



ANIMAL BEHAVIOR BULLETIN

Center for the Integrative Study of Animal Behavior

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Confernece*

Annual Awards

CISAB SCHOLARS 2006

CISAB announces its 2006 Scholars. Scholars are IU students whose outstanding research, teaching, and service have fostered the integrative study of animal behavior in our community. This years scholars are:

Shawn Hurst
Devin Zysling
Cuauhcihuatl Vital
Sayuri Kojima
Julienne Rutherford Goehl
Melissa Scotti
Joel McGlothlin

**News? Story Ideas?
Let us know!**

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MEREDITH WEST IS SELECTED DISTINGUISHED FACULTY RESEARCH LECTURER



Dr. Meredith West, CISAB member and Department of Psychological and Brain Sciences Faculty, has been recognized as Distinguished Faculty Research Lecturer for 2006-2007. The award, administered by the Office of the Provost, was established to recognize the significant role of research and creative activity in the mission of the Bloomington campus. In conjunction with the award, Dr. West will present a major lecture for all segments of the university community, which is

regarded as one of the intellectual highlights of the year.

Dr. West studies the development of avian vocal communication and social competence. She has taken many approaches to looking at social experience ranging from work with birds who live and interact with humans in their homes to investigations in large aviaries of how social affiliations among younger and older generations of birds leads to social and evolutionary change. Her laboratory was the first to discover that female cowbirds, who do not sing, can still "teach" males how to sing by using visual gestures to motivate and manipulate the male cowbird's vocal practice, demonstrating the multiple means by which animals guide one another's ability to learn.

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SUMMER 2006 REU STUDENTS

CISAB offers congratulations to the undergraduates chosen for this year's Summer Research Experience for Undergraduates. These students were selected from a competitive field of nearly 200 applicants. The ten students will be working closely with faculty, post-docs and graduate students to design and complete a research project. They will also participate in a series of workshops, lunch meetings and social functions to build a sense of community among the students.

Rachel Andrews:

Purdue University
(Mentor: George Rebec)

Adolfo (Leo) Arellanos:

Hunter College
(Mentor: Preston Garraghty)

Mirela Conway:

University of Massachusetts- Amherst
(Mentors: Emilia Martins & Saul Nava)

Erica Davis:

Alabama A& M University
(Mentor: Emilia Martins & Mayte Ruiz)

Maksymilian (Maks) Deryl:

Dominican University
(Mentors: Troy Smith & Cameron Turner)

Shannon Fredebaugh:

Ohio Wesleyan University
(Mentors: Bill Timberlake & Eddie Fernandez)

Lakeisha Hall:

Albright College
(Mentors: Greg Demas & Devin Zysling)

Chanin Miller:

Tuskegee University
(Mentor: Jeff Alberts & Sayuri Kojima)

Michael Peace:

North Carolina State University
(Mentors: Butch Brodie & Heather Bleakley)

India Swearingen:

Loyola Marymount University
(Mentor: Bill Timberlake)

CTRD FELLOWS

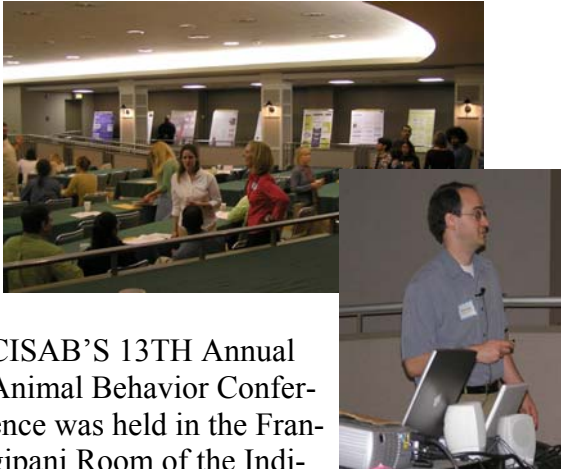
Through the NIH training grant "Common Themes in Reproductive Diversity" and under the direction of Ellen Ketterson, Dale Sengelaub, Troy Smith and Greg Demas, three Fellowships have been awarded.

Idelle A. Cooper is a graduate student in the Biology Department working under the direction of Dr. Curtis Lively. At her field station in Hawaii, she is examining whether ecological shifts lead to sexual dimorphism in damselflies. She has completed geographic surveys of patterns of sex differences and correlated them with environmental conditions, and is currently determining microsatellite markers in several species. Idelle has received previous fellowships from IU and CISAB, a grant from Sigma Xi, and presented research at many conferences.

Kathryn M. Lenz is a graduate student in Psychological and Brain Sciences and the Program in Neuroscience working with Dr. Dale Sengelaub. Her research investigates how early social contact between mother and offspring is transduced into neural development. She is looking specifically at the development of the spinal cord and the spinal nucleus of the bulbo-

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THE 13TH ANNUAL INDIANA UNIVERSITY ANIMAL BEHAVIOR CONFERENCE



CISAB'S 13TH Annual Animal Behavior Conference was held in the Frangipani Room of the Indiana Memorial Union with a record number of attendees, over 110, registering for the conference. Continuing our association with the Keck Center for Behavioral Biology at North Carolina State University and Georgia State University, we welcomed researchers from both universities. We also attracted scientists from Emory, Purdue, St. Joseph College, Bellarmine University and the University of Louisville. The plenary speaker, Lauren V. Riters, hailed from the University of Wisconsin. Twenty presentations and 21 posters covered a range of topics including ecology, physiology, genetics and neurobiology. IU Departments and programs represented included: Anthropology, Biology, Chemistry, Cognitive Science, Informatics, Institute for Pheromone Research, Physics, Program in Neuroscience, and Psychological and Brain Sciences.

Although much of the research presented was integrative in approach, the broad range of topics presented at the conference encompassed the following areas:

Communication and Social Dynamics:
Social interactions are dependent upon com-

munication, whether it be visual, auditory or olfactory. Research presented at the conference examined several forms of communication and the importance of recognition and signal learning. Early learning was found to be an important component to female sociality in brown-headed cowbirds, while mockingbirds were found to exploit the two sides of the syrinx to approximate tutored song. Auditory processing in chickadees and nuthatches was found to be influenced by season, with species specific changes occurring. Although humans are unaware of odor signals, these signals may still play an important role as indicators of relatedness. Rats were able to determine the degree of genetic relatedness of human odor cues, suggesting that a variety of human behaviors may be influenced by these cues.



Ecology, Evolution, and Environment:
An organism's behavior often directly reflects its association with its environment. Several presentations examined the influence of the environment on behavioral traits, distributions,

and the survival of dimorphic characteristics. Foraging behavior is an important component for survival of an individual in the wild. Simple rules for switching between resource patches were presented and aberrant foraging behavior due to competition or the lack of foraging opportunities was examined. Juvenile herring gulls were found to be less efficient foragers and thus turned to kleptoparasitism to increase their success. Walruses deprived of normal foraging opportunities in a zoo setting exhibited destructive and stereotypic behaviors in captivity, which was reduced when offered enrichment in the form of feeding mats. Siren salamander feeding behavior and aestivation was influenced by life stage as well as location, while phenotypic differences of Hawaiian megalagrion damselflies was maintained by natural as opposed to sexual selection. A study on the effects of pesticides on spider behavior suggested that although not lethal, detrimental changes caused by pesticides may deplete populations of spiders which are important predators and control agents themselves.



Species Interactions:

Species success depends not only upon survival in the natural environment, it also depends upon surviving interactions with other species including finding prey, escaping predators and ensuring the survival of the next generation in an environment filled with competitors. Presentations at the conference examined

such interactions. The *Heliothis subflexa* moth is a specialized herbivore whose larvae can only survive by consuming plants in the genus *Physalis*. Despite this adaptation, some females deposit eggs on non-host plants, reducing their fitness by up to 12.6%. Explanations for this behavior may include avoidance of parasitism, predation or host-plant defenses. Like moths, rough-skinned newts do not protect their eggs after they are deposited, but the newts are able to lay eggs that contain a neurotoxin, tetrodotoxin (TTX) that offer protection against caddisfly larvae that prey upon newt eggs. Of course, use of toxins to deter predation leads to resistance. Garter snakes that feed upon the adult newts have evolved the ability to sequester TTX up to seven weeks in the liver and have developed aposematic coloration as a visual cue to predators such as birds. Sometimes, species act in concert to deter predators. Mobbing of avian predators by several prey species is a common behavior, but the mechanism behind this behavior is a complex interaction. The presented research suggested that the response was the product of interdependent mobbing followed by immediate and overlapping responses by heterospecifics.

Genetics:

Genetics is one of the fastest growing fields in biology today with many studies focusing on the links between genes and behavior and/or disease. In one study, *Drosophila* was artificially selected to generate two lines of flies with different levels of aggression. Several genes were identified within the two phenotypes, suggesting aggression is controlled by more than one neurotransmitter gene. At the same time, genes are not the only factor influencing behavior. Guppies inspection of potential predators in the wild was found to be influenced by the phenotype of social partners. In other studies, amphetamine and ceftriaxone were examined to determine their effect on treating mice with Huntington's disease, a late onset genetic disorder that results in loss of

motor control, cognitive decline and psychosis. Looking toward future genetic studies, a new chemometric method was developed to examine large numbers of volatile organic compounds found in human skin secretions. This will enable quantitative measurements to be made of MHC-related odors.



Neurobiology:

The development and function of the nervous system is inextricably linked to an organism's behavior. In the case of rat pups, maternal licking was found to influence the number of motoneurons that developed in the spinal nucleus of the bulbocavernosus. At the same time, young cardinals were able to compensate from denervation of one side of the syrinx and produce a full range of frequencies seen usually when both sides of the syrinx are intact. Comparing two white-throated sparrow color morphs with differing levels of aggressive behavior, a connection was found between aggression and vasotocin binding in the nucleus taeniae of the amygdale. Drugs can have enduring and progressive effects on the nervous system. Studies on rats examined the impact of MDMA (ecstasy) on nucleus accumbens output neurons, evaluated the role of circadian rhythms on nicotine addiction, and suggested that learning and memory defects brought on by valproic acid could be used as an animal model to assess the neural problems found in

autism. A final study addressed the physical limits of the neural system, stating that visual signals in organisms such as the blowfly are limited by the physical properties of photons.

Physiology:

Behavior often occurs in response to hormone levels or environmental cues. Studies presented at the conference examined the effects of several hormones and/or photoperiod on the behavior of fish, birds and mammals. The rapid down regulation of aromatase, which converts testosterone to estrogen in fish, was found to mediate sex change in the blue banded goby. Even though testosterone has been linked to a decrease in parental care among dark-eyed juncos, it was found to both increase male tail whiteness (mating signal) and overall fitness due to mating success. Volatile compounds excreted from junco preen glands were also quantified and found to be seasonally variable, suggesting that they may play an unidentified role in behavior. Several studies looked at Siberian hamster physiology examining: the response of the immune system to stress in short and long-day photoperiods, the regulation of aggression in females, the effects of social defeat on humoral immune response, and the importance of kisspeptin in gonadotropin release. Rats and terns were the subject of stress tests. Chronic stress was found to impair rat spatial learning and increase memory deficits as well as impair avoidance acquisition. It was suggested that the deficit may be mediated through an increase in CORT levels. Research with common terns found that the stress response was attenuated by an increase in age.



PLENARY SPEAKER

CISAB was happy to welcome this year's plenary speaker, Lauren V. Riters, to our meeting. Lauren is a faculty member of the Department of Zoology at the University of Wisconsin. Her research focuses on neural regulation of song in European starlings. She is interested in determining the motivating factors behind communication and determining how dependent vocal song production is on the context in which the song is produced.



The European starling is a seasonally breeding bird that sings all year. In spring the song is used to attract a mate, while in fall and winter when the birds are found in mixed flocks, the song functions to maintain dominance and cohesion. Dr. Riters has found that even though the song structure is complex, females prefer males with longer songs, and prefer spring songs to those sung in the fall. But choice is just one aspect of the communication story. Dr. Riters wanted to not only determine song preference, but motivation for singing.

To determine song motivation she had to examine the neuroregulation of song. Both Testosterone levels and the volume of the posterior medial nucleus (POM) increase during the breeding season. Aromatase levels are highest in the POM during spring and there is a positive correlation between POM volume and song bout length. She found that males with lesions in the POM suppress song and fail to adjust their song so that it is context appropri-

ate. But this still did not answer the question of motivation. The POM is connected to the song producing areas of the brain by several avenues. One of those avenues is through the Ventral Tegmental Area where dopamines are created to produce motivation and opioids to produce reward. Using agonists and antagonists, Dr. Riters found that dopamine agonists and opioid antagonists appear to work directly on the POM to increase song production.

EXEMPLAR AWARD

This year's CISAB's Exemplar Award, for a scientist with an outstanding career exemplifying the integration of different perspectives of animal behavior, was awarded to **Sarah W. Bottjer**, Professor of Biological Sciences in the Neuroscience Department of the University of Southern California.



Dr. Bottjer's research focuses on the relationship between development and learning at the level of both the brain and behavior. Using the zebra finch as a model, she studies young birds who must hear songs produced by members of their own species during sensitive periods to develop their own song. She also studies the factors that regulate basic processes of neural development, including neurodegeneration, changes in synaptic sensitivity and alterations in synaptic strength. She hopes to be able to determine the cellular and molecular mechanisms behind learned behavior that emerges during sensitive periods in song development.

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cavernosus in rats. Kathryn has received several awards and professional honors including the VanLiere Prize for Excellence in Psychology at Kalamazoo College, a fellowship from the Dept of Psychology, and two honorable mentions from the NSF Graduate Research Fellowship Program.

Christina M. Million Passe is working toward her PhD in Physiology in the field of Medical Sciences under the direction of Dr. Christine Quirk. Her interests include issues of development, gender and reproduction. At present, she studies the multiple aspects of a factor called p8 which has been shown to be important in both reproductive development and pathology. She has been awarded previous fellowships, received the Paul J Harmon Award for outstanding graduate student in the medical science program, and presented her research at several national meetings.



**WILLIAM J. ROWLAND
MENTORING AWARD
2006**

Each year CISAB recognizes an IU graduate student whose outstanding mentoring of undergraduates reflects the example set by founding CISAB member, William J. Rowland. Before his untimely passing, Bill acted as director of

the REU program and helped unite faculty researchers with undergraduates as well as mentor 14 of his own REU students. He also trained over 20 graduate students over his career.

This year's Rowland Award was presented to Eduardo J. Fernandez, PhD candidate in the Department of Psychology and Brain Sciences working with William Timberlake. Eddie's research has been based both in the laboratory and at the Indianapolis Zoo where he focused on the study of stereotypic behaviors. In the laboratory setting, he has attempted to show that stereotyped behavior does not accidentally emerge, and that once it does emerge it will change to general search behavior if food is present. At the zoo, he has examined a number of species including polar bears and walruses to determine if their stereotyped behavior is actually an expression of foraging behavior.

As well as focusing on his own research, Eddie has devoted time to training undergraduate students both in the lab and at the zoo. Over the past two years he has mentored 19 students and will be adding three more this semester. He has also worked with REU students during the last three summers.



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Private contributions are an important way in which we can expand our efforts. Even a small amount can go a long way. For example, \$500 can send a student to a major scientific meeting to present their research, \$200 can buy supplies for a museum exhibit, \$25 can purchase chemicals to do DNA fingerprinting or other genetic tests, \$10 can cover the cost of distributing our Kid's Page to an elementary school class.

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