right: REU interns visiting the Exotic Feline Rescue Center; learning trapping and banding from Katie Talbot, graduate student in the Ketterson Lab, during the Kent Farm field trip.



REU Research Projects

RAYANN DORLEANS, University of Florida

“Do parasites infect optimally?”

Mentors: Dr. Farrah Bashey-Visser and Ashwini Ramesh

BRENDA DZARINGA, Vassar College

“Exploring the effects of olfaction on acoustic stimulation using the auditory brainstem response”

Mentors: Dr. Laura Hurley, Dr. Kelly Ronald

REU Research Project Titles (continued)

ALEJANDRO (Alex) GONZALEX, University of Notre Dame

“Intraspecific variation in fitness in a nematode-bacteria symbiosis”

Mentor: Dr. Farrah Bashey-Visser

CIERRA MCKOY, University of Maryland, Baltimore County

“Are juvenile songbirds from extra-pair copulations less likely to be infected iwth avian malaria?”

Mentors: Dr. Ellen Ketterson, Katie Talbot and Daniel Becker

JULIENNE NIEMYSKI, Mount Holyoke College

“Degeneration of class IV neurons affects nociceptive behaviors in drosophila larvae”

Mentors: Dr. Dan Tracey and Dr. Stephanie Mauthner

SIERRA REESE, Howard College

“Do opposites attract? Are female rainbow (*Etheostoma caeruleum*) and fantail darters (*E. flabellare*) making mate choices using MHC-based olfactory signals?”

Mentors: Dr. Curt Lively, Dr. Troy Smith, Kara Million and Misty Proffitt

LAYNE SERMERSHEIM, Indiana University, Bloomington

“Behavioral and developmental responses to heat in tree swallows (*Tachycineta bicolor*)”

Mentors: Dr. Kimberly Rosvall and Mary Woodruff

CASSANDRA SHERIDAN, University of Iowa

“Episodic memory in young humanized ApoE4 Knock-In”

Mentors: Dr. Jonathon Crystal and Danielle Panoz-Brown

VANESSA EATON, Spelman College

“The effect of early-onset alzheimer’s on episodic memory: a rat model

Mentors: Dr. Jonathon Crystal and Danielle Panoz-Brown

JACE KUSKE, California State University, San Marcos

“The role of testosterone in Tree Swallow territorial aggression”

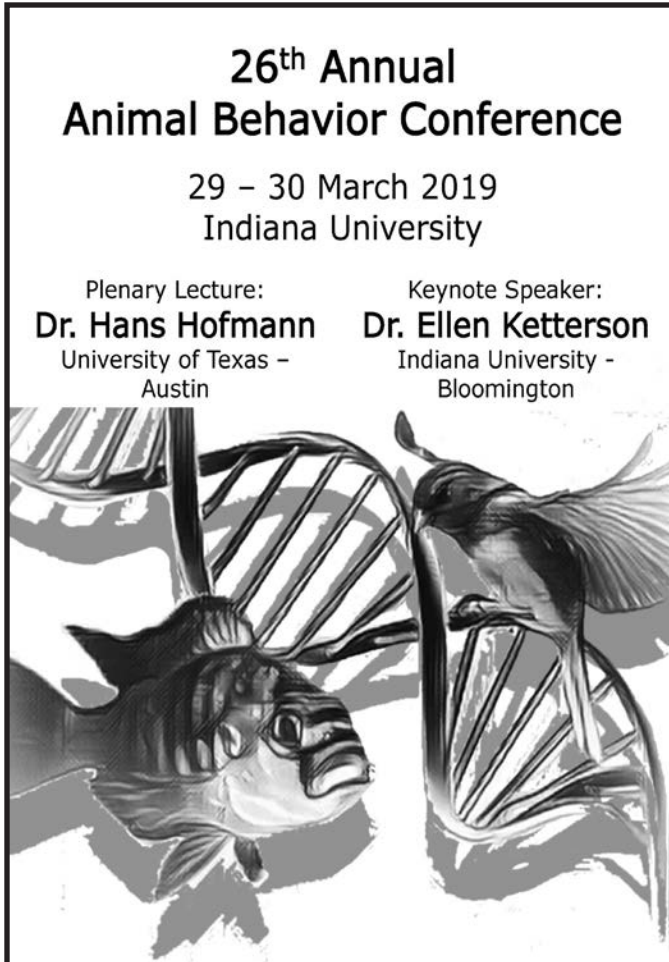
Mentors: Dr. Kimberly Rosvall and Dr. Sara Lipshultz

Back row left to right: Brenda Dzaringa, Cierra McKoy, Vanessa Eaton, Sierra Reese, Andrea Velez, Alejandro Gonzalez, Rayann Dorleans

Front row: Dr. Laura Hurley (REU Director), Cassandra Sheridan, Julienne Niemyski, Layne Sermersheim, Jace Kuske, Colleen Friendly (REU Facilitator)



2019 Animal Behavior Conference



The 26th annual IU Animal Behavior Conference was held on March 29 – 30, 2019. The conference brought together animal behaviorists from across the country, with 237 people from 40 institutions across 11 states, from Massachusetts to Texas, and Puerto Rico registered for the conference. Graduate and undergraduate students and postdocs gave 33 talks over the course of the conference. Friday’s Plenary Address was courtesy of 2019 Exemplar Award winner Hans Hofmann, who told us about his research on the evolution of social behavior in cichlid fishes. Saturday’s Keynote address was by Ellen Ketterson, who shared her research on migratory behavior, mating systems, and the evolution of hormone-mediated phenotypic traits in dark-eyed juncos. The talks were complemented by 60 poster presentations in a Friday night session.

We are as always indebted to our top-notch team of students who organized the conference, with invaluable help from CISAB staff Linda Summers and Charli Taylor.

Counter-clockwise from top left: 26th ABC program cover; Sarah Wolf presenting; Ellen Ketterson, Keynote Speaker; ABC Poster session; ABC organizing committee



2019 Animal Behavior Conference: Awards

Exemplar Award 2019: Dr. Hans Hofmann

Dr. Hofmann pursued his PhD at Leipzig University and the Max-Planck Institute for Behavioral Physiology, Seewiesen, and then completed postdoctoral training with Russ Fernald at Stanford. Has spent his career as a professor at the University of Texas at Austin. While there, he has been integrally involved in a variety of Centers on the Austin campus, including serving as co-director of the Center for Brain, Behavior, and Evolution, and recently founding the Center for Biomedical Research Support. He has also taught in and co-directed the prestigious Neural Systems and Behavior summer course at Woods Hole.

A neuroethologist, Dr. Hofmann incorporates cutting-edge molecular techniques with classic comparative neuroethological approaches to study social behavior in a naturalistic and organismal context. His work addresses integrative questions such as how has complex social behavior evolved, what are the neural and molecular mechanisms underlying specific behavioral patterns, and is there a common neural and molecular tool kit that governs social behavior across species? In pursuing these questions, Dr. Hofmann has trained a dozen graduate students, a dozen postdocs, and myriad undergraduates.



Hanna Kolodziejcki Award 2019: Savannah Bennett

Savannah is pursuing a PhD in Biology, while also completing a minor and certificate in college pedagogy. Savannah's research focuses on how herbivores and plant-soil-microbe interactions affect the balance between native and invasive plant species in the woodlands. Savannah's commitment to service manifests in both mentoring and outreach. For instance, she teaches pedagogy skills to math instructors for the PASS program, and mentors undergraduates underrepresented in STEM fields. In addition, for three years, Savannah has been heavily involved in the Bloomington Urban Woodlands Project, a campus-community initiative dedicated to restoring biodiversity to urban woodlands while reconnecting people with nature and its benefits. She has organized restoration events in Dunn's Woods, at which Bloomington residents and IU students pull invasive plants, plant native wildflowers, and remove litter. Every year, Savannah and her volunteers have removed hundreds of pounds of invasive plants and trash and planted hundreds of native plants, increasing the diversity of wildflowers that are both attractive to people and beneficial to wildlife. Savannah complements this work by mentoring service-learning students, teaching ecology lessons at local schools, preparing outreach literature, and producing a diverse and creative array of outreach activities at events such as IU Science Fest and the Indiana Native Plant Society Annual Meeting. An example of this creativity is her Woodland Yoga Tour for children.



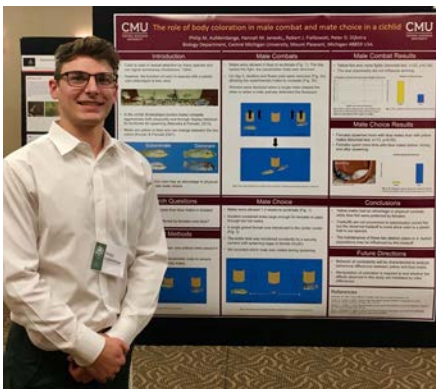
2019 Animal Behavior Conference: Awards

Rowland Award 2019: Misty Proffitt

A CISAB member and graduate student in Biology, Misty is studying how species variation in sexual dimorphism of communication signals is related to hormone-related gene expression in the brains of electric fish. Misty has mentored three summer REU students, and also served as the graduate student coordinator for the program. In that role, she served as a role model and academic counselor for many of the interns, and also made a lasting contribution to the REU by developing new presentations that continue to be used in the program. Misty's mentoring is not limited to the summer: she has also mentored a visiting masters' student from Germany and has co-supervised an undergraduate's honors thesis research. Misty's professionalism is notable, as is the example she sets in her approach to her own research, and her dedication to promoting the success of others. She takes time to make sure the students understand the literature and rationale behind their research and works with each to ensure they are proficient in the techniques they use in their experiments and understand how to interpret and analyze their data. Misty is skilled at giving students a sense of the importance of attention to detail that yields confidence in the data they generate. She is adept at assessing students' strengths and weaknesses and adapting her mentoring style accordingly. Misty is also supportive of her students, encouraging them when things do not go perfectly with their projects. In all, Misty epitomizes the commitment to undergraduate mentoring that the Rowland Award is meant to highlight.



ABC Undergraduate Poster Award Winners



Left to right:

PHILLIP AUFDEMBERGE *Central Michigan University*

"The function of body coloration in male combat and mate choice in the polymorphic cichlid fish *Astatotilapia burtoni*"

VALERIA TORO DIAZ *University of Puerto Rico, Indiana University*

"Investigating the relationships between a social trait, bacteriocin production, and virulence in pathogenic bacteria"

KAITLYN FOUKE *Denison University and Grass Lab, Marine Biological Laboratory*

"Electrophysiological responses to chemosensory stimuli in cephalopod arms"

2019 Animal Behavior Conference: Awards

Jim Goodson Art in Science Award Winner: Elizabeth M. George



Elizabeth George received the 2019 Goodson Prize for Art in Science for her dynamic image showing a tree swallow attacking a perceived intruder at its nest box. As a graduate student in the Rosvall lab, Elizabeth studies mechanisms of aggression in tree swallows, a songbird species that faces intense competition for nesting sites. She took this photo during a simulated territorial intrusion--a behavioral assay that involves placing a taxidermic mount at the entrance of a nest box to simulate a social challenge from a competitor. This bird is aggressively approaching the perceived intruder.

2019 Animal Behavior Conference: Awards

Jim Goodson Art in Science Award Runner-up: Kara Hodges's (Illinois State University)



Runner-up Kara Hodges's (Biology, Illinois State University) photo of a sample of house wren eggs shows the wide individual variation in eggshell pigmentation within a species. Some studies suggest a link between eggshell pigmentation and fitness metrics of the laying female and/or the parental investment of the attending male.

REU Presenters at the 2019 Animal Behavior Conference



With support from the departments of Biology and Psychological & Brain Sciences, as well as generous donations in memory of late CISAB alumnus Dr. Ronald Villareal, we sponsor outstanding REU alumni to return to campus to present at the Animal Behavior Conference.

Left to right:

VALERIA TORO DIAZ *University of Puerto Rico*
“Investigating the relationships between a social trait, bacteriocin production, and virulence in pathogenic bacteria”

YVETTE RODRIGUEZ JIMENEZ *University of Puerto Rico*
“Sensitivity to testosterone in the avian eye and its relationship with sex, species, and trait differences”

2019 Conference Student Exchange Program

Keck Center and CBN Student Ambassadors present at the 2019 Animal Behavior Conference



KATHERINE PATRICK

Georgia State University

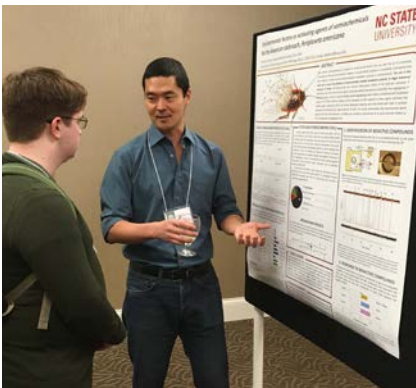
“Acute and repeated exposure to social stress reduces gut microbiota diversity in Syrian Hamsters”



JENNIFER MERRITT

Emory University

“Evidence that CISA-regulatory variation in an estrogen receptor contributes to behavioral evolution in a polymorphic sparrow”



EDUARDO HATANO

North Carolina State University

“Environmental factors as activating agents of semiochemicals for the American cockroach, *Periplaneta Americana*”



STEPHANIE PRAÑO

North Carolina State University

“Estrous cycle-induced sex differences in MSN excitatory synaptic transmission and intrinsic excitability in adult rat nucleus accumbens core”

2019 Conference Student Exchange Program

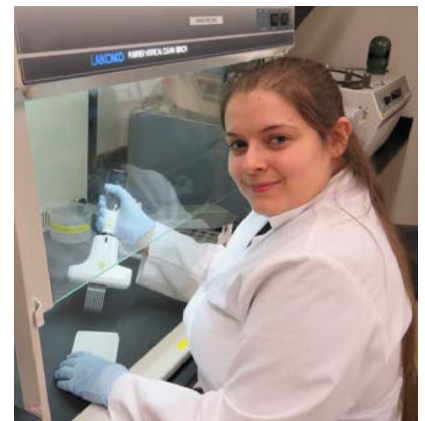
CISAB Members Attend Symposium at North Carolina State's W.M. Keck Center for Behavioral Biology

Keyleigh Hood shares her experience: I was grateful to have been given the opportunity to visit the North Carolina State W.M. Keck Center for their 20th annual Graduate Student and Postdoc Symposium. Thanks to the support of CISAB, Misty Proffitt and I were able represent Indiana University and continue the long-running exchange program between the two centers. We were warmly welcomed by our host, Keck Center graduate student and student ambassador to the 2018 CISAB Animal Behavior Conference, Erin Peterson, who introduced us to the city of Raleigh and other graduate students participating in the symposium. Over dinner, we were able to become better acquainted with our graduate student hosts as well as the integrative behavior research taking place at the Keck Center.



Like CISAB, the Keck Center values using interdisciplinary approaches to study animal behavior. This was apparent throughout the 19 talks and poster session that made up the symposium. Student presentations covered an impressive variety of topics, such as the genetic underpinnings of variation across trophic levels, reproductive senescence, and sex determination. I was particularly interested in the presentations that provided new perspectives to our understanding of rodent behavior by applying behavior research to investigate the effectiveness of gene drives to reduce propagation of invasive rodents, the role of cyclical hormone variation and exposure to toxic chemicals on rodent brains and behavior. During the breaks in between presentations, I was able to make connections with many members of the Keck Center and get new perspectives on the research I presented on female mouse vocal behavior. Participating in this symposium has enriched both my research and professional network and would not have been possible without the hospitality of our NC State hosts as well as the support of CISAB.

Misty Proffitt shares her experience: I felt very fortunate to have the support from the CISAB program to travel to North Carolina State University and give a talk at their annual W. M. Keck Center conference for Behavioral Biology. I was grateful for the opportunity to present my most recent findings on sex and species differences in ion channel gene expression in a brain region controlling a behavior in weakly electric fish. On the evening I arrived, I was able to meet with current graduate students and post docs over dinner and I had a really pleasant discussion about the research we were all currently conducting. The next morning, I was able to listen to a variety of wonderful talks, given by graduate students and post docs. Many of these talks were investigating gene expression and links to various behaviors across multiple species. Since so many researchers at NC State are working with genetic techniques to investigate various behavioral and/or neuroscience questions, I found it particularly helpful to present to the NC state group. This allowed me to get some feedback on my recent work with gene expression, and help me look at additional future directions to follow up my most recent study. I also am currently searching for post-doctoral positions, so in addition for helping my current work, this trip also allowed me to talk to potential post-doctoral mentors. I had a wonderful experience, and I am so grateful that I was able to participate in this conference.



2019 Conference Student Exchange Program

CISAB Members enjoyed the 2019 annual Brains and Behavior Retreat at Georgia State University

Misty Proffitt also attended the Brains and Behavior Retreat this year:

With support from the CISAB program, I was able to travel to Georgia State to participate in their yearly brains and behavior retreat. The morning after my arrival, we were escorted to the center for behavioral neuroscience in downtown Atlanta. We heard a number of great scientific presentations, with a wide range of topics. Out of many wonderful talks, I found Dr. Karen Gamble's talk on the effect of circadian rhythm on various brain regions particularly interesting. She had been investigating links between circadian rhythm in the brain and large effects on things like insulin sensitivity and metabolism. The way that many of these talks framed their research questions, in more of a clinically relevant manner, inspired me to think much more about how I will frame my research questions in the future. I enjoyed the poster presentation session, and was pleasantly surprised by the placement of science related art intermittently placed between poster stands. I presented a poster on my recent work, examining androgen receptor sequence variation and how these sequence differences might influence the selectivity to different types of androgens in electric fish. I also made sure to visit a few other neighboring posters to see more of the work that is currently being conducted at Georgia State. After the poster session, we attended dinner at a local restaurant with current graduate students, and discussed more research that was currently ongoing at Georgia State.



Kara Million shares her experience:

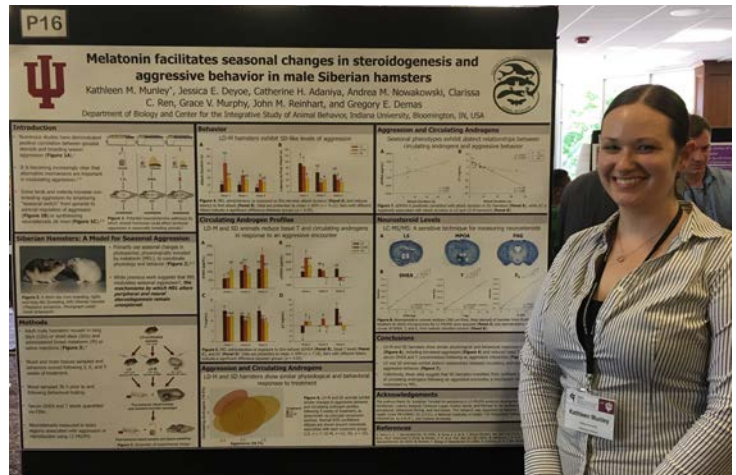
Thanks to the support of CISAB, I had the pleasure of attending the Brains and Behavior retreat at Georgia State in Atlanta. I was introduced to a vibrant, active research community conducting a wide range of fascinating work at the intersection of neuroscience and behavior. I heard many engaging research talks, including Dr. Karen Gamble's keynote presentation on her research on how "chronotherapy" can assist with a variety of health problems. I also appreciated the researchers who presented their work simulating neuron activity to model various neurological disorders such as Parkinson's disease. During the poster session, I presented mine and Misty's research on parasites, circulating androgens, and reproductive characteristics in Darters. I received some great feedback on our work and enjoyed getting a closer look at the research of the other attendees. One feature that stood out at the poster session was the presentation of "brains and behavior"-themed art pieces interspersed between the posters. This was a refreshing change of pace and added a lot to the session. After the poster session I had dinner with a group of Georgia State graduate students and received a candid and fascinating glimpse into the academic culture at this institution. Overall I greatly benefitted from this experience. Attending the Brains and Behavior retreat enabled me to meet many colleagues who share my interest in behavioral research, to present some of my own work and receive helpful feedback, and to engage with some cutting-edge, integrative research. I was proud to represent CISAB this year at this event, and I greatly enjoyed my visit.



2019 Meeting of the Society for Behavioral Neuroendocrinology held at IU

By Dr. Greg Demas and Kat Munley

The 23rd annual meeting of the Society for Behavioral Neuroendocrinology (SBN) was held in the Indiana Memorial Union (IMU) on the campus of Indiana University from June 19th-22nd, 2019. SBN integrates ideas across the field of behavioral endocrinology that span all levels of biological organization, from molecular to organismal, both through the society's annual meetings and its journal, *Hormones and Behavior*. SBN members conduct research on myriad organisms across a diversity of contexts, including field-based investigations of animals in their natural habitats, laboratory research on important model systems, and clinical research on a variety of topics directly related to human health.



CISAB member Kat Munley presented during the SBN poster session

SBN 2019 consisted of six scientific symposia across all levels of behavioral neuroendocrinology, including the New Investigators Symposium, which highlighted contributions of early-career researchers contributing in important ways to the field. This symposium included fascinating talks by W.C. Young Recent Graduate Award Winner Dr. Jeremy Borniger and Lyn Clemens Travel Award Winner Dr. Nicole Gervais. In addition, several keynote and plenary lectures were given by outstanding scholars in our field. Conference attendees had the opportunity to hear about topics such as the pleiotropic effects of testosterone on birdsong from Dr. Gregory Ball in this year's Stoelting Keynote Address and the cutting-edge techniques that Dr. Zoe Donaldson is using to study the hormonal, genetic, and neural basis of pair bonding in prairie voles in this year's Frank A. Beach Award Lecture.

Furthermore, SBN 2019 provided several opportunities for graduate students and postdoctoral students to participate in professional development events and to network with prominent scientists in the field. This year's meeting included a half-day Early Career Workshop, mid-meeting workshops, trainee networking breakfasts, and meet-the-professor lunches. Three poster sessions, which were mainly comprised of presentations from graduate students and postdoctoral fellows, were also scheduled throughout the meeting, allowing for a more informal exchange of information and to enable networking between established scientists and trainees. These sessions were an excellent forum for postdoctoral fellows as well as graduate and undergraduate students to present their ongoing work in a more intimate setting and to engage in one-on-one interactions with experts in their field. SBN's 2019 meeting was a great success, thanks in large part to the host committee, which included several CISAB faculty; our registration table volunteers, including Charli Taylor and CISAB graduate student and postdoctoral fellows; and our generous sponsors from the Indiana University Bloomington campus. We hope to host this excellent group of scientists again soon!

2019 CISAB Outreach

In October CISAB visited The Project School and participated in Science Fest, sharing educational demonstrations reflecting the 3 perspectives emphasized in the animal behavior major: Evolution and Ecology; Mechanisms of Behavior; and Environmental, Developmental, and Cognitive Approaches to Behavior. The 3 demos were: Race against a Chimpanzee, How to Build a Neuron, and What Can a Skull tell Us about Behavior.

THE PROJECT SCHOOL: CISAB worked with TPS to bring the 3 educational activities plus a bird migration game to students during Fall Break Enrichment Days. CISAB volunteers Kara Million, Alec Iruri-Tucker, Mackenzie Mills joined CISAB Director Cara Wellman and CISAB assistant Charli Taylor to spend the afternoon with rotating groups of children that ranged in age from kindergarten through eighth grade. The experience taught us how to work with a variety of age groups—so it was educational for us as well as the kids!

SCIENCE FEST: CISAB participated in this wonderful event for its 2nd year. CISAB student volunteers Lauren Bruner, Mecca Burris, Courtney Eshelman, Molly Fagan, Megan Freiler, Jay Goldberg, Clara Hall, Alec Iruri-Tucker, Sierra McAlister, Mackenzie Mills, Layne Sermersheim, Cat Steinbeiser, Katie Talbot, Ashlee Webb, along with Cara Wellman and Charli Taylor, spent the day sharing their knowledge of science with folks brave enough to weather a full day of rain!



In Remembrance

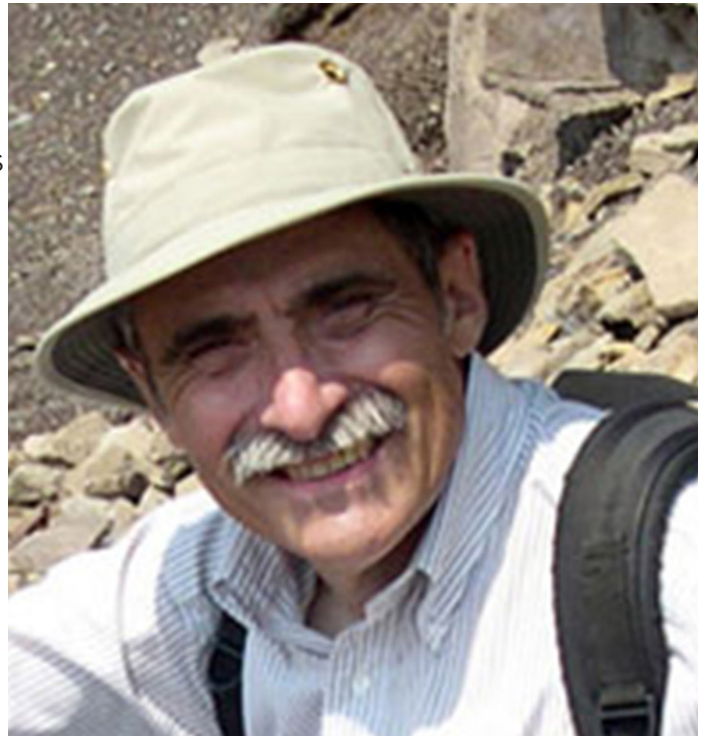
Teresa Dzieweczynski (1976 - 2019)

Teresa worked with one of CISAB's founding members, Bill Rowland, and received her PhD in Ecology, Evolution, and Behavior in 2005. Fittingly, she was one of the first recipients of the Rowland Mentoring Award in 2005. A faculty member at the University of New England (UNE) for 14 years, she was responsible for establishing their Animal Behavior major, which grew to be one of the largest majors at UNE. She was promoted to full professor in February 2019, just a month before her untimely loss due to pancreatic cancer. An ethologist whose work focused on the behavioral effects of inadvertent pharmaceutical exposure in fish, she was a beloved and dedicated scientist and mentor at UNE.



Rudolf Raff (1949 - 2019)

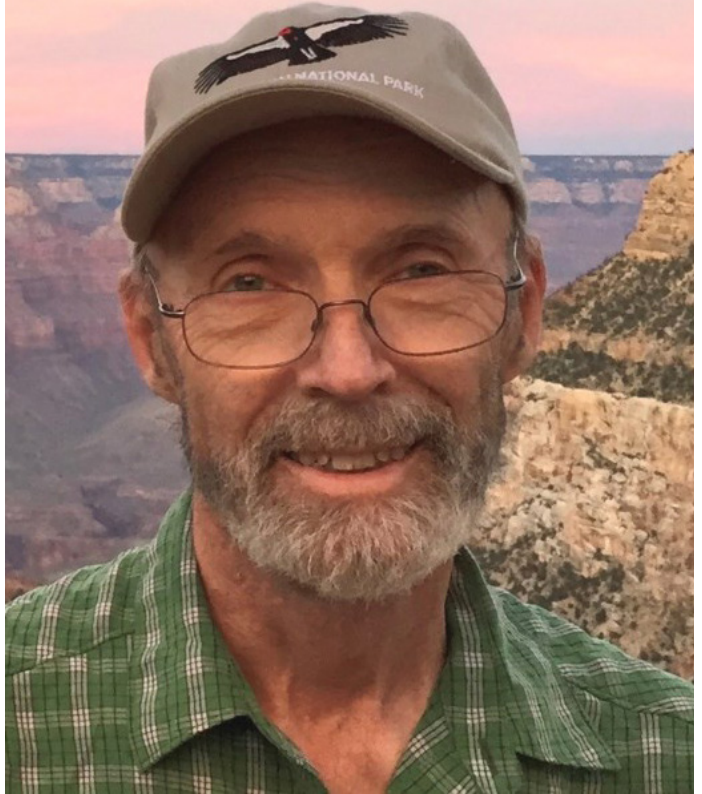
Rudy was a faculty member in Biology at IU since 1971, starting as an assistant professor and rising quickly through the ranks to a James H. Rudy Professor of Biology in 2000 and a Distinguished Professor in 2002, until his retirement in 2018. Rudy was a pioneer of the field evolutionary developmental biology (now known as Evo-Devo) and his work received numerous awards and honors, including the pioneer award of the PanAmerican Society of Evolutionary Developmental Biology, a Guggenheim Fellowship, and election to the American Association for the Advancement of Science and the American Academy of Arts and Sciences. In addition to his many scientific and scholarly accomplishments, Rudy was a wonderful colleague, friend and mentor to many at IU and was vital to the growth and success of the Biology department over the last half-century.



In Remembrance continued

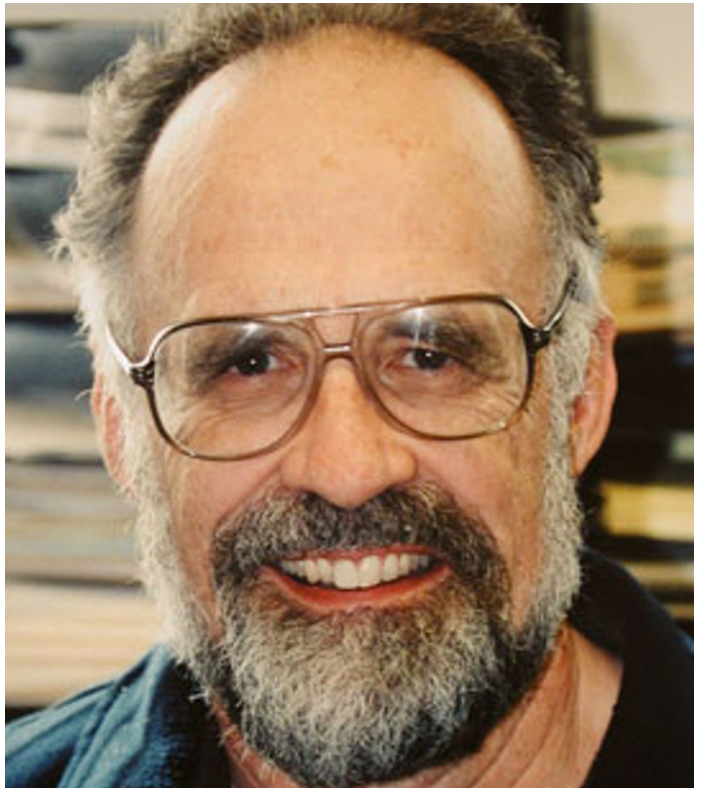
Roderick A. Suthers (1937 - 2019)

Rod completed a Ph.D. at Harvard University, working with Ernst Mayr, Donald R. Griffin and Edward O. Wilson. After pursuing postdoctoral work at Harvard, he joined the faculty at Indiana University in 1965. Rod was a Professor Emeritus of Cellular and Integrative Physiology in the Medical Sciences program at Indiana University's School of Medicine where he worked for 51 years, retiring in 2016. He was also an AAAS fellow, and his research was continuously funded for all 51 years by grants from the National Science Foundation and/or the National Institutes of Health. Rod's early research dealt with echolocation and hearing in bats, and later in his career he made distinguished contributions to the understanding of the fundamental mechanisms underlying sound production in birds. One of the original CISAB members, Rod will be missed by his many colleagues who remember him fondly.



William D. Timberlake, (1942 - 2019)

After earning his PhD from the University of Michigan in 1969, Bill became a professor in IU's Psychology department, where he remained until he retired. Bill incorporated evolutionary and ecological principles in his study of learning, at a time when this combination was considered unusual if not downright subversive. Using this approach, Bill's contributions to the science of learning included behavioral systems theory and response deprivation and behavioral disequilibrium. His scientific contributions not only influenced the field of learning and memory, but also informed the development of potential behavioral treatments for psychological disorders such as obsessive-compulsive disorder.



Bill was one of the founders of CISAB, and its first co-director. From serving as co-PI on the NSF grant that launched CISAB in 1990, to his tireless efforts to promote the integrative study of animal behavior at IU and beyond, to his efforts to secure funding and a permanent physical home for CISAB, Bill was an invaluable advocate for, and friend of, CISAB.

Contributions to CISAB help support our scholarship and fellowship programs, travel awards for graduate and undergraduate students, the Animal Behavior Conference, and more.

Please consider donating to CISAB at myiu.org/one-time-gift. Type 'ANIMAL' in the Search Box to find "Center for Animal Behavior."



Center for the Integrative Study of Animal Behavior
Indiana University
409 N Park Avenue
Bloomington, IN 47405
812-855-9663
cisab@indiana.edu
animalbehavior.indiana.edu