The Society for Integrative and Comparative Biology
with the American Microscopical Society
The Crustacean Society

SICB
2020

FINAL PROGRAM

January 3-7, 2020
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3-7 January 2021
Washington, District of Columbia

3-7 January 2022
Phoenix, Arizona

3-7 January 2023
Austin, Texas

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Table of Contents

Officers/Co-Sponsoring Societies ........ 6
Meeting Highlights/Social Events ........ 7
SICB and Divisional Business Meetings .... 9
Special Lectures ....................... 9
Symposia .................................. 11
Workshops and Programs ................. 12
General Information
Speaker Ready Room .................... 17
Coffee Breaks ......................... 17
Committee and Business Meetings ....... 17
Employment Opportunities .............. 17
Registration Location/Hours ............. 17
Exhibitor Floorplan ..................... 19
Exhibitor Listing ....................... 20
Scientific Program
Friday 3 January ...................... 24
Saturday 4 January .................... 25
Sunday 5 January ..................... 57
Monday 6 January .................... 89
Tuesday 7 January .................... 120
Keyword Index ....................... 138
Author Index ......................... 147
JW Marriott Austin Floorplan .......... 166
Arbor Assays, the first US Employee-Owned life sciences company, specializing in the development of highly sensitive detection, activity, and immunoassay kits, high-purity inhibitors, and antibodies for drug discovery and basic research. Our mission is to build the highest quality and robust detection and immunoassay products for clinically important biomolecules.

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- Sensitivity: 47.9 pg/mL
- Sample types include fecal extracts, urine and tissue culture media
Welcome to Austin
Message from the President

Buckle up and hang on, we’re in for another action-packed SICB meeting! Such a bounty of great science will keep us all hopping from room to room and still feeling conflicted about talks we have to miss. But that’s a testament to all the superb research our SICB members bring to the Annual Meeting. Thanks to all platform and poster presenters; your work is the beating heart of this meeting.

In addition to all of the scientific highlights, the SICB leadership has been working hard behind the scenes to make our upcoming meeting as welcoming, safe, and inclusive as possible for all participants. We revised the SICB Annual Meeting Code of Conduct to include a better online system for reporting violations. As stated in the Code, SICB is committed to equal opportunity and treatment for all meeting participants, regardless of gender, gender identity or expression, race, color, national or ethnic origin, religion or religious belief, age, marital status, sexual orientation, disabilities, medical condition, genetic information, military or veteran status, or any other reason not related to scientific merit. Meeting participants are expected to uphold standards of scientific integrity and professional ethics. Harassment and other forms of misconduct undermine the integrity of SICB meetings and are strictly prohibited.

This year in Austin we have a number of programs and events in support of our LGBTQ+ attendees and expect these initiatives to continue in future years. As I noted this past fall in an email message to the whole Society, the state of Texas has laws that discriminate against LGBTQ+ people, and such laws are inconsistent with the values, aspirations and mission of SICB to advance the inclusion of all talent to maximize the excellence and integrity of our field. In contrast to the state’s negative efforts, the city of Austin has taken positive steps to support the LGBTQ+ community, including a city ordinance against employment and housing discrimination based on sexual orientation and gender identity. With thanks to Outgroup, other LGBTQ+ volunteers, and the SICB Broadening Participation and Public Affairs Committees, we have the following initiatives supporting and celebrating our LGBTQ+ participants in Austin:

- Pronouns on badges: look for them in the lower left quadrant
- Outgroup-In: a sober social networking event and discussion of LGBTQ+ issues
- Outgroup Social: happy hour social event offsite for LGBTQ+ attendees and allies
- Out to Lunch: LGBTQ+ Mentor-Mentee lunches
- Outgroup badge stickers: Available for LGBTQ+ attendees and allies to show safe space and support
- Public Affairs Committee Workshop: Embracing Variation Among Humans: Perspectives on LGBTQ+ Experiences in Biology and Academia

Also, be sure to drop by the exhibits of our vendors; these exhibits provide useful information and they support our Society. I am particularly pleased to acknowledge Sable Systems International as a platinum sponsor. Sable Systems has been an important presence at our meetings for many years; please drop by their booth to see their wonderful products and to thank them for their support. I am also pleased to have Wiley Publishers as a gold sponsor. Wiley has also been an important fixture at SICB and they generously sponsor our Best Student Presentation Awards. Xcitex, Arbor Assays and Friday Harbor Labs return to SICB as silver sponsors and well as BioOne Complete as a bronze sponsor. Be sure to visit all the exhibits and support the exhibitors in any way you can; but please thank them for their support!

Finally, the SICB journals, Integrative and Comparative Biology and Integrative Organismal Biology, stand alongside our Annual Meetings as the core activities of SICB. Under the exciting leadership of Editor Ulrike Müller, Integrative and Comparative Biology is leading the way in implementing inclusive practices for scientific publishing, and IOB continues to publish synthetic and influential papers from our symposia and abstracts for the annual meeting. This year marks the first anniversary SICB’s new open-access journal, Integrative Organismal Biology. Editor Adam Summers, the IOB Editorial Board, and IOB Outreach Associates have done a superb job launching this new outlet for integrative biology research. IOB makes the most of being an open access journal by publicizing every paper through a dedicated blog post by an Outreach Associate and social media promotion. This outreach publicity for every paper is a great perk of publishing your work in IOB. Altmetric scores how much attention papers get, and most IOB papers are in the top 5% of all research outputs scored by Altmetric. The missions of our journals are nicely complementary, and support SICB’s mission to promote the scientific excellence encompassed by our Society.

I hope you enjoy the 2020 Annual Meeting of SICB!
Beth Brainerd
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To learn more, please visit us at our SICB Booth #401 or find us online at fhl.uw.edu.
Welcome to the SICB Annual Meeting in Austin, Texas. We have 4 days of jam-packed science, with a total of over 980 contributed talks arranged into 140 oral sessions and 775 posters in 3 poster sessions. We also have 11 full-day symposia and a number of special lectures and workshops. The schedule is packed with interesting science and other SICB-sponsored activities but try to find some down time to see a bit of the city if you can. The entire schedule grid is on our website at www.burkclients.com/sicb/meetings/2020/site/program.html. Use this for a quick guide to where and when everything occurs. If you are attached to your cell phone, our mobile meeting app will keep you organized.

**Major lectures:** We are excited to open the annual meeting on Friday, January 3rd at 7:30 with our Plenary Lecture presented by Sheila Patek. Her lecture will focus on the importance and impact of interdisciplinary fundamental scientific discovery. Successive evenings will hold the Bartholomew Lecture by Mary Caswell Stoddard (Saturday, January 4, 7:00 PM); the Bern Lecture by George Bentley and the AMS Lecture by Sara Lindsay (both Sunday, January 5, 7:00 PM). We will conclude the meeting with the Moore Lecture by Emily Graslie (Tuesday, January 7, 3:45 PM). This is an all-star lineup so please be sure to budget some time in for these lectures!

**Symposia:** Eleven symposia were selected by the Program Committee and represent the diversity of the 12 divisions of SICB. These symposia represent cutting-edge research and syntheses all with an eye toward establishing the future of specific research areas. This year, we have three symposia that were selected for the special SICB-wide designation because they should appeal broadly across all our divisions. All of the symposia are the result of the hard work, creativity and enthusiasm of volunteer organizers without whom we would not have our journal, *Integrative and Comparative Biology*. This is because papers from the symposia talks are the basis of this journal. More information on our symposia can be found at: sicb.org/meetings/2020/symposia/index.php.

**Workshops:** Our SICB committees have been hard at work planning workshops to appeal to different segments of our membership on topics ranging from professional development to teaching strategies. It is important to note that this year, the Broadening Participation Committee and the Public Affairs Committee are both tackling the important theme of inclusion in science. Be sure to look out for their workshops. Every year we keep adding on additional workshops, on top of our regular committee workshops, thanks to the generosity of our members who want to share their expertise and time with meeting attendees. This year we have 10 (!) additional workshops in addition to our standard SICB committee workshops. Information on all of the workshops can be found here: burkclients.com/sicb/meetings/2020/site/workshops.html.

**Socials:** Part of our programming includes many organized social events for catching up with friends and colleagues or meeting new people. The first social is the Outgroup-In meeting and social starting at 5:30 followed by the Broadening Participation Meet and Greet at 6:30 on January 3. After the Plenary Lecture on January 3, we have the society-wide welcome reception from 8:30-10:00 PM. Division Socials are on Jan 4-6 and the meeting ends with the society-wide party in honor of students and post-docs on January 7 from 5:00-7:00 PM.

**Business meetings:** Business meetings are a great opportunity to hear about the activities of your division and the society. It is also a great way to see how you can become an active member of the society. The Society Executive Officers will swing by each business meeting to give an update on major society initiatives. We keep them short and sweet so that you attendees can grab dinner or attend an evening event.

Finally, the annual meeting is the result of the hard work of many folks. Please thank the division program officers, the TCS and AMS program reps, the symposium organizers, the SICB Executive Officers, committee chairs, and our great team from Burk & Associates: Brett Burk, Lori Strong, Jennifer Rosenberg, Raelene Sok, Jill Drupa, and Ruedi Birenheide. We hope that you will enjoy the meeting, find inspiration in the presentations, and establish new friendships and collaborations!

Susan Williams
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Executive Director

Co-Sponsoring Societies

American Microscopical Society (AMS)
The Crustacean Society (TCS)

The co-sponsoring society presentations are integrated into the program to minimize the potential conflicts of similar presentations being scheduled at the same time.

Thank you to the following SICB Sponsors

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Meeting Highlights/Social Events

Events take place in the JW Marriott Austin, unless otherwise noted

Friday 3 January

**Student Worker Orientation & First Timer Orientation**
Lonestar Ballroom, 5:30 PM – 6:30 PM
“How to get the most out of your SICB Meeting”
Required for students with Charlotte Mangum support

**Plenary Session: Dr. Sheila Patek**
Lone Star Ballroom, 7:30 PM – 8:30PM
The Plenary Address, “Impact and discovery: extreme movement in an interdisciplinary and political world”, will be given by Dr. Sheila Patek.

**Welcome to Austin Reception**
Griffin Hall, 8:30 PM – 10:00 PM
The Society for Integrative and Comparative Biology welcomes you to Austin with a reception. The Welcome Reception will follow the Plenary Lecture. Light snacks and cash bar will be provided.

Saturday 4 January

**Morning Run**
JW Marriott Lobby, 6:00 AM

**Poster Session 1**
Grand Ballroom, 3:30 PM – 5:30 PM
Even # poster authors present from 3:30 pm-4:30 pm
Odd # poster authors present from 4:30 pm-5:30 pm

**DCPB Social & BART Reception**
Griffin Hall, 8:00 PM – 10:00 PM

Sunday 5 January

**Morning Run**
JW Marriott Lobby, 6:00 AM

**Poster Session 2**
Grand Ballroom, 3:30 PM – 5:30 PM
Even # poster authors present from 3:30 pm-4:30 pm
Odd # poster authors present from 4:30 pm-5:30 pm

Monday 6 January

**Morning Run**
JW Marriott Lobby, 6:00 AM

**Poster Session 3**
Grand Ballroom, 3:30 PM – 5:30 PM
Even # poster authors present from 3:30 pm-4:30 pm
Odd # poster authors present from 4:30 pm-5:30 pm

**SICB Business Meeting**
Lone Star D, 5:30 PM – 6:30 PM
SICB Society Meeting & Awards Presentation

**TCS/DEDB/DPCB/AMS/DIZ/DEE/DOB Social**
Griffin Hall, 6:30 PM – 8:30 PM

**DVM/DCB Social**
South-East Lobbies, 9:00 PM – 12:00 AM

**Broadening Participation Social**
Room 401, 7:00 PM – 9:00 PM –

Tuesday 7 January

**Morning Run**
JW Marriott Lobby, 6:00 AM

**Society-Wide Social in Honor of Students and Post-docs**
Griffin Hall, 5:00 PM – 7:00 PM
Join fellow SICB members for a Society-Wide Social. Cheese and fruit will be served, and a cash bar will be provided.

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**Morning Runs**

Do you like to run in the morning?

Join other SICB attendees for morning runs along Lake Travis. Runs will take place on the 4th, 5th, 6th and 7th. Meet in the Lobby of the JW Marriott at 6:00 am to get you back in plenty of time for the 8 am start time for sessions. A great way to start the day and meet other SICB attendees. Michele ‘Nish’ Nishiguchi will be leading the runs.
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SICB and Divisional Business Meetings

Saturday 4 January
DAB Meeting, 5:45 PM – 6:30 PM, Lone Star E
DNNSB Meeting, 5:45 PM – 6:30 PM, Lone Star F
DCPB Meeting, 5:45 PM – 6:30 PM, Lone Star G
DVM Meeting, 5:45 PM – 6:30 PM, Rooms 303-304
DEE Meeting, 5:45 PM – 6:30 PM, Room 205
DEDE Meeting, 5:45 PM – 6:30 PM, Rooms 201-202
DEDB Meeting, 5:45 PM – 6:30 PM, Lone Star H

Sunday 5 January
TCS Business Meeting, 12:00 PM – 1:30 PM, Room 309
AMS Business Meeting, 12:00 PM – 1:30 PM, Room 408
DCE Meeting, 5:45 PM – 6:30 PM, Lone Star A
DCB Meeting, 5:45 PM – 6:30 PM, Lone Star B
DIZ Meeting, 5:45 PM – 6:30 PM, Lone Star C
DPCB Meeting, 5:45 PM – 6:30 PM, Rooms 301-302
DOB Meeting, 5:45 PM – 6:30 PM, Room 205

SICB Society Business Meeting & Awards Presentation
Monday 6 January, 5:30 PM – 6:30 PM, Lone Star D

Special Lectures

Plenary Session: Dr. Sheila Patek
Friday 3 January, 7:30 PM – 8:30 PM, Lone Star Ballroom
Impact and discovery: extreme movement in an interdisciplinary and political world

Bartholomew Lecture: Dr. Mary Caswell Stoddard
Sponsored by Sable Systems
Saturday 4 January, 7:00 PM – 8:00 PM, Salons D-E
Diversity of Form and Function in the Colorful World of Birds

AMS Lecture: Dr. Sara Lindsay
Sunday 5 January, 7:00 PM – 8:00 PM, Rooms 301-302
The Art of Seeing: Using Microscopy to Power STEAM Learning in Biology

Bern Lecture: Dr. George Bentley
Sunday 5 January, 7:00 PM – 8:00 PM, Salons D-E
A Bird’s Eye View of Reproductive Endocrinology

Moore Lecture: Emily Graslie
Tuesday 7 January, 3:45 PM – 4:45 PM, Salon 5
Prehistoric Road Trip: Crafting a Story 2 Billion Years in the Making

The Exhibits will open on Saturday 4 January at 9:30 AM. JW Marriott Austin, Grand Ballroom, will be the location for coffee breaks Saturday through Tuesday mornings from 9:30 AM – 10:30 AM, and 3:30 PM – 4:30 PM Saturday through Monday during the poster sessions.
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*Evolution & Development* publishes works that address a diversity of evolution/development questions in a wide range of systems. The journal welcomes papers from evo-devo biologists reflecting such approaches as paleontology, population biology, developmental biology, and molecular evolution, and genetics.

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**Editor-in-Chief:**
**Craig Albertson, University of Massachusetts, Amherst**

[Submit your research to *Evolution & Development*](http://wileyonlinelibrary.com/journal/ede)
Symposia

Saturday 4 January

S1: New Frontiers in Antarctic Marine Biology  
Organizers: James McClintock, Charles Amsler, Bill Baker, Art Woods, Amy Moran  
Sponsors: DCPB, DEE, DIZ, AMS, TCS

S2: Epigenetic Variation in Endocrine Systems  
Organizers: Tyler Stevenson, Lynn Martin, Haley Hanson  
Sponsors: DAB, DCE, DCPB, DEDB, DEDE, DNNSB

S3: Biology at the Cusp: Teeth as a Model Phenotype for Integrating Developmental Genomics, Biomechanics, and Ecology  
Organizers: Gareth Fraser, Darrin Hulsey  
Sponsors: DCB, DEDB, DEE, DVM

Sunday 5 January

S4: Reproduction: the Female Perspective from an Integrative and Comparative Framework  
Organizers: Virginia Hayssen, Teri Orr  
Sponsors: DAB, DCE, DCPB, DEDB, DEE, DEDE, DNNSB, DPCB, DVM, AMS

S5: Form, structure and function: How plants vs. animals solve physical problems  
Organizers: Ulrike Müller, Simon Poppinga, Anna Westermeier  
Sponsors: DCB, DIZ, DVM, AMS

S6: Bio-inspiration of silent flight of owls and other flying animals: recent advances and unanswered questions  
Organizers: Christopher Clark, Justin Jaworski  
Sponsors: DAB, DCB, DEE, DVM

Monday 6 January

S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models  
Organizers: Karen Burnett, Jonathon Stillman, Donald Mykles, David Durica  
Sponsors: DCE, DCPB, DEDB, DEDE, DEE, DIZ, DPCB, AMS, TCS

Organizer: Henry Astley  
Sponsors: DAB, DCB, DNNSB, DVM

Organizers: Lance McBrayer, Eric McElroy, Diego Sustaita  
Sponsors: DAB, DCB, DEE, DNNSB, DVM

Tuesday 7 January

S10: Melding Modeling and Morphology: integrating approaches to understand the evolution of form and function  
Organizers: Lindsay Waldrop, Jonathan Rader  
Sponsors: DCB, DEDB, DPCB, DVM, TCS

S11: Integrative comparative cognition: can neurobiology and neurogenomics inform comparative analyses of cognitive phenotype?  
Organizers: Yuxiang Liu, Sabrina Burmeister  
Sponsors: DAB, DEDE, DEE, DNNSB, DPCB
Workshops and Programs

Friday 3 January

Workshop: Spatiotemporal Dynamics of Communication
9:00 AM – 2:00 PM, Rooms 301-302
This workshop will integrate approaches from neuroscience, cognitive ecology, biomechanics, spatial ecology, machine vision, evolution, and animal behavior to address the spatiotemporal dynamics of complex signaling. Our hope is that participants will leave the workshop better able to apply approaches and knowledge from the other disciplines to generate new experimental designs and analytic tools. We plan to intersperse short presentations, much discussion, and mingling to promote new collaborations.

Workshop In Honor of Stan Rachootin
1:00 PM – 6:00 PM, Rooms 303-304
This workshop honors Professor Stan Rachootin on the occasion of his retirement from Mount Holyoke College. Dr. Rachootin joined the faculty at Mount Holyoke in 1984, and over decades has taught classes on Darwin’s works, Ecology and Evolution, Macroevolution, and Invertebrate Zoology, among many others. Dr. Rachootin has had long-term impact on evolutionary and developmental biology through his mentoring of many female scientists. The senior theses of Dr. Rachootin’s students were strikingly diverse - the systems ranged from guppies to oligochaetes to mice, and the questions ranged from the evolution of behavior, to the origin of novel structural patterns on insect wings, to studies in the history of science. This workshop will feature talks by many of his students who are continuing to have impact on scientific research in their varied careers be they in academia, industry, or science communication.

Student Worker Orientation & First Timer Orientation*, “How to get the most out of your SICB meeting”
5:30 PM – 6:30 PM, Lonestar Ballroom
*Required for students with Charlotte Mangum support

Saturday 4 January

Student Postdoctoral Affairs Committee: “How-To?” Daily Booth
9:15 AM – 5:00 PM, Grand Ballroom

Public Affairs Committee Workshop: Embracing Variation Among Humans: Perspectives on LGBTQ+ Experiences in Biology and Academia
12:00 PM – 1:30 PM, Rooms 303-304
This workshop is a collaboration between the Public Affairs Committee and the National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP). NOGLSTP is a national organization with decades of experience empowering “lesbian, gay, bisexual, transgender, and queer individuals in science, technology, engineering, and mathematics by providing education, advocacy, professional development, networking, and peer support.” During this workshop we will openly discuss the perspectives of the LGBTQ+ community within our society, the field of organismal biology, and academia more broadly. A NOGLSTP representative will first lead an eye-opening information session about challenges facing this community at all career levels. This will be followed by a question-and-answer period where audience members can ask SICB members from the LGBTQ+ community about their experiences. We aim to represent the diversity of SICB in sexual orientation, gender identity and expression, career stage, and scientific interests on this panel. The PAC welcomes participations from across our membership at this workshop. No registration is required.
Workshop: Mentorship and Sponsorship: How to Curate Your Support Team and Guide Your Successful Career
12:00 PM – 1:30 PM, Rooms 301-302
What do you expect out of your relationships with mentors? Do you know the difference between a sponsor and a mentor? This workshop will be a discussion to learn what to give and gain from your mentors and sponsors to support your own career goals. You will also learn how to map your mentor and sponsor relationships and build your support team -based around your career goals. This workshop is geared for late-stage graduate students, post-docs, and early career researchers.

DPCB Ask-An-Expert: Get Phylogenetic and Comparative Methods Support with an Expert
3:30 PM – 5:30 PM, Grand Ballroom
Initiated at our 2019 meeting in Tampa, our DCPB experts are back at SICB 2020 to help your with phylogenetic methods. Bring your questions and datasets and they will be there during each poster session to help!

Broadening Participation Movie and Workshop: “Can We Talk? Difficult Conversations with Underrepresented People of Color: Sense of Belonging and Obstacles to STEM Fields” with Professor Kendall Moore
7:00 PM – 9:00 PM, Rooms 301-302
The Broadening Participation Committee will have a screening of “Can We Talk? Difficult Conversations with Underrepresented People of Color: Sense of Belonging and Obstacles to STEM Fields” by award-winning documentary film-maker Kendall Moore, followed by a discussion of the work with the filmmaker. Dr. Moore is a Professor of Journalism & Film/Media at the University of Rhode Island. Dr. Moore has produced numerous documentaries that have aired on PBS and in film festivals. She is the recipient of 2 Fulbright Scholar Awards and the Rhode Island Film Fellowship for Outstanding Filmmaking.

Sunday 5 January

Student Postdoctoral Affairs Committee: “How-To?” Daily Booth
9:15 AM – 5:00 PM, Grand Ballroom

Workshop: An Introduction to the World of Book Publishing from Editors and Authors
12:00 PM – 1:30 PM, Room 408
Join several authors and book publishers for this introduction to the world of book publishing. Panelists will include Alison Kalett of Princeton University Press, Ian Sherman of Oxford University Press, Cameron Ludwick of University of Texas Press, Prof. David Hu, author of How to Walk on Water and Climb Up Walls, and Prof. Mike Ryan, author of A Taste for the Beautiful. Publishers will explain the pitching, proposal, review, publication and promotion process. And David and Mike will explain book writing and publishing from an author’s perspective. There will be plenty of time for audience questions and a light lunch will be available on a first come first serve basis.

Symposium 5 Workshop: How to Disseminate Your Research
12:00 PM – 1:30 PM, Room 404
The goal of this workshop is to support conference presenters in their ability to disseminate their research to a general public through the press and social media. Participants will be able to interact with experts in science communication and science outreach to develop press releases, social media posts, and other formats to communicate their research to the general public.
Organizing Meeting for Building Bridges Symposium
12:00 PM – 1:30 PM, Room 407

Workshop: Panel on Research and Working at Primarily Undergraduate Institutions
12:00 PM – 1:30 PM, Room 402-403
The workshop will consist of a panel of faculty members, all of whom are currently at a Primarily Undergraduate Institution (PUI). We will discuss how research at PUIs is conducted, what opportunities are available, applying for those opportunities, and what the challenges are for faculty at PUIs. The moderator of the panel will be Adam Summers, a senior faculty member at the University of Washington and PUI alumnus (Swarthmore College). There will be a brief question and answer session for the panel members, before broadening the workshop to the entire group. We will have breakout stations where small groups of participants can interact individually with one of the panelists, to discuss different aspects of being at a PUI: teaching, research, service, and expectations. Breakout stations will rotate so that each group will have an opportunity to discuss each facet of a PUI.

DPCB Ask-An-Expert: Get Phylogenetic and Comparative Methods Support with an Expert
3:30 PM – 5:30 PM, Grand Ballroom
Initiated at our 2019 meeting in Tampa, our DCPB experts are back at SICB 2020 to help your with phylogenetic methods. Bring your questions and datasets and they will be there during each poster session to help!

TAL-X Workshop: Teaching Critical Thinking About Science and Technology: GMOs As a Case Study
7:00 PM – 9:00 PM, Rooms 303-304
The 2020 Teaching and Learning Workshop is titled: “Teaching critical thinking about science and technology: GMOs as a case study.” It will be a two-hour round table format with drinks and desserts, from 7-9pm on Sunday, January 5th in room 401.

The workshop is being organized by Bram Lutton, Ph.D., Chair of the Educational Council, who has taught ethics in science and technology for the past ten years at Endicott college and the Mount Desert Island Biological Laboratory. Dr. Lutton’s co-leader will be Steven Druker, J.D., Executive Director of the Alliance for Bio-Integrity; recipient of a Luxembourg Peace Prize for outstanding work to foster environmental health; a member of the food safety panels at conferences on GMOs held by the FDA and the National Research Council; and the author of Altered Genes, Twisted Truth, which Jane Goodall's foreword hails as "without doubt one of the most important books of the last 50 years."

The workshop will provide an excellent opportunity for SICB members interested in science education and/or bioethics to experience the application of critical thinking methods to one of the most important and controversial scientific/technological topics.
Monday 6 January

Student Postdoctoral Affairs Committee: “How-To?” Daily Booth
9:15 AM – 5:00 PM, Grand Ballroom

NSF Program Officers: Funding Opportunities, Integrative Research and Education, and Q&A
12:00 PM – 1:30 PM, Lone Star C

Round-table discussion: Overcoming Challenges for Testing Gene Function in Post-Embryonic Life Stages
12:00 PM – 1:30 PM, Rooms 211-212
Testing gene function is key for illuminating the genome to phenome connection. Post-embryonic processes (e.g., regeneration, larval patterning, growth, homeostasis, metamorphosis) are central to the biology of many animals, but manipulating gene function during these processes can be particularly challenging. This round-table discussion will focus on challenges and approaches for testing gene function specifically in post-embryonic life stages of animals. Light food will be served.

Student Support Committee Brown Bag Workshop for Graduate Students: Writing a competitive GIAR/FGST grant proposal
12:00 PM – 1:30 PM, Room 404
Specific information and tips on writing competitive GIAR & FGST grant proposals will be provided by the Chair of the Student Support Committee followed by an informal Q&A session. Previous award winners are also invited to provide their experiences and insights on the process of applying for these awards.

Workshop: Parenting Through Academia
12:00 PM – 1:30 PM, Rooms 402-403
A growing body of societal research across STEM disciplines has shown that academics experience different professional expectations, salaries, and resource availability as a result of their gender and parenting status. Leaky pipeline notwithstanding, female professionals with children are often thought to be less productive by employers and management (1), despite recent published findings showing higher productivity and greater efficiency from those with children (2); yet a historical bias that it is not possible to be both productive in science and have a family has caused many persons to choose against having children. Parenting can be challenging regardless of professional circumstances, but given the possibility to identify resources, enable opportunities, and create flexibility, academia may in fact be one of the best possible situations in which to be a career-oriented parent. The purpose of this workshop is to present a forum for conversation regarding a diverse range of parenting and professional experiences, with the goal of making useful strategies and lesser-known resources more widely available, in addition to building a community of persons for support and mentorship.

Podcast: Live Recording of Big Biology with Dr. Molly Cummings
3:30 PM – 4:30 PM, Room 407

DPCB Ask-An-Expert: Get Phylogenetic and Comparative Methods Support with an Expert
3:30 PM – 5:30 PM, Grand Ballroom
Initiated at our 2019 meeting in Tampa, our DCPB experts are back at SICB 2020 to help your with phylogenetic methods. Bring your questions and datasets and they will be there during each poster session to help!
Workshops and Programs

Tuesday 7 January

**Student Postdoctoral Affairs Committee Workshop: Transitions in Science Careers**
12:00 PM – 1:30 PM, Lone Star E
How should you approach making the transition from undergrad to Masters/PhD; or PhD to postdoc; or postdoc/ fellow to faculty; or other careers? SPDAC is hosting a roundtable lunch event to facilitate (with expert "hosts") discussion and advice for all those interested.

**Workshop: Building Bridges from Genome to Phenome: Molecules, Methods and Models**
12:00 PM – 1:30 PM, Room 401
Workshop attendees will be asked to evaluate newly developed approaches and models presented or discussed in the Building Bridges sessions in the context of the grand challenge of linking genome to phenome. They will work to identify the leading edges as well as the key barriers to this research with respect, for example, to melding different types of datasets and working across levels of biological organization to inform our understanding of how phenotype variation arises. This synthesis will form the basis for the symposium policy white paper, which will be published in Integrative and Comparative Biology as part of the symposium volume.

**Workshop: 3D Visualization and Morphometrics with SlicerMorph**
12:00 PM – 3:30 PM, Rooms 502-503
SlicerMorph is an NSF funded project to extend the functionality of the 3D-Slicer with tools that will help biologists working with 3D specimen data. Toolkit enables biologists to retrieve, visualize, measure and annotate high-resolution specimen data both from volumetric scans (CTs and MRs) as well as from 3D surface scanners effectively within 3D-Slicer. Functionalities SlicerMorph offers are: landmark-based statistical shape analysis, 3D visualization of shape deformation, ability to generate movies and more. Free and open-source nature of the project help remove the roadblocks to data sharing and collaboration that commercial software impede on research. We will also cover how to do segmentation and visualization in 3D-Slicer as part of the workshop.
General Information

Final Program
SICB does not assume responsibility for any inconsistencies or errors in the abstracts for contributed paper and poster presentations. We regret any possible omissions, changes and/or additions not reflected in this final program.

Speaker Ready Room
All presenters must visit the Ready Room, Room 405, 4th Floor, at least one half day prior to his/her session time. It is highly recommended that you preview your presentation prior to your presentation to guarantee that it will work properly. Each presentation will be loaded onto a master file for each session. You may use your own computer, however, your fifteen minute time slot does not include time for set up and testing. There will be students and audio visual personnel to assist you and to check you in during the following hours:

- Friday 3 January 12:00 PM – 7:00 PM
- Saturday 4 January 7:00 AM – 5:00 PM
- Sunday 5 January 7:00 AM – 5:00 PM
- Monday 6 January 7:00 AM – 5:00 PM
- Tuesday 7 January 7:00 AM – 10:00 AM

Registration
The SICB Registration/Information area is located in the foyer of the Grand Ballroom. The Registration Desk will be open during the following hours:

- Friday 3 January 3:00 PM – 7:30 PM
- Saturday 4 January 7:00 AM – 5:00 PM
- Sunday 5 January 7:30 AM – 3:30 PM
- Monday 6 January 7:30 AM – 3:00 PM
- Tuesday 7 January 7:30 AM – 2:30 PM

Pop Up Meeting?
Do you need a room for an unscheduled meeting, come to the registration desk and book your time.

Keyword Index
Refer to the keyword index located at the end of this program for easy access when looking up a specific subject matter. Each author who is presenting an abstract has supplied up to three keywords for your reference.

Committee/Business Meetings
Please refer to the Schedule of Events on the first page of each day’s listing for committee meetings and business meetings of your division or co-sponsoring society.

Employment Opportunities
The Employment Opportunity bulletin board will be located in the SICB Registration/Information area. The Employment Opportunity board will provide a place for attendees to post “Positions Wanted,” and learn about “Positions Available.” Interested attendees may schedule interviews in the room set aside for that purpose. See a registration desk attendant for assistance.

Coffee Breaks
Coffee break service is available each day of the meeting. There will be a morning service from 9:30 AM — 10:30 AM and an afternoon service from 3:30 PM — 4:30 PM. The coffee breaks will be located in the Grand Ballroom.

Quiet Room
Feeling anxious and need a moment to decompress? A Quiet Room (Room 297) with low lighting is available for attendees to rest quietly and recharge before diving back into the fray.

SICB Childcare Room
This year, SICB is providing FREE onsite childcare through Preferred Sitters Childcare in Rooms 310-311. Pre-registration was required, but there may be space for drop-ins.

Mother’s Room
SICB recognizes that balancing a family and meeting attendance creates unique challenges for parents. There is a Mother’s room on the third floor in Room 305, located next-door to the childcare room and within quick access of talks. The Mother’s room is a private room equipped with comfortable chairs for nursing, chairs and tables for pumping, outlets, a refrigerator for milk.
Getting Our Event App is a Snap!

Scan the QR code to access our event app for iPhone, iPad or Android today!

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Use our direct link: https://sicb2020.quickmobile.mobi and jumpstart your event!

You can also download our event app from the App Store and Google Play!
2020 SICB Exhibitor Floorplan

Grand Ballroom • JW Marriott Austin

Exhibit Hours
Saturday 4 January
9:30 AM – 5:30 PM
Sunday 5 January
9:30 AM – 5:30 PM
Monday 6 January
9:30 AM – 5:30 PM

Coffee Breaks
Morning
9:30 AM – 10:30 AM
Evening
3:30 PM – 4:30 PM

Specialty Booths
SICB Journals, Booth 104
Find out more information about SICB’s journals,
Integrative and Comparative Biology, and our
new journal, Integrative Organismal Biology

DPCB Ask-An-Expert, Booth 505
Get phylogenetic and comparative
methods support with an expert

Student Postdoctoral Affairs Committee:
“How-To?” Daily Booth
<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth</th>
<th>Address</th>
<th>Phone</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AEI Technologies</strong></td>
<td>404</td>
<td>410 Technology Drive, Bastrop, TX 78602</td>
<td>800-860-5930</td>
<td><a href="http://www.aeitechnologies.com">www.aeitechnologies.com</a></td>
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<td></td>
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<td>AEI Technologies manufactures single and multi-channel metabolic measurement systems providing everything you need to accurately measure energy metabolism by indirect calorimetry. Perfect for insects, amphibians, reptiles, birds, mammals, and humans. Proprietary software enables real-time data acquisition, which can be displayed tabular, graphical or exported to an excel spreadsheet.</td>
</tr>
<tr>
<td><strong>The Company of Biologists</strong></td>
<td>507</td>
<td>Bidder Building, Station Road, Histon, Cambridge CB24 9LF UK</td>
<td>44 (0)1223 632877</td>
<td><a href="http://www.biologists.com">www.biologists.com</a></td>
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<td>The Company of Biologists is a not for profit publishing organisation dedicated to supporting and inspiring the biological community through scientific journals, meetings and grants. The Company publishes five specialist peer-reviewed journals: Development, Journal of Cell Science, Journal of Experimental Biology, Disease Models &amp; Mechanisms and Biology Open.</td>
</tr>
<tr>
<td><strong>American Microscopical Society</strong></td>
<td>402</td>
<td>141 E. College Ave., Decatur, GA 30030</td>
<td>312-369-7395</td>
<td><a href="http://www.amicros.org">www.amicros.org</a></td>
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<td>The American Microscopical Society is an international society of biologists organized to encourage the use of microscopy. AMS publishes the journal Invertebrate Biology and co-sponsors the SICB Annual Meeting. The AMS booth features the annual Buchsbaum Photomicrography Contest and information on opportunities for student research fellowships.</td>
</tr>
<tr>
<td><strong>Arbor Assays</strong></td>
<td>107</td>
<td>1514 Eisenhower Place, Ann Arbor, MI 48108</td>
<td>734-677-1776</td>
<td><a href="http://www.arborassays.com">www.arborassays.com</a></td>
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<td>Arbor Assays produces state of the art detection and immunoassay kits to quantitate markers for oxidative stress, reproduction, HPA stress, inflammation, cell signaling, metabolism, kidney function, and normalization. We develop, manufacture and QC all products in house, in Ann Arbor, allowing us to provide optimal customer service and technical support.</td>
</tr>
<tr>
<td><strong>Biological Bulletin, The</strong></td>
<td>200</td>
<td>Marine Biological Laboratory, 7 MBL Street, Woods Hole, MA 02543</td>
<td>508-289-7149</td>
<td><a href="http://www.journals.uchicago.edu/bbl">www.journals.uchicago.edu/bbl</a></td>
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<td>The Biological Bulletin is a peer-reviewed, international interdisciplinary journal that publishes outstanding experimental research on a wide range of organisms and biological topics, with a focus on marine systems. Published since 1897, it is one of America’s oldest and most respected journals.</td>
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<td>Expert Digital Imaging is an independent distributor of high-speed and high-resolution camera equipment from various manufacturers, including the full NAC and Mega Speed camera lines. At EDI, we offer hand-held, affordable high-speed cameras, traditional high-speed cameras as well as long-recording high speed systems with associated image tracking software.</td>
</tr>
<tr>
<td><strong>Fastec Imaging</strong></td>
<td>301</td>
<td>17150 Via Del Campo, Suite 301, San Diego, CA 92127</td>
<td>858-592-2342</td>
<td><a href="http://www.fastecimaging.com">www.fastecimaging.com</a></td>
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<td>Fastec designs and manufactures high-speed cameras including the 5-MP portable TS5 and computer-operated IL5, popular for field and lab applications. The new HS Series, with approximately 4x the record speed and 20x the image transfer rate, will be released in January 2020.</td>
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</tbody>
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IO Industries Inc.  
15940 Robin's Hill Road  
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519-663-9570

www.ioindustries.com

IO Industries Inc., London, ON, Canada (est. 1991), designs and manufactures digital video cameras, digital video recorders and software for applications in aerospace, defense testing, medical, scientific, machine vision, broadcast and cinema.

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Lehigh University  
Booth: 105  
Department of Biological Science

111 Research Drive  
Bethlehem, PA 18015  
610-758-6235

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Booth: 501

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Alexandria, VA 22314  
703-292-8420

www.nsf.gov

The National Science Foundation, an independent federal agency created by Congress in 1950, supports non-medical basic research in all science and engineering fields with an annual budget of about $7 billion. NSF funds approximately 20% of all federally supported basic research conducted by US colleges and universities.

Oxford University Press  
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198 Madison Avenue  
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800-445-9714

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Oxford University Press is proud to publish one of the most highly respected and cited journals in the field of biology, Integrative and Comparative Biology, and the 2019 new launch journal Integrative Organismal Biology, in partnership with The Society for Integrative and Comparative Biology. Oxford University Press is a department of the University of Oxford. It furthers the University’s objective of excellence in research, scholarship, and education by publishing worldwide. As a press, we take pride in this mission, which allows us to enable, support, and facilitate research and scholarship.
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Princeton, 08540
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Royal Society Publishing Booth: 204
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44 207 451 2647
www.roaysociety.org/journals

Royal Society Publishing has several journals of interest to the SICB community, including *Journal of the Royal Society Interface*, *Proceedings B* and *Biology Letters*. We offer high quality peer review, rapid publication and open access options. Visit booth 204 to find out more about what we’ve been publishing in the field of integrative and comparative biology. Further information at http://royalsociety.org/journals

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UW Friday Harbor Laboratories Booth: 401
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University Tables

Clemson University  
Biological Sciences Department  
132 Long Hall  
Clemson, SC 29634  
864-656-2328  
www.clemson.edu/science/departments/biosci

Clemson University’s Biological Sciences Department provides opportunism for integrative M.S. and Ph.D. projects in organismal biology. From Molecules to Ecosystems, our research spans the tree of life, with expertise in behavioral ecology, biomechanics, evo-devo, evolutionary morphology, macroevolution, modeling, and physiology. We value diversity and offer strong TA support.

University of Michigan – Department of Ecology and Evolutionary Biology  
1105 North University Avenue  
Ann Arbor, MI 48109  
734-764-1443  
lsa.umich.edu/eeb

The University of Michigan Department of Ecology and Evolutionary Biology is recruiting at several career stages. We have a fully funded Frontiers Masters program, a NextProf workshop to equip students with the skills to land their dream job in academia, and several postdoctoral fellowships, many of which bridge into professorships.

New Mexico State University  
Department of Biology  
Box 30001, MSC 3AF  
Las Cruces, NM 88003-8001  
575-646-3613  
rise.nmsu.edu

The NMSU RISE (Research Initiative for Scientific Enhancement) to the Postdoctorate Program aspires to augment the interest, skills, and competitiveness of graduate students in pursuit of biomedical and biobehavioral research careers. NMSU RISE Scholars are prepared for the next step of their career through, mentored research experiences in four NMSU colleges, scientific workshops that develop cutting edge quantitative and technical skills, guided expansion of their professional network, career planning, and training for the professoriate, biomedical research seminars, formal courses, research internships at STARTUP partner institutions, tuition, health care, and budget for research supplies and travel to present at scientific conferences.

Texas A&M University  
Gulf Center for Sea Turtle Research  
200 Seawolf Parkway  
Department of Marine Biology  
Galveston, TX 77553  
409-740-4884  
www.tamug.edu/GulfCenterforSeaTurtleResearch

The Gulf Center for Sea Turtle Research was created to address the research needs to conserve sea turtles throughout the Gulf of Mexico. The Center seeks to organize sea turtle biologists in the region, to speak with one voice to attract attention, and funding, for sea turtle research and conservation.
# Friday Schedule of Events

Events take place in the JW Marriott Austin, unless otherwise noted

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker Ready Room</td>
<td>12:00 PM – 7:00 PM</td>
<td>Room 405</td>
</tr>
<tr>
<td>Exhibitor Set-Up</td>
<td>1:00 PM – 6:00 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Registration</td>
<td>3:00 PM – 7:30 PM</td>
<td>Grand Ballroom Foyer</td>
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</table>

## SPECIAL LECTURE

Plenary Session: Dr. Sheila Patek: Impact & Discovery: Extreme Movement in an Interdisciplinary and Political World

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>7:30 PM – 8:30 PM</td>
<td>Lone Star Ballroom</td>
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</tbody>
</table>

## COMMITTEE AND BOARD MEETINGS

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SICB Executive Committee Meeting</td>
<td>2:30 PM – 5:30 PM</td>
<td>Brazos</td>
</tr>
<tr>
<td>Student Worker Orientation &amp; First Timer Orientation*</td>
<td>5:30 PM – 6:30 PM</td>
<td>Lonestar Ballroom</td>
</tr>
<tr>
<td>&quot;How to get the most out of your SICB meeting&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Support Committee</td>
<td>5:30 PM – 7:00 PM</td>
<td>Room 301</td>
</tr>
</tbody>
</table>

## WORKSHOPS AND PROGRAMS

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop: Spatiotemporal Dynamics of Communication</td>
<td>9:00 AM – 2:00 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td>Workshop In Honor of Stan Rachootin</td>
<td>1:00 PM – 6:00 PM</td>
<td>Rooms 303-304</td>
</tr>
</tbody>
</table>

## SOCIAL EVENT

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outgroup-In Sober Social and Meeting</td>
<td>5:30 PM – 6:30 PM</td>
<td>Rooms 201-202</td>
</tr>
<tr>
<td>Broadening Participation Meet &amp; Greet</td>
<td>6:30 PM – 7:30 PM</td>
<td>Room 401</td>
</tr>
<tr>
<td>SICB Welcome Reception</td>
<td>8:30 PM – 10:00 PM</td>
<td>Griffin Hall</td>
</tr>
</tbody>
</table>
# Saturday Schedule of Events

Events take place in the JW Marriott Austin, unless otherwise noted

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration</td>
<td>7:00 AM – 5:00 PM</td>
<td>Grand Ballroom Foyer</td>
</tr>
<tr>
<td>Speaker Ready Room</td>
<td>7:00 AM – 5:00 PM</td>
<td>Room 405</td>
</tr>
<tr>
<td>Poster Session 1 Set Up</td>
<td>7:00 AM – 8:00 AM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Coffee Break AM</td>
<td>9:30 AM – 10:30 AM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Exhibit Hall</td>
<td>9:30 AM – 5:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Coffee Break PM</td>
<td>3:30 PM – 4:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 1 Even Numbers Authors Present</td>
<td>3:30 PM – 4:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 1 Odd Numbers Authors Present</td>
<td>4:30 PM – 5:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 1 Teardown</td>
<td>5:30 PM – 6:00 PM</td>
<td>Grand Ballroom</td>
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</tbody>
</table>

**SPECIAL LECTURE**

Bartholomew Lecture: Dr. Mary Caswell Stoddard
Diversity of Form and Function in the Colorful World of Birds

7:00 PM – 8:00 PM
Salons D-E

**SYMPOSIUM ORAL PRESENTATIONS**

**S1: New Frontiers in Antarctic Marine Biology**
Chairs: James McClintock, Charles Amsler, Bill Baker, Art Woods, Amy Moran
7:45 AM – 3:30 PM
Rooms 203-204

**S2: Epigenetic Variation in Endocrine Systems**
Chairs: Tyler Stevenson, Lynn Martin, Haley Hanson
7:45 AM – 3:30 PM
Brazos

**S3: Biology at the Cusp: Teeth as a Model Phenotype for Integrating Developmental Genomics, Biomechanics, and Ecology**
Chairs: Gareth Fraser, Darrin Hulsey
8:00 AM – 3:30 PM
Lone Star D

**CONTRIBUTED PAPER ORAL PRESENTATIONS**

**MORNING**

Session 1: Neuroanatomy & Neurobiology
8:00 AM – 9:30 AM
Lone Star A

Session 2: DEE Best Student Paper: Huey Award
8:00 AM – 10:00 AM
Lone Star B

Session 3: It's Not the Fall That Kills You, It's the LANDING
8:00 AM – 9:45 AM
Lone Star C

Session 4: Living in Syrup: Dealing with Viscosity
8:00 AM – 9:30 AM
Lone Star E

Session 5: Energy: Checks and Balances
8:00 AM – 9:45 AM
Lone Star H

Session 6: Sensory Neurobiology and Control
8:00 AM – 9:30 AM
Rooms 301-302

Session 7: Temperature Effects from Development to Life History
8:00 AM – 10:00 AM
Rooms 303-304

Session 8: Microbiome: Living with Multitudes
8:00 AM – 10:00 AM
Room 205

Session 9: Movement in Space
8:00 AM – 9:45 AM
Rooms 201-202

Session 10: DPCB Best Student Paper: Wake Award
8:00 AM – 10:00 AM
Rooms 402-403

Session 11: Predator Prey
10:15 AM – 12:00 PM
Lone Star A

Session 12: Species and Speciation
10:30 AM – 12:00 PM
Lone Star B

Session 13: Evolutionary Ecology and Life History
10:15 AM – 12:00 PM
Lone Star C

Session 14: DCB Best Student Paper: Mimi A.R. Koehl and Steven Wainwright Award
10:00 AM – 12:00 PM
Lone Star E

Session 15: Rising Star in Organismal Botany Award
10:00 AM – 12:00 PM
Lone Star F

Session 16: Undergraduate Education Success Stories
10:00 AM – 12:00 PM
Lone Star G

Session 17: Sensing, Signaling and Transduction
10:15 AM – 12:00 PM
Lone Star H

Session 18: Social Neuroethology
10:00 AM – 12:00 PM
Rooms 301-302

Session 19: Connubiality, Conjugal, or Civil Union? Symbiotic Relationships, Part I
10:00 AM – 11:00 AM
Rooms 303-304

Session 20: Population Variation in Life-history Traits
10:30 AM – 12:00 PM
Room 205

Session 21: Foraging: Memory and Mechanisms
10:00 AM – 12:00 PM
Rooms 201-202

Session 22: Evolution of Behaviour
10:30 AM – 12:00 PM
Rooms 402-403
<table>
<thead>
<tr>
<th>SESSION</th>
<th>TIME</th>
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<tbody>
<tr>
<td>Session 23: Evolutionary Ecology</td>
<td>1:45 PM – 3:00 PM</td>
<td>Lonestar A</td>
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<tr>
<td>Session 24: DEDE Best Student Paper Competition</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star B</td>
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<tr>
<td>Session 25: On the Wing</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star C</td>
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<tr>
<td>Session 26: Biological Rhythms</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star E</td>
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<tr>
<td>Session 27: DEDB Best Student Paper</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star F</td>
</tr>
<tr>
<td>Session 28: Make the Flow Go</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star G</td>
</tr>
<tr>
<td>Session 29: Biological Mousetraps: Springs and Latches</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star H</td>
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<tr>
<td>Session 30: Flying and Swimming Behaviour</td>
<td>1:30 PM – 3:15 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td>Session 31: Connubiality, Conjugality, or Civil Union?</td>
<td>1:30 PM – 3:00 PM</td>
<td>Rooms 303-304</td>
</tr>
<tr>
<td>Session 32: Symbiotic Relationships, Part II</td>
<td>1:30 PM – 3:30 PM</td>
<td>Room 205</td>
</tr>
<tr>
<td>Session 33: Plasticity</td>
<td>1:30 PM – 3:15 PM</td>
<td>Rooms 201-202</td>
</tr>
<tr>
<td>Session 34: Comparative Genomics and Phylogenetics of the Spineless</td>
<td>1:30 PM – 3:30 PM</td>
<td>Rooms 402-403</td>
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<tr>
<td>COMMITTEE AND BOARD MEETINGS</td>
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<tr>
<td>ICB Editorial Board</td>
<td>7:00 AM – 8:30 AM</td>
<td>Room 408</td>
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<tr>
<td>Division Chairs, President/President Elect</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 406</td>
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<tr>
<td>TCS Board Meeting</td>
<td>5:30 PM – 10:00 PM</td>
<td>Room 406</td>
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<tr>
<td>AMS Executive Committee Meeting</td>
<td>8:00 PM – 10:30 PM</td>
<td>Room 404</td>
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<tr>
<td>BUSINESS MEETINGS</td>
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<td>DAB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
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<tr>
<td>DNNSB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Lone Star F</td>
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<tr>
<td>DCPB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Lone Star G</td>
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<tr>
<td>DVM Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Rooms 303-304</td>
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<tr>
<td>DEE Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Room 205</td>
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<tr>
<td>DEDE Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Rooms 201-202</td>
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<tr>
<td>DEDB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Lone Star H</td>
</tr>
<tr>
<td>WORKSHOPS AND PROGRAMS</td>
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<tr>
<td>Student Postdoctoral Affairs Committee: “How-To?” Daily Booth</td>
<td>9:15 AM – 5:00 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Public Affairs Committee Workshop: Embracing Variation Among Humans: Perspectives on LGBTQ+ Experiences in Biology and Academia</td>
<td>12:00 PM – 1:30 PM</td>
<td>Rooms 303-304</td>
</tr>
<tr>
<td>Workshop: Mentorship and Sponsorship: How to Curate Your Support Team and Guide Your Successful Career</td>
<td>12:00 PM – 1:30 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td>Broadening Participation Movie and Workshop: “Can We Talk? Difficult Conversations with Underrepresented People of Color: Sense of Belonging and Obstacles to STEM Fields” with Professor Kendall Moore</td>
<td>7:00 PM – 9:00 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td>SOCIAL EVENTS</td>
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<tr>
<td>Morning Run</td>
<td>6:00 AM</td>
<td>JW Marriott Lobby</td>
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<tr>
<td>DCPB Social and BART Reception</td>
<td>8:00 PM – 10:00 PM</td>
<td>Griffin Hall</td>
</tr>
</tbody>
</table>
# Saturday Program Symposia

**Saturday 4 January 2020**

Note: Presenter is first author unless noted by an asterisk (*).

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Chairs</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45 AM</td>
<td>S1-1</td>
<td><strong>New Frontiers in Antarctic Marine Biology</strong></td>
<td>McClintock JB, Amsler CD, Baker B, Moran AL, Woods HA; University of Alabama at Birmingham, University of South Florida, University of Hawaii at Manoa, University of Montana</td>
<td>Rooms 203-204</td>
</tr>
<tr>
<td>7:45 AM</td>
<td>S1-2</td>
<td><strong>Introduction to the Symposium: New Frontiers in Antarctic Marine Biology</strong></td>
<td></td>
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</tr>
<tr>
<td>8:00 AM</td>
<td>S1-2</td>
<td><strong>Allies, Cheaters and Thieves: Macroalgal-Mesograzer Interactions on the Western Antarctic Peninsula</strong></td>
<td>Heiser S, Shilling AJ, Amsler CD, McClintock JB, Baker BJ; University of Alabama at Birmingham, University of South Florida</td>
<td></td>
</tr>
<tr>
<td>8:30 AM</td>
<td>S1-3</td>
<td><strong>Advances in the use of biogeochemical markers to track the diets and movement of Antarctic marine predators</strong></td>
<td>Polito MJ, Michelson CI, McMahon KW; Louisiana State University, University of Rhode Island</td>
<td></td>
</tr>
<tr>
<td>9:00 AM</td>
<td>S1-4</td>
<td><strong>From Glaciers to Benthos: Fjord Ecosystem Processes in a Changing Climate</strong></td>
<td>Ziegler AF, Hahn-Woernle L, Powell B, Lundesgaard Ø, Cape M, Smith CR; University of Hawaii at Manoa, Norwegian Polar Institute, University of Washington</td>
<td></td>
</tr>
<tr>
<td>9:30 AM</td>
<td>S1-5</td>
<td><strong>Coffee Break</strong></td>
<td></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>S1-5</td>
<td><strong>New Insights Into Patterns of Zooplankton Abundance Along the Rapidly Changing Western Antarctic Peninsula</strong></td>
<td>Steinberg DK, Conroy JA, Thibodeau PS; Virginia Institute of Marine Science, College of William &amp; Mary</td>
<td></td>
</tr>
<tr>
<td>10:30 AM</td>
<td>S1-6</td>
<td><strong>Revisiting phylogeographic patterns in Antarctica in the age of “-omics.”</strong></td>
<td>Mahon AR, Halanych KM; Central Michigan University, Auburn University</td>
<td></td>
</tr>
<tr>
<td>11:00 AM</td>
<td>S1-7</td>
<td><strong>Antarctic Microbial Interactions Revealed by Continuous Flow Incubation and Variable Rates of DMSP Supply</strong></td>
<td>Countway PD, Matrai PA; Bigelow Laboratory for Ocean Sciences</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>S1-8</td>
<td><strong>You are what you eat: mixotrophic protists in Antarctic marine plankton communities</strong></td>
<td>Gast RJ, Sanders RW; Woods Hole Oceanographic Institution, Temple University</td>
<td></td>
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<tr>
<td>12:00 PM</td>
<td>S1-9</td>
<td><strong>Responses of Antarctic Microalgae to Seasonal Shifts in Temperature and Salinity</strong></td>
<td>Young JN, Dawson HM, Rundell SM; University of Washington</td>
<td></td>
</tr>
<tr>
<td>1:30 PM</td>
<td>S1-10</td>
<td><strong>Diving deep: Mechanistic insights into the extreme physiology of Antarctic seals</strong></td>
<td>Hindle AG; University of Nevada Las Vegas</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>S1-11</td>
<td><strong>Two Plus Two Doesn’t Equal Four: The Importance of Incorporating Realistic Environmental Variability in Understanding the Resilience of Antarctic Fishes to Climate Change</strong></td>
<td>Todgham AE; University of California Davis</td>
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<tr>
<td>2:30 PM</td>
<td>S1-12</td>
<td><strong>Reconsidering the oxygen-temperature hypothesis of polar gigantism: successes, failures, and nuance</strong></td>
<td>Woods HA, Moran AL; University of Montana, University of Hawaii at Manoa</td>
<td></td>
</tr>
<tr>
<td>3:00 PM</td>
<td>S1-13</td>
<td><strong>Coffee Break</strong></td>
<td></td>
<td>Grand Ballroom</td>
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<tr>
<td>3:30 PM</td>
<td>S1-13</td>
<td><strong>Introduction to Epigenetic Variation in Endocrine Systems</strong></td>
<td>Hanson H, Martin LB, Stevenson TJ; University of South Florida, University of Glasgow</td>
<td></td>
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<tr>
<td>7:45 AM</td>
<td>S2-1</td>
<td><strong>Epigenetic Potential and DNA Methylation Across an Ongoing Avian Range Expansion</strong></td>
<td>Hanson HE, Wang C, Schrey AW, Jiang RHY, Martin LB; University of South Florida, Georgia Southern Armstrong Campus</td>
<td>Brazos</td>
</tr>
<tr>
<td>8:00 AM</td>
<td>S2-2</td>
<td><strong>Epigenetic effects on thermal tolerance and resource use shifts in insects, with implications for range shift potential and life history syndromes</strong></td>
<td>Lancaster LT, McCaw B, Areshi S, Leonard A, Moore B, Stevenson TJ; University of Aberdeen, University of Glasgow</td>
<td></td>
</tr>
<tr>
<td>8:30 AM</td>
<td>S2-3</td>
<td><strong>Introduction to Epigenetic Variation in Endocrine Systems</strong></td>
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</tr>
</tbody>
</table>
Saturday 4 January 2020

9:00 am  S2-4  Eyck HJF, Sarma RR, Crino OL, Waters PD, Crossland M, Shine R, Rollins LA*; UNSW, Deakin University, Macquarie University
Corticosterone response to experimental manipulation of methylation in invasive amphibian larvae

9:30 am  Coffee Break  Grand Ballroom

10:00 am  S2-5  Rubenstein DR; Columbia University
Epigenetic Programming and the Evolution of Adaptive Coping

10:30 am  S2-6  Silvestre F, Carion A, Chapelle V, Voisin AS, Fellous A, Suarez-Ulloa V, Markay A, Hetru J, Goujon V, Wauthier E, Chatterjee A, Earley RL; University of Namur, University of Otago, University of Alabama
The Self-Fertilizing Mangrove Rivulus as a Model Species in Environmental Epigenetics

11:00 am  S2-7  Phelps SM; University of Texas at Austin
Genetic and epigenetic influences on alternative tactics in the mostly monogamous prairie vole

11:30 am  S2-8  Lindner M, Viltianiemi H, Van Oers K, Visser M, Laine V, Verhagen I, Husby A*; Netherlands Institute of Ecology, University of Helsinki, Uppsala University
Epigenetic regulation of seasonal timing of reproduction

12:00 pm  Lunch Break

1:30 pm  S2-9  Champagne FA; University of Texas at Austin
Epigenetics and Reproductive Trade-offs in Response to Stress

2:00 pm  S2-10  Van Oers K, Sepers B, Sies W, Gawehns-Bruning F, Laine VN, Verhoeven KJF; Netherlands Institute of Ecology (NIOO-KNAW)
Epigenetic insights into the Heritability of Exploratory Behaviour in a Songbird

2:30 pm  S2-11  Tolla E; University of Glasgow
Rhythmic Neuroendocrine Expression of DNA Methyltransferase Enzymes in Seasonal Models

3:00 pm  S2-12  Hunter RG; University of Massachusetts Boston
Transposons, Stress and the Endocrinology of the Deep Genome

3:30 pm  Coffee Break  Grand Ballroom

8:00 AM – 3:30 PM  Symposium S3  Lone Star D
Biology at the Cusp: Teeth as a Model Phenotype for Integrating Developmental Genomics, Biomechanics, and Ecology
Chairs: Gareth Fraser, Darrin Hulsey

8:00 am  S3-1  Hulsey CD; University of Konstanz
The evolutionary developmental genetics of vertebrate tooth size

8:30 am  S3-2  Miller CT; University of California Berkeley
Developmental Genetic Analysis of Tooth Number Variation in Sticklebacks

9:00 am  S3-3  Cohen KE, Weller HI, Summers AP; University of Washington, Brown University
What is homodonty?

9:30 am  Coffee Break  Grand Ballroom

10:00 am  S3-4  Brink KS, Chuang CM, Wu P, Richman J; University of British Columbia, University of Southern California
Effects of Premature Tooth Extraction on Tooth Replacement Rates in Iguana iguana

10:30 am  S3-5  Crofts SB, Smith SM, Anderson PLS; UIUC, Field Museum of Natural History
Crushing and puncturing: biomechanics of tooth shape

11:00 am  S3-6  Karagic N, Meyer A, Hulsey CD; University of Konstanz
Plasticity of Vertebrate Dentition

11:30 am  S3-7  Tucker AS; King’s College London
Developmental basis of tooth regeneration

12:00 pm  Lunch Break

1:30 pm  S3-8  Johanson Z, Underwood C, Manzanares E, Fernandez V, Clark B, Smith M; Natural History Museum, University of London, Universitat de Valencia, King’s College
Evolution of the Dentition in Sharks
Saturday Program Morning Sessions

Note: Presenter is first author unless noted by an asterisk (*).

8:00 AM – 9:30 AM  Session 1  Lone Star A

**Neuroanatomy & Neurobiology**  Chair: Ross DeAngelis

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation #</th>
<th>Authors</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>8:00 am</td>
<td>1-1</td>
<td>McDonald MS, Cohen JH, Porter ML; University of Hawai‘i at Mānoa,</td>
<td>Evidence for Ultraviolet Vision in Larval Stomatopod Crustaceans</td>
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<td></td>
<td></td>
<td>University of Delaware</td>
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<tr>
<td>8:15 am</td>
<td>1-3</td>
<td>Young BA; Kirksville College of Osteopathic Medicine</td>
<td>CSF flow dynamics in Alligator mississippiensis: The role of the myodural bridge</td>
</tr>
<tr>
<td>8:30 am</td>
<td>1-4</td>
<td>Tovar RU, Gignac PM; University of Texas at Austin, Oklahoma State</td>
<td>The Comparative Anatomy of Degenerate Neural Structures Using Diffusible Iodine-based Contrast-</td>
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<td></td>
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<td>University Center for Health Sciences</td>
<td>enhanced Computed Tomography (diceCT)</td>
</tr>
<tr>
<td>8:45 am</td>
<td>1-5</td>
<td>Deangelis RS, Rhodes JS, University of Texas, University of Illinois</td>
<td>Nonapeptides Mediate Trade-Offs in Parental Care Strategy</td>
</tr>
<tr>
<td>9:00 am</td>
<td>1-6</td>
<td>Vargas M, Martinez Acosta VG; Univ of the Incarnate Word, Marine</td>
<td>Regeneration of Negative Phototactic Response in Lumbriculus variegatus</td>
</tr>
<tr>
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<td>Biological Laboratory</td>
<td></td>
</tr>
<tr>
<td>9:15 am</td>
<td>1-7</td>
<td>Haney WA, Strother JA; University of Florida</td>
<td>Time to Panic? Stressors modulate exploratory behavior in larval zebrafish</td>
</tr>
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9:30 am  Coffee Break  Grand Ballroom

8:00 AM – 10:00 AM  Session 2  Lone Star B

**DEE Best Student Paper: Huey Award**  Chair: Cameron Ghalambor

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation #</th>
<th>Authors</th>
<th>Title</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>2-1</td>
<td>Klepac CN, Barshis DJ; Old Dominion University</td>
<td>Decreased thermal tolerance in corals from high-frequency variable environments</td>
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<tr>
<td>8:15 am</td>
<td>2-2</td>
<td>Powers SD, Thompson LM, Parry D, Grayson KL, Agosta SJ, Virginia</td>
<td>Climate-related variation in metabolic rate across the geographic range of an invasive ectotherm</td>
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<td>Commonwealth University, Clemson University, State University of New</td>
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<td>York</td>
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<tr>
<td>8:30 am</td>
<td>2-3</td>
<td>Naragon TH, Brückner A, Wijker RS, Sessions AL, Parker J; Caltech</td>
<td>Cuticular hydrocarbons and the integration of myrmecophile rove beetles into ant colonies</td>
</tr>
<tr>
<td>8:45 am</td>
<td>2-4</td>
<td>Chung AK, Cox RM, Logan ML, McMillan WO, Cox CL; University of</td>
<td>Sex-biased Gene Expression and Sexual Dimorphism in Anole Lizards</td>
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<td>California Los Angeles, University of Virginia, University of Nevada</td>
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<td>Reno, Smithsonian Tropical Research Institute, Georgia Southern</td>
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<td>University</td>
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<tr>
<td>9:00 am</td>
<td>2-5</td>
<td>Treidel LA, Clark RM, Williams CM, UC Berkeley, Siena College</td>
<td>Females pay the price: high costs of reproduction dictate sensitivity to diet quality in adult crickets</td>
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### Saturday 4 January 2020

**9:15 am** 2-6  
**Habitat Structure Influences Sex-Specific Patterns of Multilevel Selection in Experimental Populations of Forked Fungus Beetles**  
Costello RA, Cook PA, Formica VA, Brodie III ED; University of Virginia, Swarthmore College  

**9:30 am** 2-7  
**Poleward proliferation of an inshore squid**  
Burford B, Wild L, Schwarz R, Kosma M, Chenoweth E, Sreenivasan A, Gilly W, Heintz R, Field J, Hoving HJ, Straley J, Denny M; Stanford University, University of Alaska Fairbanks, GEOMAR, University of Alaska Southeast, Alaska Fisheries Science Center, Southwest Fisheries Science Center  

**9:45 am** 2-8  
**Repeated mitochondrial evolution underlies adaptation to extreme environments**  
Barts N, Greenway R, Henpita C, Arndt S, Shaw J, Kelley J, Tobler M; Kansas State University, Oklahoma State University, University of Cambridge, Washington State University  

**10:00 am**  
**Coffee Break**  
Grand Ballroom

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<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>3-1</td>
<td>Directed Aerial Descent in Arboreal Salamanders</td>
<td>Brown CE, Deban SM, Dudley R, Sathe EA; University of South Florida, University of California, Berkeley</td>
</tr>
<tr>
<td>8:15 am</td>
<td>3-2</td>
<td>Olympians of Controlled Deceleration: Cane Toads Stick the Landing Across Surface Stiffness</td>
<td>Duman A, Azizi E; University of California, Irvine</td>
</tr>
<tr>
<td>8:30 am</td>
<td>3-3</td>
<td>Gliding through clutter – obstacle-avoidance and path-planning in the flying lizard Draco dussumieri</td>
<td>Khandelwal PC, Hedrick TL; UNC Chapel Hill</td>
</tr>
<tr>
<td>8:45 am</td>
<td>3-4</td>
<td>Mosquitoes use multiple bounces to engage landing zones</td>
<td>Smith NM, Dickerson AK; University of Central Florida</td>
</tr>
<tr>
<td>9:00 am</td>
<td>3-5</td>
<td>Modelling the flight envelope for transition to an unpowered perching manoeuvre.</td>
<td>Kleinheerenbrink M, France LA, Taylor GK; University of Oxford</td>
</tr>
<tr>
<td>9:15 am</td>
<td>3-6</td>
<td>Influence of approach trajectory on water landings in mallards</td>
<td>Whitehead JG, Worrell TA, Socha JJ; Virginia Tech</td>
</tr>
<tr>
<td>9:30 am</td>
<td>3-7</td>
<td>Leg Length, Not Stiffness, Allows Bipedal Lizards To Navigate Drops</td>
<td>Tucker EL, Hsieh ST, Temple University</td>
</tr>
<tr>
<td>9:45 am</td>
<td></td>
<td>Coffee Break</td>
<td>Grand Ballroom</td>
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<th>Time</th>
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<th>Authors</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>4-1</td>
<td>Longer Development Provides First-Feeding Fish with the Jaw Kinematics to Escape Hydrodynamic Constraints</td>
<td>Dial TR, Lauder GV; Harvard University</td>
</tr>
<tr>
<td>8:15 am</td>
<td>4-2</td>
<td>Suction feeding in zebrafish is improved by upregulated Wnt signaling</td>
<td>Matthews DG, Dial TR, Lauder GV; Harvard University</td>
</tr>
<tr>
<td>8:30 am</td>
<td>4-3</td>
<td>Plancton Dispersion Through Vegetative Seabed Within Complex Flow Environments</td>
<td>Ozalp MK, Miller LA, Strickland C; UNC Chapel Hill, UT Knoxville</td>
</tr>
<tr>
<td>8:45 am</td>
<td>4-4</td>
<td>A Bayesian framework for the detection of diffusive heterogeneity</td>
<td>Cass JA, Williams CD, Knijnenburg TA, Theriot J; Allen Institute for Cell Science, University of Washington</td>
</tr>
<tr>
<td>9:00 am</td>
<td>4-5</td>
<td>Hydrodynamic constraints on jet propulsion in squid paralarvae at intermediate Reynolds numbers</td>
<td>Li DH, Katjia K, Gilly WF; Stanford University, Monterey Bay Aquarium Research Institute</td>
</tr>
<tr>
<td>9:15 am</td>
<td>4-6</td>
<td>Bristled wings in fling: aerodynamic importance of initial inter-wing spacing</td>
<td>Kasoj VT, Santhanakrishnan A; Oklahoma State University</td>
</tr>
<tr>
<td>9:30 am</td>
<td></td>
<td>Coffee Break</td>
<td>Grand Ballroom</td>
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### Session 5: Energy: Checks and Balances

**Chairs:** Callum Ross, Jim Usherwood

<table>
<thead>
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<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
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<tbody>
<tr>
<td>8:00 am</td>
<td>5-1</td>
<td>8:00 am – 9:45 AM Session 5 Lone Star H Energy: Checks and Balances</td>
<td>Othayoth R, Thoms G, Li C; Johns Hopkins University</td>
</tr>
<tr>
<td>8:15 am</td>
<td>5-2</td>
<td>8:15 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Lynch J, Gau JF, Sponberg S, Grewish N; University of California San Diego, Georgia Institute of Technology</td>
</tr>
<tr>
<td>8:30 am</td>
<td>5-3</td>
<td>8:30 am – 10:00 am Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Jorge J, Patek SN; Duke University</td>
</tr>
<tr>
<td>8:45 am</td>
<td>5-4</td>
<td>8:45 am – 10:00 am Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Jung SJ, Kim S, Wu B, Dombroskie J; Cornell University</td>
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<tr>
<td>9:00 am</td>
<td>5-5</td>
<td>9:00 am – 10:00 am Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Xu NW, Dabiri JO; Stanford University, California Institute of Technology</td>
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<tr>
<td>9:15 am</td>
<td>5-6</td>
<td>9:15 am – 10:00 am Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Usherwood JR; Royal Veterinary College, University of London</td>
</tr>
<tr>
<td>9:30 am</td>
<td>5-7</td>
<td>9:30 am – 10:00 am Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Ross CF, Laird MF, Granatosky MC; University of Chicago, University of Southern California, New York College of Osteopathic Medicine</td>
</tr>
</tbody>
</table>

**Abstracts:**

- **Animals and robots transition from more challenging to easier locomotor modes to traverse obstacles**
- **Resonance Properties of Insect-Inspired Series-Elastic Flapping Wings**
- **Taking a swing at measuring small-scale, high acceleration impacts: a novel two-pendulum approach**
- **Shattering raindrops on biological surfaces (insect wings, bird feathers)**
- **Metabolic costs of enhancing propulsion in live biohybrid robotic jellyfish**
- **The possibility of zero-work gaits in sprawled and parasagittal quadrupeds: insights from linkages of the industrial revolution**
- **Energetic costs of locomotion and feeding in capuchin primates.**

#### Coffee Break

**Grand Ballroom**  
**8:00 AM – 9:30 AM**

**Session 6: Sensory Neurobiology and Control**  
**Chair:** Noah Cowan

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>6-1</td>
<td>8:00 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Aiello BR, Sponberg S; Georgia Institute of Technology</td>
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<tr>
<td>8:15 am</td>
<td>6-2</td>
<td>8:15 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Cellini BO, Mongeau JM; Pennsylvania State University</td>
</tr>
<tr>
<td>8:30 am</td>
<td>6-3</td>
<td>8:30 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Kéver L, Bass AH, Parmentier E, Chagnaud BP; Liège University, Cornell University, Ludwig-Maximilian University, University of Graz</td>
</tr>
<tr>
<td>8:45 am</td>
<td>6-4</td>
<td>8:45 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Yang Y, Pan Y, Uyanik I, Cowan NJ; Johns Hopkins University</td>
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<tr>
<td>9:00 am</td>
<td>6-5</td>
<td>9:00 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Uyanik I, Sefati S, Cho K, Ankarali MM, Fortune ES, Cowan NJ*; Hacettepe University, Johns Hopkins University, Middle East Technical University, New Jersey Institute of Technology</td>
</tr>
<tr>
<td>9:15 am</td>
<td>6-6</td>
<td>9:15 am – 9:30 am Session 6 Rooms 301-302 Sensory Neurobiology and Control</td>
<td>Lunsford ET, Liao JC; Whitney Laboratories for Marine Bioscience</td>
</tr>
</tbody>
</table>

**Abstracts:**

- **The visual perception of moving flowers during the flower tracking behavior in descending neurons in the hawkmoth, Manduca sexta**
- **Flexible visual control of gaze via head saccades in Drosophila flight**
- **Conserved Neural Circuitry among Mochokid Catfish despite Morpho-Functional Diversity of Sonic and Electric Organs**
- **The Selection of Stimuli Affects Non-parametric System Identification for Refuge Tracking Behavior in Eigenmannia virescens**
- **Variability in Locomotor Dynamics Reveals the Critical Role of Feedback in Task Control**
- **Lateral line activity is attenuated during the glide phase of intermittent swimming behavior**

#### Coffee Break

**Grand Ballroom**  
**8:00 AM – 10:00 AM**

**Session 7: Temperature Effects from Development to Life History**  
**Chairs:** Morgan Furze, Racine Rangel

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<tr>
<th>Time</th>
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<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>7-1</td>
<td>8:00 AM – 10:00 AM Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Thomas PA, Wheeler CR, Pelee EE, Pabst DA, Yopak KE, Kinsey ST; UNC-Wilmington, University of Massachusetts Boston</td>
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<tr>
<td>8:15 am</td>
<td>7-2</td>
<td>8:15 AM – 10:00 AM Session 7 Rooms 303-304 Temperature Effects from Development to Life History</td>
<td>Bock SL, Lowers RH, Rainwater TR, Hale MD, Lei FM, Parrott BB; Univ of Georgia, Kennedy Space Center, Clemson Univ, Univ of Virginia</td>
</tr>
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</table>

**Abstracts:**

- **Effects of Elevated Temperature on Muscle Development in Juvenile Epaulette Sharks, Hemiscyllium ocellatum**
- **Real-time responses to ecologically-relevant thermal fluctuations during temperature-dependent sex determination in the American alligator**
Saturday 4 January 2020

8:30 am 7-3 Weber CJ, Zhou Y, Lee JG, Looger L, Qian G, Ge C, Capel B; Duke University, Zhejiang Wanli University, HHMI Janelia Research Campus

Temperature-dependent sex determination is mediated by pSTAT3 repression of Kdm6b

8:45 am 7-4 Lidgard AD, French SS, Hudson SB; Utah State University

Stress Sensitivity to Temperature in Plateau Side-blotched Lizards (Uta stansburiana uniformis): Implications for Immune Function

9:00 am 7-5 Furze ME, Drake JE, Wiesenbauer J, Richter A, Pendall E; Harvard University, Yale University, State University of New York, University of Vienna, Western Sydney University

Tracing Sugars Throughout Whole–Trees Exposed to Climate Warming

9:15 am 7-6 Nash SB, Rahman SM; University of Texas Rio Grande Valley

Short-term heat stress attenuates gonadal functions and induces apoptosis and oxidative stress in the American oyster, Crassostrea virginica: molecular mechanisms and signaling pathways

9:30 am 7-7 Sykes BE, Balenger SL; University of Mississippi

Nest Microclimate Manipulation Affects Growth, Development, and Heat-shock Protein Production in the Eastern Bluebird (Sialia sialis)

9:45 am 7-8 Rangel RE, Sorte CJB; University of California Irvine

Staying local: small-scale environmental history influences the metabolic response of marine invertebrates to increased temperature

10:00 am Coffee Break Grand Ballroom

8:00 AM – 10:00 AM Session 8 Room 205

Microbiome: Living with Multitudes
Chairs: Gregory Demas, Sarah Gardner

8:00 am 8-1 Mruzek JL, Dimos B, MacKnight N, Kathryn C, Brandt M, Mydlarz LD; University of Texas at Arlington, University of the Virgin Islands

Linking Disease Resistance in Coral to its Ability to Maintain a Complex Microbiome

8:15 am 8-2 Scott-Elliston A, Warne R; Southern Illinois University

Modulation of the gut microbiome affects host developmental and stress response phenotypes

8:30 am 8-3 Guidry ME, Reigel AM, Kelly MW; Louisiana State University

Variation in the Microbiome of the Eastern Oyster: Environmental Influences and Effects on Oyster Health

8:45 am 8-4 Morrison E, Deckard T, Adaniya K, Demas G; Indiana University

Maternal gut dysbiosis via antibiotic administration affects the behavior of offspring Siberian hamsters (Phodopus sungorus)

9:00 am 8-5 Hernandez J, Belden LK, Moore IT; Virginia Tech

Sexual activity and the cloacal microbiome in female tree swallows

9:15 am 8-6 Bo TB, Trevelline BK, Cabezas Ruiz S, Morrissey C, Marchant TA, Eng ML, Latta SC, Kohl KD; Univ of Pittsburgh, Univ of Saskatchewan, National Aviary

Glucocorticoid Stress Hormones Affect the Gut Microbiota of Captive Birds

9:30 am 8-7 Slevin MC, Fresin W, Cannataro G, Anderson RC; Florida Atlantic University

Smarts and Symbiosis: Elucidating the Relationship between the Microbiome and Cognitive Performance in Birds

9:45 am 8-8 Gardner SA, Arevalo L, Campbell P; University of California, Riverside, Oklahoma State University

Characterizing the placental microbiome in mouse (Mus) hybrids

10:00 am Coffee Break Grand Ballroom

8:00 AM – 9:45 AM Session 9 Rooms 201-202

Movement in Space
Chair: Marc Badger

8:00 am 9-1 Badger MA, Perkes AD, Pfrommer BG, Wang Y, Modh A, Darilidis K, Schmidt MF; University of Pennsylvania

From moments to months: Multi-timescale tracking and analysis of songbird social interactions in a smart aviary

8:15 am 9-2 Kennedy JR, Mahadevan L, Nagpal R; Harvard University

Mapping spatiotemporal changes of North American beaver (L. Castor canadensis) damming complexes

32 The Society for Integrative and Comparative Biology
## Saturday 4 January 2020

**8:30 am**  **9-3**  
Schulz AK, Ayala J, Zhao W, Rong H, Hu DL; Georgia Institute of Technology, Chengdu Panda Base for Giant Panda Breeding  
**Panda Cub Climbing for Conservation**

**8:45 am**  **9-4**  
Crall JD, Easton-Calabria A, Cronin K, Thuma J, Dey B, Ford Versypt A, De Bivort BL; Harvard University, Tufts University, Princeton University, Oklahoma State University  
The social scaling of stress-sensitivity: Understanding the impacts of pesticide exposure and temperature stress in bumblebee colonies

**9:00 am**  **9-5**  
Peters JM, Petersen KH; Cornell University  
**Honeybee swarms use a flow-mediated pheromone signaling scheme to coordinate aggregation**

**9:15 am**  **9-6**  
Nave GK, Tallackson H, Peleg O; University of Colorado, Boulder  
The Formation of Honey Bee Swarms

**9:30 am**  **9-7**  
Wagner JM, Parker J; California Institute of Technology, Pasadena  
Chemical Cues Underly an Interspecies Symbiosis by Triggering a Modular Social-Behavioral Program

**9:45 am**  
**Coffee Break**  
Grand Ballroom

**8:00 AM – 10:00 AM**  **Session 10**  
Rooms 402-403

**DPCB Best Student Paper: Wake Award**  
Chair: Todd Oakley

**8:00 am**  **10-1**  
Baker CM, Boyer SL, Giribet G; Harvard University, Macalester College  
Phylogenomics and Biogeography of the Gondwanan Vicariant Harvestman Family Pettalidae (Arachnida, Opiliones)

**8:15 am**  **10-2**  
Corn KA, Martinez CM, Burress ED, Wainwright PC; Univ of California, Davis  
High rates of evolution of cranial mobility are characteristic of suction feeding

**8:30 am**  **10-3**  
Zapfe KL, Larouche O, Price SA; Clemson University  
Macroevolutionary Relationships Between High Contrast Patterns and Body Shape in Teleost Fishes

**8:45 am**  **10-4**  
King TK, Brown JM; Louisiana State University  
Identifying Atypical Modes of Continuous Trait Evolution

**9:00 am**  **10-5**  
Nix RM, Thurson K, Rabinowitz S, Havird JC; Baylor University, University of Texas at Austin  
How do mitochondrial genes with high mutation rates remain functional?

**9:15 am**  **10-6**  
Macroeceology and Morphological Evolution of the Frog Skull

**9:30 am**  **10-7**  
Friedman ST, Collyer ML, Price SA, Wainwright PC; University of California Davis, Chatham University, Clemson University  
Divergent processes drive parallel evolution in marine and freshwater fishes

**9:45 am**  **10-8**  
Nordén KK, Elason CM, Stoddard MC; Princeton University, Field Museum of Natural History  
Do diverse feather nanostructures increase the colorfulness of iridescent plumage?

**10:00 am**  
**Coffee Break**  
Grand Ballroom

**10:15 AM – 12:00 PM**  **Session 11**  
Lone Star A

**Predator Prey**  
Chair: Dale Stevens

**10:15 am**  **11-1**  
Goldberg DL, Bassingthwaite TA, Beilke S, Ward MP, Capparella AP; Illinois State University, Audubon Great Lakes, University of Illinois at Urbana-Champaign  
Never Cry Owl: Rails do not Adjust Vocal Activity Rates in Response to Predation Risk

**10:30 am**  **11-2**  
Stevens II DR, Graham MA, Badjis CB, Mason JN, Baker JA, Foster SA; Clark University  
Differences in behavioral plasticity among populations of threespine stickleback experiencing a novel predation threat.

**10:45 am**  **11-3**  
Michels NO, Hrabik TR, Mensinger AF; University of Minnesota Duluth  
To Flee or Not to Flee: A Comparison of Predator Avoidance Behaviors Under Varied Light and Predatory Conditions

**11:00 am**  **11-4**  
Gripshover ND, Jayne BC; University of Cincinnati  
Feeding of Crayfish Snakes: A Model System for Testing the Roles of Predator Anatomy and Behavior on Foraging Ecology
Saturday 4 January 2020

11:15 am 11-5  Whitford MD, Freymiller GA, Higham TE, Clark RW; San Diego State University, University of California, Riverside
The Effects of Temperature on the Predatory and Defensive Strikes of Rattlesnakes

11:30 am 11-6  Goeppner SR, Luttbeg B, Oklahoma State University
Growth, lifespan, and reproductive investment of Physa snails exposed to predators

11:45 am 11-7  Drown RM, Anderson CV; University of South Dakota
Does individual performance influence antipredator behavioral strategy choice in chameleons?

12:00 pm Lunch Break

10:30 AM – 12:00 PM Session 12 Lone Star B

Species and Speciation
Chair:

10:30 am 12-1  Lord NP, Weller H, Sharkey CR; Louisiana State University, Brown University, University of Minnesota
The Color of the Jewels: Evolution of Color Patterns Across a Speciose Lineage of Jewel Beetles

10:45 am 12-2  Kelly JB, Thacker RW; Stony Brook University
Ecological divergence in the sponge genus Ircinia

11:00 am 12-3  Myers CR; University of California Los Angeles
Towards a synthesis on insect host selection and speciation

11:15 am 12-4  Martin CM; University of California, Berkeley
How to investigate the origins of novelty: insights gained from ecology, genomics, function, and fitness landscapes

11:30 am 12-5  Gibson JD, Botnaru L, Cobb BA; Georgia Southern University
Mortality and Physiology of Nasonia Hybrids

11:45 am 12-6  Kuhn BF, Salesa MJ, Mauricio A, Argant A, Randolph-Quinney P, Kgasi L, Gommery D; University of Johannesburg, Museo Nacional de Ciencias Naturales-CSIC, Aix Marseille Univ, LAMPEA, University of Central Lancashire, Ditsong National Museum of Natural History, Sorbonne Université
Evidence for an African Cave Lion (Panthera sp): Multiple Panthera individuals from Bridge Cave, Bolt’s Farm, South Africa

12:00 pm Lunch Break

10:15 AM – 12:00 PM Session 13 Lone Star C

Evolutionary Ecology and Life History
Chair:

10:15 am 13-1  Somjee U, Anzaldo S, Marting PM, Painting CJ, Powell E, Hickey T; Smithsonian Tropical Research Institute, Arizona State University, University of Auckland, University of Waikato
Extreme size variation in an armed weevil sheds light on the relationship between body mass and metabolic rate

10:30 am 13-2  Powers MJ, Weaver RJ, Heine KB, Hill GE; Auburn University, University of Texas at Austin, Auburn University
First clutch size is a reliable proxy for reproductive success in a marine copepod

10:45 am 13-3  Sorlin MV, Marks JR, Johnson MA, Husak JF, Lailvaux SP; University of New Orleans, Trinity University, University of Saint Thomas
Effect of Exercise Training on Brain Allometry and Cognitive Abilities in Anolis carolinensis

11:00 am 13-4  Mugel SG, Naug D; Colorado State University
Metabolic Rate Variation Shapes Pace of Life Traits at Both the Individual and the Group Level

11:15 am 13-5  Mainwaring MC, Martin TE, Wolf BO, Tobalske BW; University of Montana, University of New Mexico
Nests reduce the energetic costs of brooding offspring for passerine birds in the tropics

11:30 am 13-6  Boggs CL; University of South Carolina, Rocky Mountain Biological Lab
Trans-generational Ecological Determinants of Egg Composition in the Butterfly Speyeria mormonia

11:45 am 13-7  Caledo J; Ohio State University
Evidence for a Semi-Aquatic Ecology in a 30-Million-Year-Old Beaver and the Evolution of Locomotion in Castoridae

12:00 pm Lunch Break
Saturday 4 January 2020

10:00 AM – 12:00 PM  Session 14  Lone Star E

DCB Best Student Paper: Mimi A.R. Koehl and Steven Wainwright Award
Chair: Stacey Combes

10:00 am  14-1  Manafzadeh AR, Kambic RE, Gatesy SM; Brown Univ, Johns Hopkins Univ
How informative is joint mobility? A 3-D analysis of potential versus realized joint poses in archosaurs

10:15 am  14-2  Crane RL, Denny MW; Stanford University
Resistance and Repair of Mechanical Fatigue in Mussel Shells

10:30 am  14-3  Kahane-Rapport SR, Savoca MS, Cade DE, Segre PS, Bierlich KC, Calambokidis J, Friedlaender AS, Johnston DW, Werth AJ, Goldbogen JA; Stanford University, Duke University, Cascadia Research Collective, University of California, Santa Cruz, Hampden-Sydney College
From Feast Mode to Least Mode: How Lunge Filter Feeding Biomechanics Constrain Rorqual Foraging Ecology Across Scale

10:45 am  14-4  Jacobs C, Day S, Holzman R; Tel Aviv University, Rochester Institute of Technology
A power amplification dyad in Syngnathidae

11:00 am  14-5  Sleboda DA, Wold ES, Roberts TJ; Brown University
The Hydrostatic Skeleton of Muscle

11:15 am  14-6  Harrison JS, Porter ML, Patel SN; Duke University, University of Hawai’i, Manoa
Scaling and development of elastic mechanisms: the tiny strikes of larval mantis shrimp

11:30 am  14-7  Stark AY; Villanova University
Gans Award Lecture: Tenacious Toes and Fastening Feet: Biological Adhesive Systems in Complex Environments

12:00 pm  Lunch Break

10:00 AM – 12:00 PM  Session 15  Lone Star F

Rising Star in Organismal Botany Award
Chair: Janet Steven

10:00 am  15-1  Morrison CR, Smiley J; University of Texas at Austin, University of California San Diego
Using a Portable Hydrogen Cyanide Gas Meter to Uncover a Dynamic Phytochemical Landscape

A new perspective on ecological prediction reveals limits to climate adaptation in a temperate tree species

10:30 am  15-3  Monroe JG, McKay JK; Max Planck Institute for Developmental Biology, Colorado State University
From satellites to sequences: investigating drought adaptive life history evolution in plants

10:45 am  15-4  Gorman CE, Band L, Van Kleunen M, Dorken M, Stift M; University of Konstanz, Trent University, Taizhou University
Phenological and pollinator-mediated isolation among selfing and outcrossing Arabidopsis lyrata populations

11:00 am  15-5  Babin CH, Bell CD; University of New Orleans
A global molecular phylogeny of chromosomal evolution in wild onions (Allium, Amaryllidaceae)

11:15 am  15-6  Zumajo-Cardona C, Ambrose BA; New York Botanical Garden, Graduate Center-CUNY
Evolution of the integument and its implication in seed plant evolution.

11:30 am  15-7  Min Y, Ballerini ES, Kramer EM; Harvard University, Sacramento State University
Understanding Floral Meristem Termination by Exploring Genetic Architecture Underlying Stamen Whorl Numbers in Aquilegia

11:45 am  15-8  Katzer AM, Wessinger CA, Hileman LC; University of Kansas
Nectary size is a pollination syndrome trait in Penstemon

12:00 pm  Lunch Break
### Undergraduate Education Success Stories

**Chairs: Christopher Martine, Jasmine Coyle**

10:00 am **16-1**  
English P, Silverthorn DU, University of Texas at Austin  
The Minimal Marking Technique: Grading Writing Assignments while Promoting Active Learning

10:15 am **16-2**  
Yen J, Li W, Georgia Tech  
Bio Inspired Design: translating biology to engineering and design

10:30 am **16-3**  
Pask GM, Bucknell University  
Working to Learn: Applying Labor-Based Assessment to Scientific Writing and Laboratory Courses

10:45 am **16-4**  
Killion KD, Blinn College  
Getting Undergrads to Write the Something

11:00 am **16-5**  
Mineo PM, Hebert AK, Bennett KF, Guenther MF, Ksiazek-Mikenas K, Raimondi SL, Elmhurst College  
Implementing Vision and Change into the first-year biology sequence for majors.

11:15 am **16-6**  
Martine CT, Kell A, Bucknell University  
Cross-pollination: Art &amp; Sex through the Lens of Botany

11:30 am **16-7**  
Sharpe SL, Kansas State University  
Creating LGBTQIA+ Inclusive Biology Curricula and Classrooms

11:45 am **16-8**  
Coyle JA, Lolavar AA, Meredith TL, Florida Atlantic University  
Developing a multidisciplinary, undergraduate research training program for dual enrolled students

12:00 pm **Lunch Break**

### Sensing, Signaling and Transduction

**Chair: James Newcomb**

10:15 am **17-1**  
Harris OK, Kingston ACN, Steichmann NR, Johnsen S, Speiser DI, University of Cincinnati, University of South Carolina, Duke University  
How and why are the blue eyes of scallops blue?

10:30 am **17-2**  
Hall BE, Bigman JS, Bedore CN, Georgia Southern University, Simon Fraser University  
Allometric relationships in the visual ecology of sharks

10:45 am **17-3**  
Briscoe AD, Macias-Muñoz A, Rangel-Olguin AG, University of California, Irvine  
Evolution of Phototransduction Genes in Lepidoptera

11:00 am **17-4**  
Smedley GD, Serb JM, Iowa State University  
Molluscan Transcriptomes Suggest a More Complex Visual Cycle Homologous to Vertebrates

11:15 am **17-5**  
Kozma MT, Ngo-Vu H, Senatore A, Bobkov Y, Ache BW, Derby CD, Georgia State Univ, Univ of Toronto, Mississauga, Univ of Florida  
Single Cell Transcriptomics Reveals Expression Patterns of Chemoreceptor Genes in Olfactory Receptor Neurons of the Caribbean Spiny Lobster, *Panulirus argus*

11:30 am **17-6**  
Lebow CL, Burt DB, Taylor J, Stephen F Austin State University  
Glare Reduction Properties of Dark Avian Facial Markings

11:45 am **17-7**  
Newcomb JM, Gingras MA, Nelson SN, McGhee CB, Easter JH, Goodheart JA, Ramirez MD, New England College, University of California, Santa Barbara, University of Massachusetts, Amherst  
Nudibranch opsins: identification, localization and potential roles in extraocular photoreception and circadian rhythms

12:00 pm **Lunch Break**

### Social Neuroethology

**Chair: Scott MacDougall-Shackleton**

10:00 am **18-1**  
Rogers LS, Van Wert JC, Mensinger AF, University of Minnesota Duluth, Marine Biological Laboratory  
Multimodal sensory integration of the utricle in freely swimming toadfish, *Opsanus tau*

10:15 am **18-2**  
Clements KN, Heagy FK, Blain E, Ward J, Issa FA, East Carolina University  
Repeated Social Defeat Affects Dopaminergic Modulation of Spinal Motor Circuits

10:30 am **18-3**  
Bentz AB, George EM, Wolf SE, Rusch DB, Buechlein A, Rosvall KA, Indiana University  
Immediate and lasting neurogenomic responses to competition in a free-living songbird: an experimental manipulation of a dynamic social environment
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:45 am</td>
<td>18-4</td>
<td>Honey, I Ate the Kids: Role of Galanin in Maternal Care, Infanticide, and Energetics in a Mouthbrooding Fish</td>
<td>Butler JM, Herath E, Whitlow SM, Rimal A, Maruska KP, Louisiana State University</td>
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<td>11:00 am</td>
<td>18-5</td>
<td>Is Coordination Key? Investigating the Timing of Provisioning Visits in a Biparental Songbird Species</td>
<td>Enns JL, Purdey L, Stojkovic L, Williams TD, Simon Fraser University</td>
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<tr>
<td>11:15 am</td>
<td>18-6</td>
<td>Effect of sleep on loss on parental care in Arctic-breeding songbirds</td>
<td>Payette WI, Richter MM, Hodinka BL, Pullum KB, Ashley NT, Western Kentucky University, Simon Fraser University, University of Pennsylvania</td>
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<tr>
<td>11:45 am</td>
<td>18-8</td>
<td>Neurogenesis and the development of neural sex differences in vocal control regions of songbirds</td>
<td>Diez A, MacDougall-Shackleton SA*, University of Western Ontario</td>
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<td>12:00 pm</td>
<td></td>
<td>Lunch Break</td>
<td></td>
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<tr>
<td>10:00 AM – 11:00 AM</td>
<td>Session 19</td>
<td>Connubiality, Conjugality, or Civil Union? Symbiotic Relationships, Part I</td>
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<tr>
<td>10:00 am</td>
<td>19-1</td>
<td>The Genome of Deep-Sea Seep-Dwelling Lamellibrachia luymesi (Siboglinidae) and Clues on Chemosynthetic Symbiosis</td>
<td>Halanych KM, Li Y, Tassia MG, Waits DS, Bogantes VE, David KT, Auburn University</td>
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<tr>
<td>10:15 am</td>
<td>19-2</td>
<td>Characterizing the Impact of a Complex Mix of Toxins on Survival in Drosophila Species</td>
<td>Haynes L, Beveridge J, Fish O, Giambrone SA, Reed L, Scott Chialvo C*, University of Alabama, Appalachian State University</td>
</tr>
<tr>
<td>10:45 am</td>
<td>19-4</td>
<td>Temporal effects of temperature on tadpole gut microbial communities</td>
<td>Fontaine SS, Kohl KD; University of Pittsburgh</td>
</tr>
<tr>
<td>11:00 am</td>
<td></td>
<td>Lunch Break</td>
<td></td>
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<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Session 20</td>
<td>Population Variation in Life-history Traits</td>
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<td>10:30 am</td>
<td>20-1</td>
<td>Distance Matters: Experimental Test of the Influence of Avian Migration Distance on Readiness to Breed in Spring</td>
<td>Fudickar AM, Brewer DE, Indiana University</td>
</tr>
<tr>
<td>10:45 am</td>
<td>20-2</td>
<td>Genotype-by-temperature effects on thermal preference in the house fly Musca domestica</td>
<td>Delclos PJ, Meisel RP, University of Houston</td>
</tr>
<tr>
<td>11:00 am</td>
<td>20-3</td>
<td>Genetic Variation and Molecular Regulation of Cold Hardiness in Spotted Wing Drosophila</td>
<td>Garcia MJ, Teets NM; University of Kentucky</td>
</tr>
<tr>
<td>11:15 am</td>
<td>20-4</td>
<td>Genetic mechanisms of basal thermal tolerance in Drosophila melanogaster</td>
<td>Awde DN, Lecheta MC, Unfried LN, Jacobs NA, Powers B, Bora K, Waters JS, Axen HJ, Fietze SE, Lockwood BL, Cahan SH, Teets NM; University of Kentucky, University of Vermont, Providence College, Salve Regina University NM</td>
</tr>
<tr>
<td>11:30 am</td>
<td>20-5</td>
<td>Ontogenetic scaling of gill area and brain size between two populations of blacktip shark (Carcharhinus limbatus)</td>
<td>Wong S, Bigman JS, Dulvy NK; Simon Fraser University</td>
</tr>
<tr>
<td>11:45 am</td>
<td>20-6</td>
<td>Impact of Thermal-Hydric Stress on Surface Activity and Waving Behavior of Fiddler Crabs</td>
<td>Yeghisian TG, Darnell MZ; University of Southern Mississippi</td>
</tr>
</tbody>
</table>
### Saturday 4 January 2020

#### 10:00 AM – 12:00 PM  
**Session 21**  
**Rooms 201-202**

**Foraging: Memory and Mechanisms**  
*Chair: Caroline Strang*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>21-1</td>
<td>Muth F, Francis JS, Leonard AS; University of Texas at Austin, University of Nevada</td>
<td>Bumblebee cognition and the influence of anthropogenic stressors</td>
</tr>
<tr>
<td>10:15 am</td>
<td>21-2</td>
<td>Strang CG, Brown EK, Sherry DF, Hampton RR; University of Western Ontario, Emory University</td>
<td>Memory systems in food-caching caching and non-caching birds</td>
</tr>
<tr>
<td>10:30 am</td>
<td>21-3</td>
<td>Cade DE, Carey N, Domenici P, Potvin J, Goldbogen JA, Stanford University, Scottish Association of Marine Science, IAS-CNR, Istituto per l’Ambiente Marino Costiero, Saint Louis University</td>
<td>Predator-informed looming stimulus experiments reveal how large filter feeding whales capture highly maneuverable forage fish</td>
</tr>
<tr>
<td>10:45 am</td>
<td>21-4</td>
<td>Behbahani AH, Rak AK, Skutt-Kakaria KJ, Dickinson MH; California Institute of Technology</td>
<td>Flies Remember Multiple Food Locations in the Absence of External Cues</td>
</tr>
<tr>
<td>11:00 am</td>
<td>21-5</td>
<td>Mora YA, Sustaita D, Farabaugh SM; California State University San Marcos, San Diego Zoo Global</td>
<td>Analysis of Loggerhead Shrike wing-flashing movements during hunting</td>
</tr>
<tr>
<td>11:30 am</td>
<td>21-7</td>
<td>Johnson MW, Tricomo AS, Shough AE, Sanders JC, Cohen SC; San Francisco State University, Humboldt State University, University of Portland, Southern Illinois University Edwardsville</td>
<td>Investigating the Foraging Behavior of Leptasterias spp. Across Intertidal Microhabitats</td>
</tr>
<tr>
<td>11:45 am</td>
<td>21-8</td>
<td>Paggeot LX, Gosliner TM; California Academy of Sciences</td>
<td>Stinger Thieves: Nematocyst Acquisition Process in Aeolid Nudibranchs</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td>Lunch Break</td>
<td></td>
</tr>
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#### 10:30 AM – 12:00 PM  
**Session 22**  
**Rooms 402-403**

**Evolution of Behaviour**  
*Chair: Angela Freeman*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 am</td>
<td>22-1</td>
<td>Phipps N, Stein LR, Hoke K; Colorado State University, University of Oklahoma</td>
<td>Genetic Background and Sexual Experience Jointly Determine Courtship Strategy</td>
</tr>
<tr>
<td>10:45 am</td>
<td>22-2</td>
<td>Young RL, Hofmann HA; University of Texas at Austin</td>
<td>Leveraging Network Analysis to Study the Evolution of Sociality in Vertebrates</td>
</tr>
<tr>
<td>11:00 am</td>
<td>22-3</td>
<td>Culumber ZW, University of Alabama in Huntsville</td>
<td>Variation in Animal Personality Across a Major Environmental Gradient</td>
</tr>
<tr>
<td>11:15 am</td>
<td>22-4</td>
<td>Bensky MK, Bell AM; University of Illinois Urbana-Champaign</td>
<td>The evolution of cognition and behavior during a natural biological invasion</td>
</tr>
<tr>
<td>11:30 am</td>
<td>22-5</td>
<td>Schumm MR, Cummings ME, Ramsey ME; UT</td>
<td>Testing cognitive flexibility in non-model organisms: Poeciliid fishes vary by species, sex and context in detour performance</td>
</tr>
<tr>
<td>11:45 am</td>
<td>22-6</td>
<td>Freeman AR, Ophir AG, Sheehan MJ; Cornell University</td>
<td>Doing more with less: African giant pouched rats specialize in olfaction with a typical olfactory receptor repertoire</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td>Lunch Break</td>
<td></td>
</tr>
</tbody>
</table>
## Saturday Program Afternoon Sessions

Note: Presenter is first author unless noted by an asterisk (*).

### 1:45 PM – 3:00 PM  
**Session 23**  
**Lonestar A**  
**Evolutionary Ecology**  
Chair: Patrick Kelly

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 23</th>
<th>Presenter(s) and Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:45 pm</td>
<td><strong>23-2</strong></td>
<td>Kelly PW, Pfennig DW, Pfennig KS; UNC Chapel Hill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sexual Selection and Adaptive Evolution in Variable Environments: Phenotypic Plasticity as a Good-Genes Effect</td>
</tr>
<tr>
<td>2:00 pm</td>
<td><strong>23-3</strong></td>
<td>King RW, Wund MA, Foster SA, Baker JA; Clark University, University of New Jersey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Salinity mediated shape plasticity in oceanic threespine stickleback</td>
</tr>
<tr>
<td>2:15 pm</td>
<td><strong>23-4</strong></td>
<td>Rippe JP, Dixon GB, Matz MV; University of Texas at Austin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Genomic evidence of environmental specialization and cryptic speciation in two massive coral species on the Florida Keys Reef Tract</td>
</tr>
<tr>
<td>2:30 pm</td>
<td><strong>23-5</strong></td>
<td>Wilson LE, Curtis JD, Lonsdale G, Cox CL; Georgia Southern University, University of Michigan, University of Plymouth, Florida International University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The role of sympatry on predator-based selection on coral snake mimicry components in the montane tropics</td>
</tr>
<tr>
<td>2:45 pm</td>
<td><strong>23-6</strong></td>
<td>Griffiths JS, Johnson KM, Kelly MW; Louisiana State University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evolutionary Change in the Oyster, <em>Crassostrea virginica</em>, Following an Experimental Low Salinity Event</td>
</tr>
</tbody>
</table>

### 3:00 pm  
Coffee Break  
Grand Ballroom

### 1:30 PM – 3:30 PM  
**Session 24**  
**Lone Star B**  
**DEDE Best Student Paper Competition**  
Chairs: Dan Becker, Daniel Becker

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 24</th>
<th>Presenter(s) and Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td><strong>24-1</strong></td>
<td>Kernbach ME, Unnasch TR, Martin LB; University of South Florida</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differential Effects of Spectral Composition of Nighttime Lighting on West Nile Virus Resistance and Mortality in House Sparrows</td>
</tr>
<tr>
<td>1:45 pm</td>
<td><strong>24-2</strong></td>
<td>Thublin RN, Moore PA; Bowling Green State University, University of Michigan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crayfish self-medication: crayfish alter their feeding preferences based on parasite loads</td>
</tr>
<tr>
<td>2:00 pm</td>
<td><strong>24-3</strong></td>
<td>Amonett SD, Balenger SL; University of Mississippi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mother Knows Best: Immune-based Maternal Effects in Response to <em>Mycoplasma gallisepticum</em> Infection in Eastern Bluebirds (<em>Sialia sialis</em>)</td>
</tr>
<tr>
<td>2:15 pm</td>
<td><strong>24-4</strong></td>
<td>Dimos BA, MacKnight NJ, Brandt M, Mydlarz LD; University of Texas at Arlington, University of the Virgin Islands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differential Disease Susceptibility Between Closely Related Coral Species is due to Regulation of Mitochondrial Genes</td>
</tr>
<tr>
<td>2:30 pm</td>
<td><strong>24-5</strong></td>
<td>Slama SL, Sandmeier FC, Sheedy MD, Painter MN; Colorado State University Pueblo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quantifying Phagocytic Activity of Lymphocytes in Ectotherms</td>
</tr>
<tr>
<td>2:45 pm</td>
<td><strong>24-6</strong></td>
<td>Houtz JL, Shipley JR, Zimmer C, Vitousek MN; Cornell University, Max Planck Institute of Animal Behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impacts of Gut Microbiota on Developmental Temperature Priming in Birds</td>
</tr>
<tr>
<td>3:00 pm</td>
<td><strong>24-7</strong></td>
<td>MacKnight NJ, Dimos BA, Brandt M, Muller E, Mydlarz L; University of Texas at Arlington, University of Virgin Islands, Mote Marine Laboratory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The species-specific and shared immune competence of seven Caribbean coral when exposed to white plague disease</td>
</tr>
<tr>
<td>3:15 pm</td>
<td><strong>24-8</strong></td>
<td>Names G, Krause J, Schultz E, Hunt K, Heal M, Hahn T, Cornelius J, Wingfield J; Univ of California, Davis, Univ of Nevada, Reno, Wittenberg Univ, George Mason Univ, Bangor Univ, Oregon State Univ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immunological consequences of circulating corticosterone: an experimental investigation comparing avian malaria-tolerant and -susceptible Hawaii Amakihi (<em>Hemignathus virens</em>)</td>
</tr>
</tbody>
</table>

### 3:30 pm  
Coffee Break  
Grand Ballroom
1:30 PM – 3:15 PM  Session 25  Lone Star C

**On the Wing**  
*Chairs: Aimy Wissa, Tomer Urca*

1:30 pm  **25-1**  
Bustamante J, Ahmed M, Daniel TL; University of Washington  
Restricting abdominal flexion yields poor flight performance in hawkmoths

1:45 pm  **25-2**  
Urca T, Ribak G; Tel-Aviv University  
The Effect of Body Mass on Long-Distance Flight Efficiency in a Wood Boring Beetle, the ‘Mango Stem Borer’, Batocera Rufomaculata.

2:00 pm  **25-3**  
McCarty B, Matthews M, Spoonberg S; Georgia Institute of Technology  
Flexibility Maintains Leading-edge Vortex Structure on Manduca Wings

2:15 pm  **25-4**  
Schwab RK, Jankauski MA; Montana State University  

2:30 pm  **25-5**  
Cheney JA, Song J, Windsor SP, Stevenson JPJ, Dierksheide D, Nila A, Bomphrey RJ, Usherwood JR; Royal Veterinary College, Döngguf University of Technology, University of Bristol, LaVision GmbH, LaVision UK Ltd  
The tails of gliding birds disrupt induced drag minimization and instead approach optimal viscous drag minimization

2:45 pm  **25-6**  
Williamson CJ, Spelt A, Windsor SP*; University of Bristol  
Are complex wind fields beneficial for soaring? An urban gull’s perspective

3:00 pm  **25-7**  
Wissa AA; University of Illinois Urbana-Champaign  
Aerodynamic Characterization of a Leading-Edge Alula-Inspired Device

3:15 pm  Coffee Break  Grand Ballroom

1:30 PM – 3:15 PM  Session 26  Lone Star E

**Biological Rhythms**  
*Chair: Helen Chmura*

1:30 pm  **26-1**  
Wingfield JC, Reid AMA, Perez JH, Bishop VR, Krause JS, Meddle SL; University of California, Roslin Institute University of Edinburgh, University of Glasgow, University of Nevada Reno  
Divergence of Hypothalamic-pituitary-gonadal (HPG) Axis Gene Expression and Testosterone in Migrant and Resident Female White-crowned Sparrows

1:45 pm  **26-2**  
Chmura HE, Duncan CM, Barnes BM, Buck CL, Christian HC, Loudon AS, Williams CT; University of Alaska Fairbanks, Northern Arizona University, Oxford University, University of Manchester  
Reimagining the hibernating brain: Hypothalamic remodeling in an arctic hibernator

2:00 pm  **26-3**  
Bilak JD, Whiles MR, Milanovich JR, Bystriansky JS, Warne RW; Southern Illinois University, Shedd Aquarium  
Understanding the physiological mechanisms causing seasonal movement changes in common mudpuppies.

2:15 pm  **26-4**  
Shankar A, McCahon S, Callegari K, Seitz T, Drown D, Williams CT; University of Alaska Fairbanks  
SAD rats: Effects of short photoperiod on sleep disruption, the gut microbiome, and carbohydrate consumption in diurnal grass rats

2:30 pm  **26-5**  
Kahn AS, Pennelly CW, Leys SP; Moss Landing Marine Laboratories, University of Alberta  
Factors Affecting the Behaviors of Sessile Animals on the Deep Seafloor

2:45 pm  **26-6**  
Fissette SD, Bussy U, Huerta B, Li W; Michigan State University  
Diel Pattern of Pheromone Production and Release in Sea Lamprey, Petromyzon marinus

3:00 pm  **26-7**  
Hernandez E, Vázquez O, Torruco A, Rahman MD; University of Texas Rio Grande Valley  
Histological evidence of annual and lunar reproductive rhythms of Atlantic sea urchin, Arbacia punctulata in the southern Gulf of Mexico: changes in nutritive phagocytes in relation to gametogenesis

3:15 pm  Coffee Break  Grand Ballroom
## Saturday 4 January 2020

### Session 27

**DEDB Best Student Paper**  
*Chair: Kim Hoke*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>27-1</td>
<td>Pomerantz AF, Kishi Y, Pinna C, Elias M, Patel NH; University of California Berkeley, California Institute of Technology, Museum National d’Histoire Naturelle, Marine Biological Laboratory</td>
<td>Making it Clear: Evolution and Development of Wing Transparency in Lepidoptera</td>
<td></td>
</tr>
<tr>
<td>1:45 pm</td>
<td>27-2</td>
<td>Nunez SA, Sanger TJ; Loyola University Chicago</td>
<td>The Physiological Basis of Structural Malformations in Thermally Stressed Lizard Embryos</td>
<td></td>
</tr>
<tr>
<td>2:00 pm</td>
<td>27-3</td>
<td>Morris ZS, Pierce SE, Abzhanov A; Harvard University, Imperial College London</td>
<td>Developmental mechanisms shaping crocodylian snouts</td>
<td></td>
</tr>
<tr>
<td>2:15 pm</td>
<td>27-4</td>
<td>Steinworth BM, Martindale MQ, Ryan JF; University of Florida</td>
<td>The evolution of cnidarian and bilaterian Hox genes</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>27-5</td>
<td>Lanza AR, Seaver EC; University of Florida</td>
<td>Activin/Nodal signaling is required for establishing the dorsal-ventral axis in Capitella teleta</td>
<td></td>
</tr>
<tr>
<td>2:45 pm</td>
<td>27-6</td>
<td>Zang H, Nagayasu N; Lyon College, University of Arkansas</td>
<td>The evolution of novel neuropeptides in Cnidaria: investigating the function of a lineage-specific neuropeptide RPamide during sea anemone development</td>
<td></td>
</tr>
<tr>
<td>3:00 pm</td>
<td>27-7</td>
<td>Guernsey MW, Van Kruistum H, Reznick DN, Pollux BJA, Baker JC; Stanford University School of Medicine, Wageningen University, University of California, Riverside, Wageningen University</td>
<td>Poeciliopsis maternal follicle transcriptomes reveal importance of placenta and secretory genes in the emergence of live-birth</td>
<td></td>
</tr>
<tr>
<td>3:15 pm</td>
<td>27-8</td>
<td>Senevirathne G, Baumgart S, Shubin NH, Hanken J; University of Chicago, Laboratory Schools, Harvard University</td>
<td>Ontogeny of the anuran urostyle: the developmental context of evolutionary novelty</td>
<td></td>
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</table>

### Session 28

**Make the Flow Go**  
*Chair: Konstantin Kornev*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>28-1</td>
<td>Kaczmarek EB, Li EY, Brainerd EL; Brown University</td>
<td>XROMM Analysis of Air-Breathing in the Royal Knife Fish, Chitala blanci</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>28-2</td>
<td>Grand Pre CA, Hedrick BP, Schachner ER; Louisiana State University Health Science Center</td>
<td>Movement and Function of the Hepatic-Piston Pulmonary Apparatus During Various Modes of Respiration in the American Alligator (Alligator mississippiensis)</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>28-3</td>
<td>Cieri RL, Farmer CG; University of Utah</td>
<td>Net-unidirectional airflow patterns vary with pulmonary anatomy in monitor lizards (Varanidae); insights from a multi-species computational fluid dynamics investigation</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>28-4</td>
<td>Hossain M, Staples A; Virginia Tech</td>
<td>Passive Vortical Flows Compensate for Low Flow Speeds in the Interior of a Coral Colony</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>28-5</td>
<td>Gaddam MG, Santhanakrishnan A; Oklahoma State University</td>
<td>Squishy suction pumps: pore water release by upside-down jellyfish</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>28-7</td>
<td>Ahmed S, Shearer B, O’Brien H; Northeastern State University, NYU School of Medicine, OSU Center for Health Sciences</td>
<td>The Hemodynamics Of The Carotid Rete In The Brown Greater Galago, Otolemur crassicaudatus</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>28-8</td>
<td>Kornev K, Aprelev P, Brasovs A, Adler P, Beard E; Clemson University</td>
<td>Probing viscosity of insect blood at different spatial and time scales</td>
</tr>
</tbody>
</table>

### Coffee Break

- 3:30 pm **Coffee Break**  
- 3:15 pm **Coffee Break**
### Biological Mousetraps: Springs and Latches

**Chairs: Sarah Longo, Jeffrey Olberding**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 29</th>
<th>Chair(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>29-1</td>
<td>Olberding JP, Ilton M, Crosby AJ, Azizi E; University of California, Harvey Mudd College, University of Massachusetts</td>
<td>Limits and Losses: the Power of Recoiling Biological Springs</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>29-2</td>
<td>Longo SJ, Cox SM, Azizi E, Ilton M, Olberding JP, St. Pierre R, Patek SN; Duke University, Pennsylvania State University, UC Irvine, Harvey Mudd College, Carnegie Mellon University</td>
<td>Beyond power amplification: new insights from latch-mediated spring actuation (LaMSA)</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>29-3</td>
<td>Stinson Easterling CM, Seis C, Deban SM; Northwest University, University of South Florida</td>
<td>Evidence of power amplification and thermal robustness in salamandrid feeding mechanisms</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>29-4</td>
<td>Mendoza E, Olberding JP, Azizi E; University of California, Irvine</td>
<td>Temperature dependence of elastic recoil mediated by a mechanical advantage latch</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>29-5</td>
<td>Bolmin O, Alleyne M, Wissa AA; University of Illinois at Urbana-Champaign</td>
<td>How does Morphology Affect Jumping Kinematics of Click Beetles?</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>29-6</td>
<td>Gibson JC, Suarez AV; University of Illinois at Urbana-Champaign</td>
<td>Functional morphology and biomechanics of trap-jaw ants in the Daceton genus group</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>29-7</td>
<td>Acharya R, Challita EJ, Bhamla MS; Georgia Institute of Technology</td>
<td>Ultrafast Finger Snap is Mediated by a Frictional Skin Latch</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>29-8</td>
<td>Jan I, Sangha G, Schulz JR; Occidental College</td>
<td>The Cone Snail Strikes Back: A Biomechanical Study of an Ultrafast Prey Capture</td>
</tr>
</tbody>
</table>

### 1:30 PM – 3:15 PM | Session 30 | Rooms 301-302

**Flying and Swimming Behaviour**

**Chair: Matthew Lefauve**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 30</th>
<th>Chair(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>30-1</td>
<td>Lefauve MK, Hernandez LP; George Washington University</td>
<td>Invasive Behavioral Syndrome in Cypriniform Fishes</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>30-2</td>
<td>O’Mara MT, Amorim F, Scacco M, McCracken GF, Safi K, Mata V, Tomé R, Swartz SM*, Wikelski M, Beja P, Rebello H, Dechmann DKN; Southeastern Louisiana University, University of Porto, University of Konstanz, University of Tennessee, University of Lisbon, Brown University DKN</td>
<td>European Free-tailed Bats Use Wind Regimes to Fly High and Fast</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>30-3</td>
<td>Burnett NP, Badger MA, Combes SA; University of California, Davis</td>
<td>Wind and canopy height affect honey bee flight performance in cluttered environments</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>30-4</td>
<td>Tidswell BK, Tytell ED; Tufts University</td>
<td>Using physical models to examine sensory coordination during fish schooling</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>30-5</td>
<td>Katiya K, Govindarajan A, Llopiz J, Wiebe P, Breier J, Hobson B, Risi M, Robison B, Rock S, Yerger D; Monterey Bay Aquarium Research Institution, Woods Hole Oceanographic Institution, Stanford University</td>
<td>Mesobot: Toward autonomous observations of organismal behavior in the ocean’s midwaters</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>30-6</td>
<td>White CF, Whitney NM, Weber DN, Frazier BS; Harvard University, New England Aquarium, Texas A&amp;M, Department of Natural Resources</td>
<td>Survival and Swimming Behavior of Red Drum (Sciaenops ocellatus) Following Recreational Capture and Release</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>30-7</td>
<td>Khursigara AJ, Esbaugh AJ; University of Texas at Austin</td>
<td>Does crude oil exposure alter behavior in fish?</td>
</tr>
</tbody>
</table>

### 1:30 PM – 3:30 PM | Session 29 | Lone Star H

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<thead>
<tr>
<th>Time</th>
<th>Session 29</th>
<th>Chair(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>29-1</td>
<td>Olberding JP, Ilton M, Crosby AJ, Azizi E; University of California, Harvey Mudd College, University of Massachusetts</td>
<td>Limits and Losses: the Power of Recoiling Biological Springs</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>29-2</td>
<td>Longo SJ, Cox SM, Azizi E, Ilton M, Olberding JP, St. Pierre R, Patek SN; Duke University, Pennsylvania State University, UC Irvine, Harvey Mudd College, Carnegie Mellon University</td>
<td>Beyond power amplification: new insights from latch-mediated spring actuation (LaMSA)</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>29-3</td>
<td>Stinson Easterling CM, Seis C, Deban SM; Northwest University, University of South Florida</td>
<td>Evidence of power amplification and thermal robustness in salamandrid feeding mechanisms</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>29-4</td>
<td>Mendoza E, Olberding JP, Azizi E; University of California, Irvine</td>
<td>Temperature dependence of elastic recoil mediated by a mechanical advantage latch</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>29-5</td>
<td>Bolmin O, Alleyne M, Wissa AA; University of Illinois at Urbana-Champaign</td>
<td>How does Morphology Affect Jumping Kinematics of Click Beetles?</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>29-6</td>
<td>Gibson JC, Suarez AV; University of Illinois at Urbana-Champaign</td>
<td>Functional morphology and biomechanics of trap-jaw ants in the Daceton genus group</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>29-7</td>
<td>Acharya R, Challita EJ, Bhamla MS; Georgia Institute of Technology</td>
<td>Ultrafast Finger Snap is Mediated by a Frictional Skin Latch</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>29-8</td>
<td>Jan I, Sangha G, Schulz JR; Occidental College</td>
<td>The Cone Snail Strikes Back: A Biomechanical Study of an Ultrafast Prey Capture</td>
</tr>
</tbody>
</table>

### 3:30 pm | Coffee Break | Grand Ballroom

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### 1:30 PM – 3:15 PM | Session Break | Grand Ballroom

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### 3:30 pm | Coffee Break | Grand Ballroom

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### 1:30 PM – 3:30 PM | Session 30 | Rooms 301-302

**Flying and Swimming Behaviour**

**Chair: Matthew Lefauve**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 30</th>
<th>Chair(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>30-1</td>
<td>Lefauve MK, Hernandez LP; George Washington University</td>
<td>Invasive Behavioral Syndrome in Cypriniform Fishes</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>30-2</td>
<td>O’Mara MT, Amorim F, Scacco M, McCracken GF, Safi K, Mata V, Tomé R, Swartz SM*, Wikelski M, Beja P, Rebello H, Dechmann DKN; Southeastern Louisiana University, University of Porto, University of Konstanz, University of Tennessee, University of Lisbon, Brown University DKN</td>
<td>European Free-tailed Bats Use Wind Regimes to Fly High and Fast</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>30-3</td>
<td>Burnett NP, Badger MA, Combes SA; University of California, Davis</td>
<td>Wind and canopy height affect honey bee flight performance in cluttered environments</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>30-4</td>
<td>Tidswell BK, Tytell ED; Tufts University</td>
<td>Using physical models to examine sensory coordination during fish schooling</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>30-5</td>
<td>Katiya K, Govindarajan A, Llopiz J, Wiebe P, Breier J, Hobson B, Risi M, Robison B, Rock S, Yerger D; Monterey Bay Aquarium Research Institution, Woods Hole Oceanographic Institution, Stanford University</td>
<td>Mesobot: Toward autonomous observations of organismal behavior in the ocean’s midwaters</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>30-6</td>
<td>White CF, Whitney NM, Weber DN, Frazier BS; Harvard University, New England Aquarium, Texas A&amp;M, Department of Natural Resources</td>
<td>Survival and Swimming Behavior of Red Drum (Sciaenops ocellatus) Following Recreational Capture and Release</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>30-7</td>
<td>Khursigara AJ, Esbaugh AJ; University of Texas at Austin</td>
<td>Does crude oil exposure alter behavior in fish?</td>
</tr>
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### Saturday 4 January 2020

#### Session 31

**Connubiality, Conjugality, or Civil Union? Symbiotic Relationships, Part II**

**Chair:** Hanny Rivera

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Authors and Affiliations</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>31-2</td>
<td>Fifer JE, Bui V, Berg J, Gabriel M, Bentáge B, Davies S, Boston University, University of Guam</td>
<td>Coral Microbial Community Shifts Along a Steep Environmental Gradient</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>31-3</td>
<td>Rivera HE, Davies SW; Boston University</td>
<td>What does it take to stay together? Uncovering symbiosis gene networks in a facultatively symbiotic coral</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>31-4</td>
<td>Howe-Kerr LI, Bachelot B, Wright RM, Kenkel C, Bay LK, Correa AMS, Rice University, Smith College, University of Southern California, Australian Institute of Marine Science</td>
<td>Symbiont diversity correlates with variablity in holobiont stress tolerance</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>31-5</td>
<td>Bedwell H, Abbott E, Bologh A, Kolodziej G, Hejmadi P, Diaz L, Huynh K, Ma J, Matz MV, Kenkel C; University of Texas at Austin, NOAA, University of Southern California</td>
<td>Hurricane-driven asexual reproduction in massive boulder corals in the Florida Keys</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>31-7</td>
<td>Barfield SJ, Davies SW, Matz MV; University of Texas, Austin, Boston University</td>
<td>Co-recruitment of Relatives Leads to Emergence of Inbred Genetically Isolated Group within a Panmictic Population of a Broadcast-spawning Reef-Building Coral</td>
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**Coffee Break**  
Grand Ballroom

#### Session 32

**(Eco)Energetics**

**Chairs:** Rebecca Clark, Hugh Ellis

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Authors and Affiliations</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>1:30 pm</td>
<td>32-1</td>
<td>John JS, Thometz NM, Boerner K, Denum L, Kendall T, Richter BP, Gaspard JC, Williams TM; University of California Santa Cruz, San Francisco University, Mote Marine Laboratory &amp; Aquarium, Pittsburgh Zoo, PPG Aquarium</td>
<td>Energetics of swimming in tropical marine mammals- Examining metabolic tradeoffs in West Indian manatees and Hawaiian monk seals</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>32-2</td>
<td>Dolan JE, Musial NA, Hammond KA; UC, Riverside</td>
<td>Energy expenditure of cage activity versus wheel running in deer mice</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>32-3</td>
<td>Clark RM, Fox TP, Harrison JF, Fewell JH; Siena College, Arizona State University</td>
<td>Energetic Savings of Grouping During Nest Initiation in Harvester Ants</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>32-4</td>
<td>Prinzning TS, Bigman BS, Skelton Z, Wegner NC, Dulvy NK; Simon Fraser University, Scripps Institution of Oceanography, NOAA Southwest Fisheries Science Center</td>
<td>Paired Estimates of Metabolic Rate and Gill Surface Area in the Horn Shark (<em>Heterodontus franciscii</em>)</td>
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<tr>
<td>2:30 pm</td>
<td>32-5</td>
<td>Oliver KD, Martin TE, Wolf BO; University of New Mexico, University of Montana</td>
<td>Air Temperature Limits Metabolic Scope in Mid-elevation Tropical Birds</td>
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<tr>
<td>2:45 pm</td>
<td>32-6</td>
<td>Ellis Hl, San Francisco S; University of San Diego, Texas Tech University</td>
<td>Sustained Metabolic Scope: Verification from Eared Grebe Time and Energy Budgets</td>
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<tr>
<td>3:00 pm</td>
<td>32-7</td>
<td>Goodchild CG, Durant SE; Oklahoma State University, University of Arkansas</td>
<td>Is a novel marker of oxidative damage linked to aerobic scope and flying performance in birds exposed to crude oil?</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>32-8</td>
<td>Kunkel EL, Dale AS, Fuller NW, McGuire LP; Texas Tech University</td>
<td>Partial Migration in Mexican free-tailed Bats: Ecology and Bioenergetics of Winter Residents</td>
</tr>
</tbody>
</table>

**Coffee Break**  
Grand Ballroom

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2020 Final Program 43
### Session 33

**Plasticity**  
*Chairs: David Coughlin, Javier Mendez Narvaez*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>33-1</td>
<td>Mendez-Narvaez J, Warkentin K; Boston University, Smithsonian Tropical Research Institute</td>
<td>Nitrogen Excretion Plasticity and Reproductive Colonization of Land by Frogs: Multiple Strategies to Avoid Ammonia Toxicity</td>
<td>Rooms 201-202</td>
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<tr>
<td>1:45 pm</td>
<td>33-2</td>
<td>Foster SA, Baker JA; Clark University</td>
<td>Plasticity and the Origin of Evolutionary Pattern</td>
<td></td>
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<tr>
<td>2:00 pm</td>
<td>33-3</td>
<td>Rosso AA, Logan ML, McMillan WO, Cox CL; Georgia Southern University, University of Nevada Reno, Smithsonian Tropical Research Institute, Florida International University</td>
<td>Phenotypic Plasticity and the Response to Increasing Temperatures in a Tropical Lowland Lizard</td>
<td></td>
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<tr>
<td>2:15 pm</td>
<td>33-4</td>
<td>Coughlin DJ; Widener University</td>
<td>Thermal Acclimation Studies in Cold-Water Fishes: Do They Reveal the Potential Impact of Climate Change?</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>33-5</td>
<td>Helms Cahan S, Frietze SE, Gerrard DL, Bora K, Kaplan I, Perez M, Lockwood BL, Teets NM, Waters JK, Axen HJ; University of Vermont, LeTourneau University, University of Kentucky, Providence College, Salve Regina University</td>
<td>Developmental temperature alters brain gene expression in adult <em>Drosophila melanogaster</em></td>
<td></td>
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<tr>
<td>2:45 pm</td>
<td>33-6</td>
<td>Esbaugh AJ, Lonthair J; University of Texas at Austin</td>
<td>The Development of Acid-base Pathways in Marine Fish: Implications for Ocean Acidification</td>
<td></td>
</tr>
<tr>
<td>3:00 pm</td>
<td>33-7</td>
<td>Dijkstra PD, Fialkowski RJ, Janeski HM, Aufdemberge PM; Central Michigan University</td>
<td>Sexual Selection Favors Phenotypic Plasticity in Body Coloration in a Polymorphic Cichlid Fish</td>
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<tr>
<td>3:15 pm</td>
<td>Coffee Break</td>
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<td></td>
<td>Grand Ballroom</td>
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</table>

### Session 34

**Comparative Genomics and Phylogenetics of the Spineless**  
*Chair:*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Room</th>
</tr>
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<tbody>
<tr>
<td>1:30 pm</td>
<td>34-1</td>
<td>Spagna JC, Espinosa AJ, Crews SC; William Paterson University, California Academy of Sciences</td>
<td>Grass Spiders of North America and Europe: A Long-Distance Relationship Lasting 50 Million Years</td>
<td>Rooms 402-403</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>34-2</td>
<td>Yap-Chiongco MK, Varney RM, Kocot KM; University of Alabama, Alabama Museum of Natural History</td>
<td>What the Shell-less Aplacophorans Can Tell us About Molluscan Biomineralization</td>
<td></td>
</tr>
<tr>
<td>2:00 pm</td>
<td>34-3</td>
<td>Kocot KM; University of Alabama</td>
<td>Revolutionizing Biodiversity and Systematics Research on Aplacophora (Mollusca) and Training the Next Generation of Invertebrate Systematists</td>
<td></td>
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<tr>
<td>2:15 pm</td>
<td>34-4</td>
<td>Cannon JT, Kocot KM, Varney RM, Eernisse DJ, Speiser DI, Oakley TH; UC Santa Barbara, University of Alabama, Cal State Fullerton, University of South Carolina</td>
<td>Target-capture phylogenomics of Polyplacophora and the origins of shell eyes</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>34-5</td>
<td>Ballou L, Iliffe T, Olesen J, Bracken-Grissom HD; Texas AM University at Galveston, University of Copenhagen, Florida International University</td>
<td>Molecular Phylogeny of Remipedia: Providing Preliminary Insights into the Evolution of Feeding across an Enigmatic Crustacean Group</td>
<td></td>
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<tr>
<td>2:45 pm</td>
<td>34-6</td>
<td>Ontano AZ, Benavides L, Harvey M, Gribet G, Sharma PP; University of Wisconsin, Harvard University, Western Australian Museum</td>
<td>Disentangling Arachnid Systematics Through Rare Genomic Events</td>
<td></td>
</tr>
<tr>
<td>3:00 pm</td>
<td>34-7</td>
<td>Kitchen SA, Bruckner A, Kishi Y, Miller DR, Naragon T, Wagner J, Parker J; California Institute of Technology</td>
<td>Genomic insights into gland development of rove beetles</td>
<td></td>
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<tr>
<td>3:30 pm</td>
<td>Coffee Break</td>
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<td></td>
<td>Grand Ballroom</td>
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### BART Lecture

**Sponsored by Sable Systems**  
*Stoddard MC, Princeton University*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 pm</td>
<td>BART Lecture</td>
<td>Diversity of Form and Function in the Colorful World of Birds</td>
<td></td>
<td>Salons D-E</td>
</tr>
<tr>
<td>Session</td>
<td>Title</td>
<td>Authors</td>
<td>Abstract</td>
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<tr>
<td>P1-1</td>
<td>Evodevo: Chavarria R, Smith FW; University of North Florida</td>
<td>The loss of several Wnt genes is correlated with the loss of posterior growth in Tardigrada.</td>
<td></td>
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<tr>
<td>P1-2</td>
<td>Austiff JK; Harvard University</td>
<td>Development of the Stomach of the Carnivorous Tadpoles of the Budgett's Frog, Lepidobatrachus laevis Compared to Filter Feeding Tadpoles.</td>
<td></td>
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</tr>
<tr>
<td>P1-3</td>
<td>Silva MAP, Nakanishi N; University of Arkansas</td>
<td>Assessing the Function of the POU-Domain Transcription Factor Pit-1 During Development of the Cnidarian Nematostella vectensis.</td>
<td></td>
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<tr>
<td>P1-4</td>
<td>Neal S, Daly CMS, Koenig KM; Harvard University</td>
<td>Differentiation and Notch signaling in the Cephalopod Retina.</td>
<td></td>
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<tr>
<td>P1-5</td>
<td>Larocca-Stravalle Z, Kaufman J, Gilien K*; Kenyon College</td>
<td>Labial A and Post-1 Hox Gene Expression in Lumbricus variegatus.</td>
<td></td>
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<tr>
<td>P1-6</td>
<td>Rojas AM, Smith FW; University of Connecticut, University of North Florida</td>
<td>A Secondarily Simplified Mechanism Patterns the Tardigrade Through-Gut.</td>
<td></td>
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</tr>
<tr>
<td>P1-7</td>
<td>Phelps AN, Luc HM, Gross JB; University of Cincinnati</td>
<td>Comparative developmental expression of neural crest genes in the blind Mexican cavefish, Astyanax mexicanus.</td>
<td></td>
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<tr>
<td>P1-8</td>
<td>Romano L, Broady C, Ji K, Madar M, Scoggin S, Wong M; Denison University</td>
<td>Comparative analysis of developmental mechanisms and their plasticity with regard to changes in the environment: derived species versus the pencil urchin, Eucidaris tribuloides.</td>
<td></td>
<td></td>
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<tr>
<td>P1-9</td>
<td>Dao TK, Lambert JD; University of Rochester</td>
<td>The possible roles of retinoic acid pathway in the shell and the embryonic development of the mollusc Tritia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-10</td>
<td>Whitesel CA, Barone V, Lyons DC; UC San Diego</td>
<td>Studying Neuroanatomy in B. Stephanieae through Immunohistochemistry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-11</td>
<td>Gavazzi LM, Cooper LN, Thewissen JGM; Kent State University, Northeast Ohio Medical University</td>
<td>Patterning and development of the beluga whale (Delphinapterus leucas) fluke.</td>
<td></td>
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<tr>
<td>P1-12</td>
<td>Daniel L, Dubansky B, Burggren W; University of North Texas</td>
<td>Differences in Early Embryo Cleavage Rate in Two Populations of Killfish (Fundulus grandis).</td>
<td></td>
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<tr>
<td>P1-13</td>
<td>Luc HM, Berning DJ, Adams H, Gross JB; University of Cincinnati</td>
<td>Expression Analysis of In-Frame Indel Mutations in Astyanax Cave- and Surface-Dwelling Fish.</td>
<td></td>
<td></td>
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<tr>
<td>P1-14</td>
<td>Breen CM, Funk EC, McCune AR; Cornell University</td>
<td>Role of Bmps in Evolution of Gas Bladder in Ray-Finned Fishes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-15</td>
<td>Amaudoff LA, Sanger TC; Loyola University</td>
<td>Three-Dimensional Embryological Atlas of Anolis sagrei based on micro-CT.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-16</td>
<td>Cumming M, Smith FW; University of North Florida</td>
<td>Genomic and developmental origins of tardigrade legs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-17</td>
<td>Hogan AVC, Balanoff AM, Bever GS; Johns Hopkins School of Medicine</td>
<td>Developmental and Evolutionary Scaling in the Olfactory System of Birds.</td>
<td></td>
<td></td>
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<tr>
<td><strong>DEE BSP: Huey Award</strong></td>
<td></td>
<td>The Impact of Microplastics on Sea Anemone Behavior, Survivorship, and Gene Expression.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-19</td>
<td>Frãs Vellón AI, Krantz J, Macrander J; Florida Southern College</td>
<td>Investigation of Coral Growth and The Genetic Expression of The Hippo Growth Signaling Pathway in Orbicella faveolata.</td>
<td></td>
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<tr>
<td>P1-20</td>
<td>Villafranca N, Weglarz M, Hamlyn S, Vaughan D, Stenesen DS, Soper DM; University of Dallas, University of Dallas, Mote Marine Laboratory, Plant A Million Corals, University of Dallas, University of Dallas</td>
<td>Examining Metabolic Allometry Among Birds: A Phylogenetic Approach.</td>
<td></td>
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<td>P1-21</td>
<td>Giancarli SM, Dunham AE, O’Connor MP; Drexel University, University of Pennsylvania</td>
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<td>P1-22</td>
<td>2bRAD-seq Paternity Testing Pipeline for Complex and Mixed DNA Samples</td>
<td>Miller-Crews I, Matz MV, Hofmann HA; University of Texas at Austin</td>
<td></td>
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<tr>
<td>P1-23</td>
<td>Mismatched: Do Northern Kelp crabs (<em>Pugettia producta</em>) eat where they live?</td>
<td>Cordova KC, Farr D, Dethier MN, Dobkowski KA; California Polytechnic State University, University of Southern California, Friday Harbor Laboratories, University of Washington, Bates College</td>
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<td><strong>Cladistics and Phylogenetics</strong></td>
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<tr>
<td>P1-24</td>
<td>Phylogenetic relationships among burrowing sea anemones in the family Halocladidae (Cnidaria: Anthozoan: Actiniaria)</td>
<td>Hamilton N, Rodriguez E, Izumi T, Yap N, Daly M, Texas A&amp;M University, American Museum of Natural History, University of Tokyo, National University of Singapore, Ohio State University</td>
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<tr>
<td>P1-25</td>
<td>LTR retrotransposons in the non-model marine invertebrate Lamellibrachia luymesi (Annelida)</td>
<td>Oyekwe OL, Waits DS, Halanych KM; Auburn University</td>
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<td>P1-26</td>
<td>Transcriptome assembly quality affects phylogenetic inference</td>
<td>Spillane JL, Lapoclse TM, MacManes MD, Plachetzki DC; University of New Hampshire</td>
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<tr>
<td>P1-27</td>
<td>Unique Tektin Gene Complements Support the Position of Xenacoelomorpha at the Base of Bilaterians, and the Inclusion of Chaetognaths within a Spiralian Clade</td>
<td>Schneider SQ, Bastin BR, Ho S; Academia Sinica, Iowa State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-29</td>
<td>Can Air Breathing Ability in Teleost Fishes be Used to Predict Terrestrial Behavior?</td>
<td>Kyle OM, Gibb AC, Minicozzi MR, Braga A; Northern Arizona University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-30</td>
<td>Male body size evolves more rapidly than female body size</td>
<td>Ghione C, Lough-Stevens M, Dean M; University of Southern California</td>
<td></td>
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<td></td>
<td><strong>Population Genetics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-31</td>
<td>Very low genetic diversity in two species of North Atlantic sea stars</td>
<td>Harper FM, Clarke DG; Rollins College</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-33</td>
<td>Population Genetics of the Critically Imperiled Oblong Rocksnaile <em>Leptoxis compacta</em></td>
<td>Wright AD, Williams AS, Garrison N.L., Whelan NV; Tuskegee University, Auburn University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-34</td>
<td>Phylogeography of <em>Neopurcellia salmone</em>, a widespread mite harvestman from the South Island of New Zealand, with the first report of male polymorphism in the suborder Cyphophthalmi</td>
<td>Tardelli Canedo P, Baker CM, Morisawa R, Pessereau EJ, Boyer SL; Macalester College, Harvard University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-35</td>
<td>The Role of Mitonuclear Coevolution in High Altitude Adaptation</td>
<td>Corder KR, Schweitzer RM, Cheviron ZA; University of Montana</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>Evolutionary Ecology and Physiology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-36</td>
<td>Phenotypic variation of invasive lizard populations following experimental introduction on small islands</td>
<td>Fargevieille A, Cox RM, Delaney DM, Hall JM, Kahri AF, Mitchell TS, Pearson PR, Reedy AM, Warner DA; Auburn University, University of Virginia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-37</td>
<td>The effects of abiotic conditions on activity time in tropical forest lizards, a large-scale field experiment in the Panama Canal</td>
<td>Casement B, Cox C, McMillan Q, Logan M, Heidelberg University, Georgia Southern, Smithsonian Tropical Research Institute, University of Nevada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-38</td>
<td>From Killer Hornet Saliva to Mutated Super Flies: Investigating the Effect of Vespa Amino Acid Mixture (VAAM) on Energetics, Longevity, and Fitness</td>
<td>Ammen SC, Davis JE; Radford University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-39</td>
<td>The Offense and Defense of a Regenerated Weapon</td>
<td>Graham ZG, Paloro AV, Vargas C, Angilleta MJ; Arizona State University, Universidad Federal de Sao Paulo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-40</td>
<td>The Persistence of Resistance to Timber Rattlesnake Venom in Small Mammals</td>
<td>Diorio RD, Howey CAF; University of Scranton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-41</td>
<td>Learning Evolution from Crustacean Physiology: a Phylogenetic Perspective on Habitat Diversification</td>
<td>Faria S; University of Sao Paulo, Bermuda Institute of Ocean Sciences, University of California Riverside</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-43</td>
<td>Phenotypic Variation in Invasion and Community Assembly</td>
<td>Peterson CR, Bolnick DJ; University of Texas at Austin, University of Connecticut</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Saturday 4 January 2020

**Posters**

**P1-44** Robertson CM, Giakas JA, Styga JM, Fortunato JA, Earley RL; University of Alabama, Centre College

Phenotypic and Genetic Correlations between Life History Traits in a Self-Fertilizing Hermaphroditic Fish

**P1-45** Huebner CD, Treidel LA, Roberts KT, Williams CM; UC Berkeley

Effects of Life History and Starvation on Temperature Preference of a Wing-Dimorphic Cricket, *Gryllus lineaticeps*

**P1-46** Hall KC, Kolmann MA, Wilson GP, Hundt RJ; University of Washington, George Washington University, University of Minnesota

Chimaeras, sharks, skates and rays, oh my! Ecological structuring and evolutionary life-history traits of Chondrichthyes

**P1-47** Miladin JR, Steven JC, Collar DC; Christopher Newport University

Abiotic ecological niche parameters are associated with leaf and flower size in *Silene*

**P1-48** Woodman TE, Emberts Z, Miller CW; University of Florida

A high quality diet leads to improved puncture resistance of a weapon in the leaf-footed cactus bug (*Narnia femorata*)

**P1-49** Guzman A, Kolonin A, Aspbury A, Gabor C; Texas State University

Land Use Conversion Affects Stress Physiology and Life-History of Western Mosquitofish

**P1-50** Wilson EJ, Delich C, Tobler M, Lee STM, Zeglin LH; Kansas State University

Host-Microbiome Associations in Livebearing Fishes Adapted to Sulfidic Environments

**P1-51** Tran HN, Lower SE; Bucknell University

Using computational approach to identify candidate odorant receptor genes in the most common firefly species in North America, *Photinus pyralis*

**Evolutionary Paleobiology**

**P1-53** Moroz MJ, Kemp ME; University of Texas at Austin

Fossil bats’ (*Myotis velifer*) jaw morphology changes through time and with climate change in Hall’s Cave, Texas

**P1-54** Hoffman DK, Uyeda JC, Nesbitt SJ; Virginia Tech

Variable Evolutionary Rates in the Morphology of the Extinct Clade Aetosaura (Reptilia: Archosauria)

**P1-55** Tsai HP, Griffin C; Missouri State University, Virginia Tech

The cartilaginous hips of Diplodocoidea: functional implications for highly specialized locomotor behaviors among sauropods

**P1-56** Abbott CP, Lockwood R, Sues HD, Hunt G, Angielczyk KD; University of Chicago, William & Mary, Smithsonian Institution, Field Museum

How useful are extant tetrapods as analogues for non-mammalian synapsid posture?

**P1-57** Scott BR, Anderson PSL; University of Illinois Urbana-Champaign

Possible niche overlap based on similarities in body form among early jawed and jawless vertebrates

**P1-58** Orcutt JD, Ritchey TE, Vietri CB; Gonzaga University

*Otospermophilus mckayensis* and the Evolution of Burrowing in Oligo-Miocene Squirrels

**Adaptation and Sexual Selection**

**P1-59** Matz MV; University of Texas at Austin

LD networks, a new approach to detect sites under polygenic selection, applied to characterize patterns of introgression among coral ecomorphs.

**P1-60** Dunn PO, Henschen A, Whittingham LA; University of Wisconsin-Milwaukee, University of Memphis

Gene Expression and Reliable Signaling in a Plumage Ornament

**P1-61** Wittman TN, Cox RM; University of Virginia

Experimental evidence that parasites alter patterns of phenotypic selection in a wild lizard population

**P1-62** Kelly AP, Maddux SD; UNT Health Science Center

The interaction of climatic and energetic factors on human nasal morphology

**P1-63** Lundeen IK, Bertrand OC, Silcox MT; University of Texas at Austin, University of Edinburgh, University of Toronto Scarborough

Ecogeographic variation and phylogenetic signature in rodent respiratory turbinates

**P1-64** Bhave RS, Reedy AM, Wittman T, Cox RM; University of Virginia

Copulatory transfer of fluorescent powder suggests sexual selection for larger males in a wild lizard population

**P1-65** Ramos-Guivas B, Jawor J, Wight TF; New Mexico State University

Glucocorticoids and reproductive success in captive Puerto Rican Parrot *Amazona vittata*
P1-66  Tosto NM, Rose E, Masonjones HD; University of Tampa

Quantifying Sexually Selected Traits in the Female Gulf Pipefish (Syngnathus scovelli)

P1-67  Robles KD, Lin C, Osborn K; Brown University, Smithsonian Institution

Visualizing Deep-Sea Eye Adaptations Using Micro-CT 3D Reconstructions

P1-68  Comerford MS, Carroll SP, Egan SP; Rice University, University of California Davis

Spatial sorting drives rapid ecological adaptation of the soapberry bug

P1-69  Axen HJ, Taft C, Wilson-Wuestefeld A, Depelligrini F, Clifford M; Salve Regina University

Assessing Physiological Plasticity in the Face of Climate Change in Natural and Lab Reared Drosophila Species Collected Across Elevational Gradients

P1-70  Gams HC, Yerga KM, Young VKH; Saint Mary’s College

Rodents of unusual size? Fox squirrel (Sciurus niger) body mass at Saint Mary’s College

P1-71  Yerga KM, Gams HC, Young VKH; Saint Mary’s College

Body mass in female and male fox squirrels (Sciurus niger) at Saint Mary’s College

P1-72  Barts N, Nieves N, Trojahn S, Kelley J, Tobler M; Kansas State University, Washington State University

Exaptation as a possible mechanism facilitating invasion of extreme environments

P1-73  Larson TR, Jacobs JL, Smith EN; University of Texas at Arlington

Sexual dimorphism in the fanged-frog genus Limnonectes (Anura: Dicroglossidae): skull differences between males and females

Parental Care and Reproduction

P1-74  Westrick SE, Van Kesteren F, Boutin S, Lane JE, McAdam AG, Dantzer B; University of Michigan, University of Alberta, University of Saskatchewan, University of Guelph

Behavioral and Physiological Effects of Variation in Maternal Care and Glucocorticoids

P1-75  Gogel CA, Mullin SM, Leese JM; DeSales University

Environmental factors influence sex roles and nest site selection in cichlids

P1-76  Van Breukelen NA, Santangelo N*; Salem Community College, Hofstra University

Aggression by convict cichlid pairs as a means to deter brood mixing in a natural setting

P1-79  Brandt EE, Rosenthal MF, Elias DO; University of Western Ontario, University of California Berkeley

Temperature Effects on Multimodal Sexual Signals in an Ectotherm: a Network Analytical Approach

P1-80  Fernandez Y, Dowdy N, Conner W; Wake Forest University

Acoustic Communication in Bertholdia trigona (Lepidoptera: Arctiinae); High Duty Cycles Promote Survival and Mating

P1-81  Musgrove CM, Watson LAR, Hinds AD, Carvalho CM, Ambardar M; Fort Hays State University

Relationships among Parental Care, Heterophil to Lymphocyte Ratio, and Reproductive Success in a Songbird

P1-82  Riley AK, Grindstaff JL; Oklahoma State University

Paternal removal leads to changes in learning ability and sociality in zebra finch (Taeniopygia guttata) offspring

P1-83  Miller NA, Foltz SL; Radford University

Correlating nest defense behaviors in eastern bluebirds (Sialia sialis) and tree swallows (Tachycineta bicolor) with features of the nesting site and nest stage.

P1-84  Viernes RC, Farrar VS, Austin S, Feustel T, Flores L, Asmai R, Arias JG, Calisi RM; University of California Davis

Ex-spleen-ing Trade-offs Between Immunity and Reproduction during Parental Care in the Rock Dove, Columba livia

P1-85  Utt D, Foltz SL; Radford University

The Effects of Light Pollution on Nesting Behavior in Eastern Bluebirds and Tree Swallows

P1-86  Holloway F, De Bruijn R, Koshaba E, Lopes PC; Chapman Univ

Neurogenomic Changes During the Transition to Parental Care in Virgin Japanese Quail

P1-87  Sam A, Malcanghi S, Lam C, León C, Ramirez-Estrada J, Bauer C; Adelphi University, Pontificia Universidad Católica de Chile

Postnatal maternal stress decreases locomotive play behaviors in Octodon degus pups

Sensory Biology

P1-88  Congdon ER, Evans MB; Bethune-Cookman University, TheraPet Inc

Using Therapeutic Play to Alleviate Stress in Shelter Dogs

P1-89  Kamska V, Daley M, Badri-Sprowitz A; Max Planck Institute for Intelligent, University of California Irvine

Potential for elastic soft tissue deformation and mechanosensory function within the lumbosacral spinal canal of birds

P1-90  Henderson KW, Roche AS, Hale ME; University of Chicago

Hindbrain and spinal cord sensory neuron innervate of the pectoral fin
Saturday 4 January 2020

Posters

P1-91 Venuto A, Crowe S, Nicolson T, Erickson T; East Carolina University, Stanford School of Medicine
Life without a lateral line: A new genetic model to study lateral line-mediated behaviors in zebrafish.
P1-92 Yeh SY, Meade ME, Roginsky JE, Schulz JR; Occidental College
Primary Cell Culture of Adult Zebrafish Spinal Neurons for Electrophysiological Studies
P1-93 Bagge LE, Goldstein DH, Lyons BA, Weihe MF; Air Force Research Lab, University of Florida
Circularly Polarized Light Reflectance of and Wing Interference Patterns from Insects
P1-94 Martins L, Lower S; Bucknell University
Dark Firefly Seduction: Identifying the Mate Attracting Mechanism of Ellychnia corrusca via Bioinformatics
P1-95 Harris OK, Morehouse NI; University of Cincinnati
Predator-mimicking sensory exploitation in the courtship display of Maratus jumping spiders.
P1-96 Long HE, Foltz SL, Davis JE, Samuels T; Radford University
ScaryFeeder: Gauging Behavioral Responses When Introduced to Potentially Threatening Stimuli in Wild Songbirds
P1-97 Kane SA, Wang Y*, Fang R, Lu Y, Dakin R; Haverford College, Carleton University
How conspicuous are peacock eyespots and other colorful feathers in the eyes of mammalian predators?
P1-98 Currea JP, Frazer R, Theobald JC, Wasserman S; Florida International University, Wellesley College
Using Microscope or MicroCT Images to Measure Compound Eye Optics
P1-99 Dang A, Bernard GD, Olguin AR, Macias-Muñoz A, Lawrence JP, Hill RI, Mullen SP, Briscoe AD; University of California Irvine, University of Washington, Universidad Nacional Autónoma de México, University of the Pacific, Boston University
Color Vision in Nymphalid Butterfly, Adelpha fessonia
P1-100 Lucia RL, Kingston ACN, Speiser DI; University of South Carolina
The Impact of the Orbital Hood on Spatial Vision in the Snapping Shrimp Alpheus heterochaelis
P1-101 Serba KM, Fasick JI, Algrain H, Robinson PR; University of Tampa, University of Maryland Baltimore County
The Retinal Pigments of Filter-feeding Sharks and their Role in Visual Foraging Ecology
P1-102 Sharkey CR, Leibowitz M, Pinto Benito D, Wardill TJ; University of Minnesota, Cambridge University, Autonomous University of Madrid
In vivo spectral sensitivity of Drosophila photoreceptors
P1-103 Weikowski WG, Santana A, Leslie CE, Gordon WC, Bazar NG, Farris HF; LSUHSC, UT Austin
Endocrine Control of Retinal Sensitivity in Hyla cinerea
P1-104 Padilla GM, Woods CE, Todd KL; Westminster College
Electrophysiological Responses of Hirudo verbana to Different Intensities of Ultraviolet Radiation
P1-105 Solie SE, Johnsen S; Duke University
Contrast Sensitivity and Spatial Resolution in the Trinidadian Guppy (Poecilia reticulata)
P1-106 McCulloch KJ, Koenig KM; Harvard University
Regulatory logic of the retinal determination gene network in the starlet sea anemone, Nematostella vectensis
P1-107 Notar JC, Johnsen S; Duke University
Trends in Spatial Acuity Across the Sea Urchins
P1-108 Taylor BK, Kehl C; University of North Carolina at Chapel Hill
Bioinspired trans-equatorial navigation using sequential measurements of magnetic inclination
P1-109 Taylor BK, Kehl C; University of North Carolina at Chapel Hill
A bioinspired navigation strategy that uses magnetic signatures to navigate without GPS in the Northern Atlantic
P1-110 Tsai E, Naisbett-Jones L, Lohmann C, Lohmann K; University of North Carolina at Chapel Hill
Magnetic Map Sense of Gulf Flounder (Paralichthys albigutta)
P1-111 Capshaw G, Soares D, Christensen-Dalsgaard J, Carr CE; University of Maryland, New Jersey Institute of Technology, University of Southern Denmark
Acoustic reception in salamanders: Skull vibrations enable sound pressure detection
P1-112 Luscavage E, Goldina A; Elizabethtown College
Invasive crayfish Orconectes rusticus exhibit sexually dimorphic responses to conspecific pheromones
P1-113 Kelley MD, Ka C; Mendonça MT*; Auburn University
The Importance of Olfactory Cues from Male Chin Glands & Multimodal Signal Use in Gopher Tortoises Gopherus polyphemus
P1-114 Casleton R, Morgenthaler M, Shaih S, Sorge M, Tucker B, Essendrup I, Berman S, Peet MM, Aukes DM, He X, Marv H, Fisher RE; Arizona State University, University of California Los Angeles, University of Arizona College of Medicine-Phoenix
Chemoreception in Octopus bimaculoides
<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1-115</td>
<td>Using a complex chemical landscape to find an ideal habitat under predation threat</td>
<td>Adams AN, Wofford SJ; Jacksonville State University</td>
</tr>
<tr>
<td>P1-116</td>
<td>Identifying potential molecular thermosensors in Antarctic nototheniid fishes</td>
<td>York JM, Zakon HH; University of Texas at Austin</td>
</tr>
<tr>
<td><strong>Biodiversity: a new age of discovery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-121</td>
<td>Design and use of species-specific Carcinus maenas eDNA primers to analyze shedding and degradation rates of eDNA</td>
<td>Danziger A, Frederich M; University of New England</td>
</tr>
<tr>
<td>P1-122</td>
<td>Using a meta-barcoding method for studying population dynamics of larval invasive and native fishes in the Eastern Mediterranean</td>
<td>Kolker Ghatan M, Belmaker Y, Kiflawi M, Meiri S, Holzman R; Tel Aviv University, Ben-Gurion University</td>
</tr>
<tr>
<td>P1-123</td>
<td>Uncovering the Biodiversity of New Zealand Aplacophorans</td>
<td>McCutcheon MM, Kocot KM; Alabama Museum of Natural History</td>
</tr>
<tr>
<td>P1-124</td>
<td>Characterizing the gut microbiome of honeybees</td>
<td>Brady K, Kovacs J, Voisin D, Welch J; Spelman College</td>
</tr>
<tr>
<td>P1-126</td>
<td>Nematode Diversity in the Southern Ocean</td>
<td>Schwartz ML; University of Washington</td>
</tr>
<tr>
<td>P1-127</td>
<td>Can’t Kill a Bird Twice: Evaluating Non-Lethal Sampling of Avian Gut Bacteria</td>
<td>Berlow M, Kohl KD, Derryberry EP; University of Tennessee Knoxville, University of Pittsburgh</td>
</tr>
<tr>
<td><strong>Habitats and Ranges: Location Location Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-128</td>
<td>What regulates the growth of bull kelp (Nereocystis luetkeana) recruits: competition for light or for space?</td>
<td>Dobkowski KA, Farr D; Bates College, University of Southern California</td>
</tr>
<tr>
<td>P1-129</td>
<td>Shell and Other Object Use by Land Hermit Crabs: Increases in Use of Anthropomorphic Objects on Cayos, Cochinos, Honduras</td>
<td>Gilchrist SL; New College of Florida</td>
</tr>
<tr>
<td>P1-130</td>
<td>Phylogenetic Placement of Burmese Tree Frogs in the genus Polypedates (Gravenhorst, 1829)</td>
<td>Benedict C, Wood P, Grismer L, Oaks J; Auburn University, La Sierra University</td>
</tr>
<tr>
<td>P1-131</td>
<td>Biogeography of the Ouachita Dusky Salamander, Desmognathus brimleyorum</td>
<td>Clay TA, Hess AJ, Bonett RM; Nicholls State University, University of Tulsa</td>
</tr>
<tr>
<td>P1-132</td>
<td>Prairies in Pennsylvania?: Assessing the conservation status of Baptisia australis var. australis through natural history and metapopulation lenses.</td>
<td>Moore CL, McDonnell AJ, Schuette S, Martine CT; Bucknell University, Chicago Botanic Garden, Western Pennsylvania Conservancy</td>
</tr>
<tr>
<td>P1-133</td>
<td>First Documentation of Breeding Aggregations of the Ringed Salamander, Ambystoma annulatum; in Oklahoma, USA</td>
<td>Carlson TC, Cabrera-Guzmón EC, Fox SF; Oklahoma State University</td>
</tr>
<tr>
<td><strong>Interspecific interactions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-135</td>
<td>Management of P. montanaEffects on Plant Community Diversity</td>
<td>Profetto GM, Howard JJ; University of New Orleans</td>
</tr>
<tr>
<td>P1-138</td>
<td>Do Diurnal Floral Visitors Increase the Fruit-set of a Sphingophilous Plant?: The Case of the Rough-leaf Velvetseed (Rubiaceae)</td>
<td>Pimienta MC, Ruiz CA, Koptur S; Florida International University</td>
</tr>
<tr>
<td>P1-140</td>
<td>Interspecific Cooperation of Philomycus Slugs and Green Salamanders, Aneides aeneus, May Enhance Water Economy</td>
<td>Cupp PV; Eastern Kentucky University</td>
</tr>
<tr>
<td>P1-141</td>
<td>Locomotion on a Leaf: Measuring the Microtopography of a Leaf Surface</td>
<td>Hernandez AM, Wainwright DK, Farrell BD; Harvard University, Yale University</td>
</tr>
<tr>
<td>P1-142</td>
<td>Halogenated compound secreted by marine bacteria halts larval urchin development</td>
<td>Akkipeddi SMK, Xu M, Chan KYK; Swarthmore College</td>
</tr>
<tr>
<td>P1-143</td>
<td>Recruitment and Survival of the Eastern Oyster Cossostrea virginica when Challenged by the Brown Tide Aureoumbra lagunensis: Field Results</td>
<td>Walters LJ, Philips EJ, Badyak L, McClennahan G, Sacks PE, Donnelly MJ; University of Central Florida, University of Florida</td>
</tr>
<tr>
<td>P1-144</td>
<td>Environmental DNA captures shifts in Caribbean fish communities associated with the invasive seagrass Halophila stipulacea</td>
<td>Drummond JA, Brandao PB, Brandt ME, Egan SP, Correa AMS; Rice University, University of the Virgin Islands</td>
</tr>
</tbody>
</table>
P1-145 Tapsak ST, Hranitz JM, Percival CR, Pulley KL, Gonzalez VH, Petanidou T, Tscheulin T, Kantsa A, Barthell JF; Bloomsburg University of Pennsylvania, Pomona College, University of Texas at El Paso, University of Kansas, University of the Aegean, University of Central Oklahoma

Generalist Pollinators are the Foundation of a Summer Coastal Pollination Network in Dune Habitat.

P1-146 Connor C, Zinn D, Williams DA, Watson CM; Midwestern State University, Texas Christian University

Dietary Niche Overlap of Native and Invasive Anoles on Dominica

P1-147 Leavitt HE, Adrienne C, Amanda NN, Ford M; Eckerd College, NOAA Office of Ocean Exploration and Research, NOAA Fisheries Marine Ecosystems Division

Investigating Remotely Operated Vehicle Avoidance Behavior and Distribution of Mesopelagic Fauna

P1-148 Orr TJ, Yamada KYH, Nelson MD, Matocq MD, Nielsen DP, Shaprio MD, Dearing MD; Auburn University, University of Utah, University of Nevada Reno

Diet switching in mammalian herbivores: dietary specialization and toxin tolerance in two woodrat species

P1-149 Armstrong R, Torres T, Watson CM, Shipley MM; Midwestern State University

Characterization of Fatty Acid Profiles of the Butterfly Weed (Asclepias tuberosa) and its Specialist Predator, the Monarch Butterfly (Danaus plexippus).

P1-150 Semanchik P, Bergey L, Labar J, Ritchie L, Horvath T; Centenary University

Comparison of Parasite Occurrence Between Three Native and one Non-native Palaemon Species of Grass Shrimp

Animal Communication

P1-151 Austin AA, Davis J, Foltz S; Radford University

Frustrated Foragers: Can Displacement Behavior Communicate Food Quality and Accessibility Within and Between Species in the Wild?

P1-152 Ludington SC, McKinney JE, O’Connell LA; Stanford University

Role of Transcription Factor FOXP2 in Tadpole Social Communication

P1-152.5 McKinney JE, Ludington S, O’Connell LA; Stanford University

Nonapeptide Regulation of Begging and Aggressive Behavior in a Social Tadpole

P1-153 Hellmich DL, Wright TF; New Mexico State University

Mapping the Contact Call Variation of Urban Invasive Parrots as a Model for Understanding Vocal Dialect Formation.

P1-154 Kane SA, Xia S*, Fang R, Lu Y, Uitzl-Orshikh N, Wu J, Dakin R; Haverford College, Carleton University

Multispectral imaging reveals the design of iridescent visual signals in peacocks and related pheasants

P1-155 Ruvina K, Bergman DA*, Wright MA; Grand Valley State University

The Sniff of Victory: The Road to Identify an Aggressive Male Chemosignal in Crayfish

P1-156 Slattery JD, Rodriguez IM, Bilotta AJ, Wacker DW; University of Washington Bothell

Caw and Response: Context-Dependent Group Calling In American Crows

P1-157 Hardt B, Benedict L; University of Northern Colorado

Assessing the Influences of Habitat Structure on Bird Song Propagation

P1-158 Hensley NM, Gerrish GA, Saha R, Oakley TH, Rivers TJ; University of California Santa Barbara, University of Wisconsin Madison, Bates College, University of Kansas

Does ecological overlap drive the evolution of mating display discrimination in female sea fireflies?

P1-159 Krieg CA, Getty T, Wade J; University of Scranton, Michigan State University, University of Connecticut

Sex Differences in Morphology of the Song Control Circuit in House Wrens, a North Temperate Species with Female Song

P1-160 Wiser SD, Markham MR; University of Oklahoma

Electrosensory and metabolic responses of weakly electric fish to changing water conductivity

P1-161 Dupin MK, Dahlin CR, Wright TF; New Mexico State University, University of Pittsburgh at Johnstown

Assessment of Population Size and Dialect Presence in the Endangered Yellow-Naped Amazon, Amazona auropalliata


Pheromone Communication and Aggregation Behavior in a Bird Ectoparasite

P1-163 Smith C, Reichert M; Oklahoma State University

Chemical Commuion and the effect of Calling Behavior in Hyla chrysoscelis

P1-164 Hom KN, Terrazas M, Forlano PM; CUNY Graduate Center, St Mary's College, CUNY Brooklyn College

Oyster toadfish calling in noisy NYC waters

P1-165 Gomes Aversa MD, Hartley JG, Leese JM; DeSales University

Female Mate Preference in Convict Cichlids Influenced by Intrasexual Competition and Male Quality
Saturday 4 January 2020

**Posters**

**Animal Movement**

**P1-166** Coomes CM, Derryberry EP; University of Tennessee Knoxville

Some like it hot: Do female songbirds discriminate between songs produced under hot and cold temperatures?

**P1-167** Kironde E, Furlan F, Fuxjager MJ, Preininger D, Mangiamele L; Smith College, Université Paris Diderot, Brown University, Vienna Zoo

Androgens modulate dynamic changes in multimodal display structure in the Bornean rock frog (*Staurois parvus*)

**P1-168** Sung JY, Morehouse Ni; University of Cincinnati

Selection for Distinctiveness in Chinese Opera Masks

**DVM BSP: Karel F. Liem Award**

**P1-179** Black CR, Armbruster JW; Auburn University

Shape Variation of armored catfishes in a phylogenomic and ecological context using 3D geometric morphometric techniques (Loricariidae)

**P1-180** Wynd BM, Uyeda JC, Nesbitt SJ; Virginia Tech

Allometric growth and shifting diet in the large-bodied traversodontid cynodont, *Exaeretodon argentinus*, with implications for modeling growth in distorted specimens

**DCB BSP: Steven Vogel Award**

**P1-181** Galloway KA, Porter ME; Florida Atlantic University

Lionfish puncture performance is impacted by the target tissue type

**P1-182** Puffel F, Labonte D; Imperial College London

Scaling of bite forces in leaf-cutter ants

**P1-183** Attipoe AEL, Kaimaki DM, Labonte D; Imperial College London

Surface Tension of the Insect Pad Secretion

**P1-184** Quimby K, Crews SC, Spagna JC; William Paterson University

Impact of Leg Loss on Rotating Prey Strikes in “Flattie” Spiders of Genus *Karaops*

**P1-185** Salem W, Xu S, Mongeau JM; Pennsylvania State University

Kinematic control of the yaw optomotor response in *Drosophila* flight

**P1-186** Smith SK, Hakansson J, Frazel PW, Long MA, Elemans CPH, Phelps SM; University of Texas Austin, University of Southern Denmark, NYU Langone

An intralaryngeal whistle using an elaborated structure enables song in Alston’s singing mouse

**Eco/evomorphology - Jaws and Skulls**

**P1-187** Xiong D, Churchill M; University of Wisconsin

Prey capture strategy is correlated with temporalis muscle size in toothed whales (Odontoceti)

**P1-188** Gilbert MC, Lerose C, Conith A, Moyer JK, Huskey S, Albertson RC; Univ MA Amherst, Western KY Univ

Osteology and myology of *Pterycombus petersii*, with insights into the functional tradeoff between feeding and locomotion

**P1-189** Fabre AC, Noirault E, Fernandez V, Portela-Miguez R, Goswami A; Natural History Museum

Morphological integration of the skull in marsupials: impact of diet and locomotion

**P1-190** Shelburne EC; Fort Hays State University

Something’s fishy: A comparative structural analysis of the feeding morphology of the fish *Xiphactinus audax* and *Megalops atlanticus* using 2D and 3D morphometrics
### Saturday 4 January 2020

#### Posters

<table>
<thead>
<tr>
<th>Poster</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1-191</td>
<td>Gilbert MC, Lerose C, Conith A, Cox FC, Albertson RC; Univ MA Amherst, Instituto Nacional de Pesquisas da Amazônia</td>
</tr>
<tr>
<td>P1-192</td>
<td>Griner JG, Diamond KM, Blob RW; Clemson Univ</td>
</tr>
<tr>
<td>P1-193</td>
<td>Tse A, Calde J; Ohio State University</td>
</tr>
<tr>
<td>P1-194</td>
<td>Peredo CM, Marshall CD; University of Michigan, Texas A&amp;M University</td>
</tr>
<tr>
<td>P1-195</td>
<td>Hernandez CA, Heinicke M, Gamble T, Siler CD, Daza JD; University of Texas Arlington, Sam Houston State University, University of Michigan, Marquette University, University of Oklahoma</td>
</tr>
<tr>
<td>P1-196</td>
<td>Jones DD, Schmitz L; Claremont McKenna, Scripps, and Pitzer Colleges</td>
</tr>
<tr>
<td>P1-197</td>
<td>Griner JG, Diamond KM, Blob RW; Clemson Univ</td>
</tr>
<tr>
<td>P1-198</td>
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</tr>
<tr>
<td>P1-199</td>
<td>Peredo CM, Marshall CD; University of Michigan, Texas A&amp;M University</td>
</tr>
<tr>
<td>P1-200</td>
<td>Sekits NF, Tunnell Wilson WT, Jackson K; Whitman College</td>
</tr>
<tr>
<td>P1-201</td>
<td>Heerden I, Parker L, Ruddy B, Ingle D, Porter ME; Florida Atlantic University</td>
</tr>
<tr>
<td>P1-202</td>
<td>Sullivan SP, Middleton KP, Holliday CM; University of Missouri</td>
</tr>
<tr>
<td>P1-203</td>
<td>Skonieczny KL, D’Emic MD, Burk C, Hoffmann S; NYIT College of Osteopathic Medicine, Adelphi University, Northport High School</td>
</tr>
<tr>
<td>P1-204</td>
<td>Crownover LA, Anderson CV; Univ South Dakota</td>
</tr>
<tr>
<td>P1-205</td>
<td>Clark A, Caruso A, Gignac P, Uyeno T; College of Charleston, Oklahoma State University, Valdosta State University</td>
</tr>
<tr>
<td>P1-206</td>
<td>Summers DA, Wainwright DK; Harvard University, Yale University</td>
</tr>
<tr>
<td>P1-207</td>
<td>Worble AL, Clark AJ, Uyeno TA; Valdosta State University, College of Charleston</td>
</tr>
<tr>
<td>P1-208</td>
<td>Newbrey MG, Woolfolk FR, Martín-Abad H, Maisey JG; Columbus State University, Universidad Autónoma de Madrid, American Museum of Natural History</td>
</tr>
<tr>
<td>P1-209</td>
<td>Rehorek S, Elsey R, Beeching SC; Slippery Rock University, Louisiana Department of Wildlife and Fisheries</td>
</tr>
<tr>
<td>P1-210</td>
<td>Garcia PA, Deban SM, Jones MEH, Lappin AK; Univ South Florida, Natural History Museum, California Polytechnic Univ</td>
</tr>
<tr>
<td>P1-211</td>
<td>Berning DJ, Powers AK, Gross JB; University of Cincinnati, Harvard Medical School</td>
</tr>
<tr>
<td>P1-212</td>
<td>Baxter D, Farina SC, Fath MA, Tytell ED, Donatelli CM; Tufts University, Howard University, University of Ottawa</td>
</tr>
<tr>
<td>P1-213</td>
<td>Goodvin DM, Rosenbach KL, Wilson JA; University of Michigan Ann Arbor</td>
</tr>
<tr>
<td>P1-214</td>
<td>Robishaw TE, Secor SM; University of Alabama</td>
</tr>
<tr>
<td>P1-215</td>
<td>Shea-Vantine CS, Kajura SM, Porter ME, Galloway KA; Florida Atlantic University</td>
</tr>
</tbody>
</table>
## Feeding and Digestion

<table>
<thead>
<tr>
<th>Poster</th>
<th>Title</th>
<th>Authors</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1-218</td>
<td>Feeding and Digestion</td>
<td>Menegaz R, Rossiter JA, Larocque H, Boley A, Kile R, Saavedra R</td>
<td>University of North Texas Health Science Center</td>
</tr>
<tr>
<td>P1-219</td>
<td>The Relationship Between Movement Coordination and Suction Power During Feeding in Royal Knifefish (Chitala blanci)</td>
<td>Li EY, Kaczmarek EB, Olsen AM, Weller HI, Camp AL, Brainerd EL</td>
<td>Brown University, University of Liverpool</td>
</tr>
<tr>
<td>P1-220</td>
<td>FeedCycle: Facilitating rapid post-processing of XROMM data from mammalian feeding experiments</td>
<td>Chadwell BA, Olson RA*, Montuelle SJ, Williams SH, Idaho College of Osteopathic Medicine, Ohio University</td>
<td></td>
</tr>
<tr>
<td>P1-221</td>
<td>Diet-Related Plasticity in Rodent Masticatory Muscles</td>
<td>Lammers AR, Gould FDH, Ding P, German RZ, Cleveland State University, Rowan University, John Hopkins University, Northeast Ohio Medical University</td>
<td></td>
</tr>
<tr>
<td>P1-222</td>
<td>Variability in mammalian chewing using functional data analysis: Differences in jaw pitch amplitude and velocity throughout the chewing cycle</td>
<td>Edwards KM, Reznick DN, University of California, Riverside</td>
<td></td>
</tr>
<tr>
<td>P1-225</td>
<td>A 3D Model for Validating Hypotheses in Feeding Behavior in Aplysia californica</td>
<td>Kehl CE, Neustadter DM, Chiel HJ, University of North Carolina at Chapel Hill, Cardiac Success Ltd, Case Western Reserve University</td>
<td></td>
</tr>
<tr>
<td>P1-226</td>
<td>Comparing Functional Traits in Feeding Morphologies of Hybrid Sunfish</td>
<td>Chennault M, Martinez C, Wainwright P, Howard University, University of California Davis</td>
<td></td>
</tr>
</tbody>
</table>

## Complementary to S3: Biology at the Cusp: Teeth as a Model Phenotype for Integrating Developmental Genomics, Biomechanics, and Ecology

<table>
<thead>
<tr>
<th>Poster</th>
<th>Title</th>
<th>Authors</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1-228</td>
<td>Getting to the Point: Characterizing the Function of Conical Teeth in Deep-Sea Stomiformes</td>
<td>Gauthier SM, Cohen KE, Summers AP</td>
<td>Lewis and Clark College, University of Washington</td>
</tr>
<tr>
<td>P1-229</td>
<td>Relating Occlusal Offset to Diet in Piranhas and Pocus</td>
<td>Bakari KI, Lomax JJ, Farina SC, Howard University, Brown University, University of Washington Friday Harbor Laboratories</td>
<td></td>
</tr>
<tr>
<td>P1-230</td>
<td>Microstructure and Mineralogy in Dental Plates of H Listottula raieaghae (Holocephali): Novel Dentine and Conserved Patterning Combine to Create a Unique Chondrichthyen Dentition</td>
<td>Johanson Z, Underwood C, Twitchett R, Smith M, Natural History Museum, University of London, King’s College</td>
<td></td>
</tr>
<tr>
<td>P1-231</td>
<td>The beak of the snake: fang length evolution in vipers is predicted by diet</td>
<td>Holding ML, Trevine V, Zinenko O, Strickland JL, Rautsaw RM, Hofmann EP, Hogan MP, Grazziotin FG, Parkinson CL, Santana SE, Davis MR, Rokya DR, Florida State University, Instituto Butantan, VN Karazin Kharkiv National University, Clemson University, University of Washington</td>
<td></td>
</tr>
</tbody>
</table>

## Science Communication & Outreach

<table>
<thead>
<tr>
<th>Poster</th>
<th>Title</th>
<th>Authors</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1-232</td>
<td>Building a Network of Science Communicators for Change: Strategies from the National Network for Ocean and Climate Change Interpretation</td>
<td>Tanner RL, Washington State Univ</td>
<td></td>
</tr>
<tr>
<td>P1-233</td>
<td>Ecology by the people: How can citizen science inform our understanding of lizard ecology?</td>
<td>Thawley CJ, Kostka AL, Kolbe JJ, Davidson College, University of Rhode Island</td>
<td></td>
</tr>
<tr>
<td>P1-234</td>
<td>If fish could talk: Using cartoons and comics to disseminate and enhance science literacy</td>
<td>Butter JM, Wayne CR*, Maruska KP, Louisiana State University</td>
<td></td>
</tr>
<tr>
<td>P1-235</td>
<td>Oral Histories to Improve Coastal Restoration</td>
<td>Sacks PE, Walters LJ, Donnelly MJ, University of Central Florida</td>
<td></td>
</tr>
<tr>
<td>P1-236</td>
<td>Relevance and Complexity: Teaching Cancer Biology to Middle School Students</td>
<td>Schwab A, Lepkowski J, Renninger A, Davidson B, WB Saul High School, University of Pennsylvania, Swarthmore College</td>
<td></td>
</tr>
<tr>
<td>P1-237</td>
<td>BiteScis: Teacher-Researcher Partnerships to Develop Engaging Research-Based Lessons</td>
<td>Lucas KN, Keep S, Morey S, University of Michigan, BiteScis, Abbott Lawrence Academy</td>
<td></td>
</tr>
<tr>
<td>Poster Number</td>
<td>Title</td>
<td>Authors</td>
<td>Institution(s)</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>P1-238</td>
<td>Weakly Electric Fish as Charismatic Midi-fauna: Lessons in Neuroscience Broader Impacts.</td>
<td>Maltby R, Willis KL, Markham MR</td>
<td>University of Oklahoma</td>
</tr>
<tr>
<td>P1-239</td>
<td>The Relevance of Short Wavelength UV-B Radiation in Natural Light Environments</td>
<td>Nebhut AN, Semro MR, Shinkle JR</td>
<td>Trinity University</td>
</tr>
<tr>
<td>P1-240</td>
<td>Stress then Acclimation: Effect of UV Radiation on Kale Growth, Pigmentation, and Antioxidant Content</td>
<td>Semro MR, Nebhut AN, Carroll KR, Shinkle JR</td>
<td>Trinity University</td>
</tr>
<tr>
<td>P1-241</td>
<td>Feather corticosterone concentrations not related to DNA damage in house sparrors</td>
<td>Wright-Lichter JX, Gormally BMG, Romero LM</td>
<td>Tufts University</td>
</tr>
<tr>
<td>P1-242</td>
<td>2,4-D impacts on whole-body cortisol response in larval fathead minnows</td>
<td>Dehnert GD, Karasov WH, Lindborg AR</td>
<td>University of Wisconsin</td>
</tr>
<tr>
<td>P1-243</td>
<td>Annual Baseline and Post Restraint Hormonal and Immune Variations in Males of Toads (Rhinella icterica)</td>
<td>Titon Jr B, Barsotti AMG, Vaz RI, Teixeira RV, Navas CA, Gomes FR</td>
<td>University of São Paulo</td>
</tr>
<tr>
<td>P1-244</td>
<td>Assessing Background DNA Damage across Tissues in House Sparrows</td>
<td>Estrada RS, Gormally BMG, Romero LM</td>
<td>Tufts University</td>
</tr>
<tr>
<td>P1-245</td>
<td>Do endotherms acclimate to heat? Physiological responses to a simulated heat wave in free-living birds</td>
<td>Woodruff MJ, Semersheim LO, Rosvall KA</td>
<td>Indiana University</td>
</tr>
<tr>
<td>P1-246</td>
<td>Ambient Light at Night (ALAN) and the Stress Response of Green Anoles</td>
<td>McGrath MR, Howey CAF</td>
<td>University of Scranton</td>
</tr>
<tr>
<td>P1-247</td>
<td>Effects of Incubation Temperatures and Restraint on Beak Coloration in Zebra Finches</td>
<td>Choi MP, Rubin AM, Wada H</td>
<td>Auburn University</td>
</tr>
<tr>
<td>P1-248</td>
<td>Changes in Gene Expression in Response to Ambient Temperature Fluctuations in the Zebra Finch</td>
<td>Coutts VM, Beatty A, Schwartz T, Cooper C, Hurley L, Griffith S, Wada H</td>
<td>University of Auburn University, Macquarie University</td>
</tr>
<tr>
<td>P1-249</td>
<td>Expanding the dexamethasone suppression test: assessing multiple synthetic glucocorticoids in house sparrows (Passer domesticus)</td>
<td>Gormally BMG, Macy RR, Martin K, Wright-Lichter JX, Romero LM</td>
<td>Tufts University</td>
</tr>
<tr>
<td>P1-250</td>
<td>Steam Salamander Larvae Downregulate Corticosterone in the Presence of Fish Predators</td>
<td>Bryant AR, Gabor CR, Swartz LK, Lowe WH, Wagner R</td>
<td>Texas State University, University of Montana, Ohio University</td>
</tr>
<tr>
<td>P1-252</td>
<td>Hormonal Mediation of Sibling Rivalry in Eastern Bluebirds (Sialia sialis)</td>
<td>Ridenour M, Grindstaff JL</td>
<td>Oklahoma State University</td>
</tr>
<tr>
<td>P1-253</td>
<td>Impact of habitat type and disturbance level on golden-crowned sifaka (Propithecus tattersallii) fecal glucocorticoid metabolite levels</td>
<td>Semel MA, Ratovoson JC, Moore IT</td>
<td>Virginia Tech, University of Antananarivo</td>
</tr>
<tr>
<td>P1-254</td>
<td>Interactions between stress hormones and blood parasites along elevation gradients</td>
<td>Martinez V, Grace JK</td>
<td>Texas A&amp;M University</td>
</tr>
<tr>
<td>P1-255</td>
<td>Modeling glucocorticoid physiology, glucose mobilization, and return rate in migrating Mountain White-crowned Sparrows (Zonotrichia leucophrys oriantana)</td>
<td>Chrisler AD, Antunes IK, Kimball MG, Malisch JL</td>
<td>St Mary’s College of Maryland, Louisiana State University</td>
</tr>
<tr>
<td>P1-256</td>
<td>The Physiological Effects of Cannabidiol on Toads</td>
<td>Gardner LE, Watson CM, Shipleym MM</td>
<td>Midwestern State University</td>
</tr>
<tr>
<td>P1-258</td>
<td>Development of an Enzyme Linked Immunosorbent Assay for Avian Corticosterone Binding Globulin</td>
<td>Antunes IK, Johnson EB, Mertz PS, Malisch JL</td>
<td>St Mary’s College of Maryland, University of Pittsburgh</td>
</tr>
<tr>
<td>P1-259</td>
<td>Glucocorticoid and Behavioral Responses to Environmental Perturbations</td>
<td>Walker NJ, Morales OJ, Boyles JG, Warne RW</td>
<td>Southern Illinois University</td>
</tr>
<tr>
<td>P1-260</td>
<td>Brood-parasitized nestlings have higher baseline corticosterone concentrations</td>
<td>Bebus SE, Jones BC, Anderson RC</td>
<td>Florida State University, Florida Atlantic University</td>
</tr>
<tr>
<td>P1-260.5</td>
<td>Impacts of Ultraviolet Light Exposure on the Activity of Antioxidant Enzymes in the Coelomocytes of the Sea Urchins Lytechinus variegatus and Arbacia punctulata</td>
<td>Arlinghaus K, Challener R</td>
<td>Bellarmine University</td>
</tr>
</tbody>
</table>


**Lipids**

**P1-261** Montano DF, Kanatous SB; Colorado State University

Are you what you eat? Do lipids cause an intracellular response within skeletal muscle cells?

**P1-262** Rippamonti JR, De Silva IW, Dzialowski EM, Verbeck GF, Price ER; University of North Texas

Investigation of Lipid Changes During the Ontogeny of Endothermy

**P1-263** Torres T, Watson CM, Shipley MM; Midwestern State University

Fatty acid composition of native milkweed species (Asclepias) of North Texas made available to insect predators

**P1-264** Brogren D, Burley A, Holihan M, Graves S, Chrysler J, Popps K, Scott J; Saginaw Valley State University

High fat diets induce early signs of non-alcoholic fatty liver disease (NAFLD) independent of carbohydrate content

**P1-265** Moniz LE, Lyons K, Hoopes L, Lewis JM, Bedore CN; Georgia Southern University, Georgia Aquarium

Lipid Metabolites as Energy Stores in Batoids


**Microbiomes: the multitudes**

**P1-266** Krishnan A, Singh A, Faber-Hammond JJ, Renn SCP; Reed College

Effect of Social Stress on Gut Microbiome in Astatotilapia burtoni

**P1-267** Williams CE, Kueneman JG, McMillan WO, Cox CL, Logan ML; Northeastern Univ, Smithsonian, Georgia Southern Univ, Univ Nevada, Reno

The response of the gut microbiome to climate warming in a vertebrate ectotherm: A field-transplant experiment in the Panama Canal

**P1-268** Titus BM, Laroche RAS*, Rodríguez E, Wirshing H, Meyer CP; American Museum of Natural History, Rice University, Smithsonian Institution

Host Identity and Symbiotic Association Affects the Genetic and Functional Diversity of the Clownfish-Hosting Sea Anemone Microbiome

**P1-269** Murphy KM, Watkins M, Finger J, Kelley MD, Elsey RM, Warner DA, Mendonça MT, Auburn University, Rockefeller Wildlife Refuge

Xenobiotic estradiol-17β and the microbial gut communities of hatching American alligators (Alligator mississippiensis)

**P1-270** Miller A, Agyei D, Jilani C, Joshi D, Odaka Y, Owen P, Tran M, Wilson K; University of Cincinnati Blue Ash College

Effects of Plant-based Diet on the Gut Microbiota in Rusty Crayfish (Faxonius rusticus)

**P1-271** Grimes CJ, Labonté J, Lopez JV, Schulze A; Texas A&M University at Galveston, Nova Southeastern University

Microbiomes of a corallivore (Hermodice carunculata): where in the worm are the coral microbes?

**P1-272** Heitzman NS, Lower SE; Bucknell University

Relationship between sex, life stage, and gut microbial communities in Photuris fireflies
## Sunday Schedule of Events

Events take place in the JW Marriott Austin, unless otherwise noted.

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poster Session 2 Set Up</td>
<td>7:00 AM – 8:00 AM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Speaker Ready Room</td>
<td>7:00 AM – 5:00 PM</td>
<td>Room 405</td>
</tr>
<tr>
<td>Registration</td>
<td>7:30 AM – 3:30 PM</td>
<td>Grand Ballroom Foyer</td>
</tr>
<tr>
<td>Coffee Break AM</td>
<td>9:30 AM – 10:30 AM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Exhibit Hall</td>
<td>9:30 AM – 5:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Coffee Break PM</td>
<td>3:30 PM – 4:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 2 Even Numbers Authors Present</td>
<td>3:30 PM – 4:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 2 Odd Numbers Authors Present</td>
<td>4:30 PM – 5:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 2 Teardown</td>
<td>5:30 PM – 6:00 PM</td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

**SPECIAL LECTURE**

- AMS Lecture: Dr. Sara Lindsay  
  The Art of Seeing: Using Microscopy to Power STEAM Learning in Biology  
  7:00 PM – 8:00 PM  
  Rooms 301-302

- Bern Lecture: Dr. George Bentley  
  A Bird’s Eye View of Reproductive Endocrinology  
  7:00 PM – 8:00 PM  
  Salons D-E

**SYMPOSIUM ORAL PRESENTATIONS**

- S4: Reproduction: the Female Perspective from an Integrative and Comparative Framework  
  Chairs: Virginia Hayssen, Teri Orr  
  7:45 AM – 4:00 PM  
  Lone Star D

- S5: Form, structure and function: How plants vs. animals solve physical problems  
  Chairs: Ulrike Müller, Simon Poppinga  
  8:30 AM – 3:30 PM  
  Rooms 303-304

- S6: Bio-inspiration of silent flight of owls and other flying animals: recent advances and unanswered questions  
  Chairs: Chris Clark, Justin Jaworski  
  8:00 AM – 3:30 PM  
  Lone Star H

**CONTRIBUTED PAPER ORAL PRESENTATIONS**

### MORNING

- Session 35: Complementary to S3: Biology at the Cusp: Teeth as a Model Phenotype for Integrating Developmental Genomics, Biomechanics, and Ecology  
  8:00 AM – 10:00 AM  
  Lone Star A

- Session 36: Comparative Genomics and Phylogenetics in Vertebrates  
  8:00 AM – 9:30 AM  
  Lone Star B

- Session 37: Macroevolution and Evolutionary Paleobiology  
  8:00 AM – 10:00 AM  
  Lone Star C

- Session 38: Fire When Ready: Muscle Activity  
  8:00 AM – 9:30 AM  
  Lone Star E

- Session 39: DDNSB Best Student Paper  
  8:00 AM – 10:00 AM  
  Lone Star F

- Session 40: Walking in Water  
  8:00 AM – 9:45 AM  
  Lone Star G

- Session 41: What I Need: a Good Immune Defense  
  8:15 AM – 10:00 AM  
  Rooms 301-302

- Session 42: Hot Flashes to Molecular Modulation – Thermo and Chemical Ecology  
  8:00 AM – 9:30 AM  
  Rooms 203-204

- Session 43: Special Session: Celebrating the Scientific Contributions of Rosemary Knapp: Hormones and Alternative Reproductive Tactics, Part I  
  8:00 AM – 9:45 AM  
  Brazos

- Session 44: Devo-evo  
  8:00 AM – 9:45 AM  
  Rooms 402-403

- Session 45: Complementary to S2: Epigenetic Variation in Endocrine System  
  10:30 AM – 12:00 PM  
  Lone Star A

- Session 46: DIZ Best Student Paper Session  
  10:00 AM – 12:00 PM  
  Lone Star B

- Session 47: Special Session: Digestive Physiology: A Session in Honor of Bill Karasov, Part I  
  10:30 AM – 12:00 PM  
  Lone Star C

- Session 48: Best Student Paper: D. Dwight Davis Award  
  10:00 AM – 12:00 PM  
  Lone Star E

- Session 49: Neuroethology & Visual Sensing  
  10:15 AM – 12:00 PM  
  Lone Star F

- Session 50: Getting Real: Effects of Multiple Stressors on Organisms  
  10:15 AM – 12:00 PM  
  Lone Star G

- Session 51: Immune-based Tradeoffs  
  10:30 AM – 11:45 AM  
  Rooms 301-302
<table>
<thead>
<tr>
<th>Session</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>54: Adaptation and Genes</td>
<td>10:15 AM – 12:00 PM</td>
<td>Room 205</td>
</tr>
<tr>
<td>55: Growth Factors &amp; Neuropeptides</td>
<td>10:30 AM – 12:00 PM</td>
<td>Rooms 201-202</td>
</tr>
<tr>
<td>56: Beat it (the Heat): Combating Stress in Coral Reefs, Part I</td>
<td>10:00 AM – 12:00 PM</td>
<td>Rooms 203-204</td>
</tr>
<tr>
<td>57: Special Session: Celebrating the Scientific Contributions of Rosemary Knapp: Hormones and Alternative Reproductive Tactics, Part II</td>
<td>10:15 AM – 12:00 PM</td>
<td>Brazos</td>
</tr>
<tr>
<td>58: Evo-devo</td>
<td>10:15 AM – 11:30 AM</td>
<td>Rooms 402-403</td>
</tr>
<tr>
<td><strong>AFTERNOON</strong></td>
<td></td>
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</tr>
<tr>
<td>59: Complementary to S1: New Frontiers in Antarctic Marine Biology</td>
<td>1:30 PM – 3:00 PM</td>
<td>Lone Star A</td>
</tr>
<tr>
<td>60: The Biology Underground</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star B</td>
</tr>
<tr>
<td>61: Special Session: Digestive Physiology: A Session in Honor of Bill Karasov, Part II</td>
<td>1:30 PM – 2:45 PM</td>
<td>Lone Star C</td>
</tr>
<tr>
<td>62: Animals in Compliance: Structural Mechanics</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star E</td>
</tr>
<tr>
<td>63: DAB Best Student Paper: Marlene Zuk Award</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star F</td>
</tr>
<tr>
<td>64: You Got the Touch (and Sight and Sound)</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star G</td>
</tr>
<tr>
<td>65: Education and External Partnerships</td>
<td>1:30 PM – 3:15 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td>66: Thermoregulation</td>
<td>1:30 PM – 3:15 PM</td>
<td>Room 205</td>
</tr>
<tr>
<td>67: Molecular Evolution</td>
<td>1:30 PM – 3:00 PM</td>
<td>Rooms 201-202</td>
</tr>
<tr>
<td>68: Beat it (the Heat) – Combating Stress in Coral Reefs, Part II</td>
<td>1:30 PM – 3:00 PM</td>
<td>Rooms 203-204</td>
</tr>
<tr>
<td>69: DCE Best Student Paper - Aubrey Gorbman Award</td>
<td>1:30 PM – 3:15 PM</td>
<td>Brazos</td>
</tr>
<tr>
<td>70: Sensory Biology &amp; Neuroethology</td>
<td>1:30 PM – 3:15 PM</td>
<td>Rooms 402-403</td>
</tr>
<tr>
<td><strong>COMMITTEE AND BOARD MEETINGS</strong></td>
<td></td>
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</tr>
<tr>
<td>Advisory Committee</td>
<td>7:00 AM – 8:00 AM</td>
<td>Room 401</td>
</tr>
<tr>
<td>Membership Committee</td>
<td>7:00 AM – 8:00 AM</td>
<td>Room 409</td>
</tr>
<tr>
<td>Broadening Participation Committee Meeting</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 409</td>
</tr>
<tr>
<td>Educational Council</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 401</td>
</tr>
<tr>
<td><strong>BUSINESS MEETINGS</strong></td>
<td></td>
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<tr>
<td>TCS Business Meeting</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 309</td>
</tr>
<tr>
<td>AMS Business Meeting</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 406</td>
</tr>
<tr>
<td>DCE Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Lone Star A</td>
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<tr>
<td>DCB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Lone Star B</td>
</tr>
<tr>
<td>DIZ Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Lone Star C</td>
</tr>
<tr>
<td>DOB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Room 205</td>
</tr>
<tr>
<td>DPCB Meeting</td>
<td>5:45 PM – 6:30 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td><strong>WORKSHOPS AND PROGRAMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Postdoctoral Affairs Committee: “How-To?” Daily Booth</td>
<td>9:15 AM – 5:00 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Workshop: An Introduction to the World of Book Publishing from Editors and Authors</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 408</td>
</tr>
<tr>
<td>Organizing Meeting for Building Bridges Symposium</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 407</td>
</tr>
<tr>
<td>Symposium 5 Workshop: How to Disseminate Your Research</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 404</td>
</tr>
<tr>
<td>Workshop: Panel on Research and Working at Primarily Undergraduate Institutions</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 402-403</td>
</tr>
<tr>
<td>TAL-X Workshop: Teaching Critical Thinking About Science and Technology: GMOs As a Case Study</td>
<td>7:00 PM – 9:00 PM</td>
<td>Rooms 303-304</td>
</tr>
<tr>
<td><strong>SOCIAL EVENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning Run</td>
<td>6:00 AM</td>
<td>JW Marriott Lobby</td>
</tr>
<tr>
<td>DIZ/DEE/TCS/AMS/DPCB/DEDDB/DOB Social</td>
<td>8:00 PM – 10:00 PM</td>
<td>South-East Lobbies</td>
</tr>
<tr>
<td>Outgroup Social: LGBTQ+ social (allies welcome!), 21+</td>
<td>8:30 PM – 10:30 PM</td>
<td>Location TBD</td>
</tr>
</tbody>
</table>
### Sunday Program Symposia

**Sunday 5 January 2020**

#### 7:45 AM – 4:00 PM

**Symposium S4**  
**Lone Star D**

**Reproduction: the Female Perspective from an Integrative and Comparative Framework**  
**Chairs:** Virginia Hayssen, Teri Orr

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45 am</td>
<td>S4-1</td>
<td>Orr TJ, Hayssen V, New Mexico State University, Smith College</td>
<td>Introduction</td>
</tr>
<tr>
<td>8:00 am</td>
<td>S4-2</td>
<td>Hayssen V, Smith College</td>
<td>Misconceptions about Conception and Other Fallacies: Historical Bias in Reproductive Biology</td>
</tr>
<tr>
<td>8:30 am</td>
<td>S4-3</td>
<td>Hook KA, Fisher HS, University of Maryland</td>
<td>The importance of female reproductive traits: from mice to seed beetles</td>
</tr>
<tr>
<td>9:00 am</td>
<td>S4-4</td>
<td>Sirot LK, College of Wooster</td>
<td>Opportunities for Female Modulation of Seminal Fluid Molecules</td>
</tr>
<tr>
<td>9:30 am</td>
<td>Coffee Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 am</td>
<td>S4-5</td>
<td>Wolfner MF, Cornell University</td>
<td>The female side of the male x female interactions that modulate sperm competition and reproduction</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S4-6</td>
<td>Lipshutz SE, Rosvall KA; Indiana University</td>
<td>Neuroendocrinology of sex-role reversal</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S4-7</td>
<td>Karachiwalla Z, Decarvalho T, Burns M*; University of Maryland Baltimore County</td>
<td>Spermathecal Variation By Mating System in Temperate Harvestmen</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S4-8</td>
<td>Kimmitt AA, Sinkiewicz DM, Ketterson ED; Texas A&amp;M University, Indiana University</td>
<td>Female Songbirds that Differ in Migratory Strategy Also Differ in Neuroendocrine Measures in Early Spring</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td>S4-9</td>
<td>Hokekamp KE, Montgomery TM, Strauss ED; Michigan State University, University of Nebraska</td>
<td>Social competition and cooperation affect reproductive success of female spotted hyenas</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S4-10</td>
<td>Lynch KS, Ryan MJ; Hofstra University, University of Texas at Austin</td>
<td>Social Regulation of Hormones and the Implications for Female Mate Choice</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S4-11</td>
<td>Hawkes K; University of Utah</td>
<td>The centrality of grandmothers in human evolution</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S4-12</td>
<td>Orr TJ, Hayssen V, New Mexico State University, Smith College</td>
<td>Where now? Future directions in reproductive biology framed by the female perspective</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>S4-13</td>
<td>Orr TJ, New Mexico State University</td>
<td>Round Table Discussion for Reproduction: the Female Perspective from an Integrative and Comparative Framework</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>Coffee Break</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 8:15 AM – 3:30 PM

**Symposium S5**  
**Rooms 303-304**

**Form, structure and function: How plants vs. animals solve physical problems**  
**Chairs:** Ulrike Müller, Simon Poppinga

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 am</td>
<td>S5-1</td>
<td>Muller UK, Poppinga S; California State University</td>
<td>Introduction to the symposium</td>
</tr>
<tr>
<td>8:30 am</td>
<td>S5-2</td>
<td>Bauer U; University of Bristol</td>
<td>Functional Surfaces of Insect-trapping Pitcher Plants</td>
</tr>
<tr>
<td>9:00 am</td>
<td>S5-3</td>
<td>Stark AY, Yanoviak SP; Villanova University, University of Louisville, Smithsonian Tropical Research Institute</td>
<td>Adhesive Performance of Tropical Arboreal Ants on Canopy Substrates</td>
</tr>
<tr>
<td>9:30 am</td>
<td>S5-4</td>
<td>O'Donnell MK, Deban SM; Brown University, University of South Florida</td>
<td>The Effect of Water on Salamander Cling Performance at the Critical Roughness</td>
</tr>
<tr>
<td>10:00 am</td>
<td>Coffee Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 am</td>
<td>S5-5</td>
<td>Deban SM, Holzman R, Müller UK; University of South Florida, Tel Aviv University, California State University</td>
<td>Suction feeding in small animals and carnivorous plants</td>
</tr>
</tbody>
</table>

**2020 Final Program**  
59
Sunday 5 January 2020

11:00 am S5-6 Whitaker DL; Pomona College
Nature’s weapons of mass reproduction: Ballistic dispersal of seeds and spores

11:30 am S5-7 Cho MS, Neubauer P, Fahrenholtz C, Rechenberg I; Technical University of Berlin, Bionics and Evolution Techniques
A Filament-like Structure for Flight?: The Ballooning Flight of Spiders

12:00 pm Lunch Break

1:30 pm S5-8 Deban SM, Holzman R, Muller UK; University of South Florida, Tel Aviv University, California State University Fresno
Suction feeding in small animals and carnivorous plants

2:00 pm S5-9 Jaffar-Bandjee M, Steinmann T, Krijnen G, Casas J*. University of Tours, CNRS, University of Twente
Efficiency of odor capture by multiscale pectinate insect antennae

2:30 pm S5-10 Poppinga S, Speck T; University of Freiburg
Abstraction of Slow and Fast Plant Movement Principles for the Technical Transfer into Biomimetic Mobile Structures

3:00 pm S5-11 Lentink D, Chin DD, Hightower BJ, Ingersoll R; Stanford
Design principles of Fluid Force and Moment Platforms for biological locomotion studies

3:30 pm Coffee Break

8:00 AM – 3:30 PM Symposium S6 Lone Star H
Bio-inspiration of silent flight of owls and other flying animals: recent advances and unanswered questions
Chairs: Chris Clark, Justin Jaworski

7:45 am S6-1 Clark CJ; University of California Riverside
Introduction to the Symposium on Bioinspiration of silent flight of owls and other flying animals

8:00 am S6-2 Boonman A, Eitan O, Yovel Y; University of Tel Aviv
The acoustics of flapping flight in birds and bats; a preliminary analysis

8:30 am S6-3 Yack JE; Carleton University
What does a Butterfly Hear? Neurophysiological and Behavioural Responses to Predator Sounds

9:00 am S6-4 Liu H, Rao C, Nakata T; Chiba University
Robust strategies in owl silent flight: aerodynamic force production and noise suppression

9:30 am S6-5 Lepiane KL, Clark CJ; University of California Riverside
The dorsal velvet surface of owl feathers decreases sounds of rubbing during flapping flight

10:00 am Lunch Break

10:30 am S6-6 Jaworski JW; Lehigh University
Acoustic models for wing specializations of silent owl species

11:00 am S6-7 Krishnan K, Ben-Gida H, Guglielmo CG, Gurka R*; CCU, Technion, UWO
Wake Flow Mechanisms and Aerodynamic Forces of Owls During Flapping Flight

11:30 am S6-8 Krishnamoorthy K, Capuano F, Gurka R*, Balaras E; Coastal Carolina University, University of Naples Federico II, George Washington University
Numerical and experimental study of owls flapping flight

12:00 pm Lunch Break

1:30 pm S6-9 Clark CJ, Le Piane K; University of California Riverside
Evolutionary and ecological correlates of silent flight in owls, nightbirds and hawks: Does silent flight evolve for stealth, or to reduce self-masking?

2:00 pm S6-10 Gall MD, De Koning M, Beatini JR, Proudfoot GA; Vassar College
Directional sensitivity of Northern saw-whet owls: implications for prey and wing sound detection

2:30 pm S6-11 Gómez-Bahamón V, Worm A, Castaño M, Donahue E, Tuero D, Clark C; Bates J; University of Illinois, Arkansas State University, Universidad de los Andes, Universidad de Buenos Aires, University of California Riverside, Field Museum
Non-vocal Acoustic Signals in Kingbirds (genus Tyrannus)

3:00 pm S6-12 Clark CJ; UC Riverside
Final roundtable discussion on bioinspiration of silent flight

3:30 pm Coffee Break
## Sunday Program Morning Sessions

**Note:** Presenter is first author unless noted by an asterisk (*).

### Sunday 5 January 2020

#### 8:00 AM – 10:00 AM  
**Session 35**  
**Lone Star A**

**Complementary to S3: Biology at the Cusp: Teeth as a Model Phenotype for Integrating Developmental Genomics, Biomechanics, and Ecology**  
*Chairs: Natasha S. Vitek, Tyler A. Square*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>35-1</td>
<td>Burroughs RW; University of Chicago</td>
<td>Modeling rodent tooth morphogenesis reveals constraints on mammalian tooth evolution</td>
</tr>
<tr>
<td>8:15 am</td>
<td>35-2</td>
<td>Birlenbach DM, Keller JS, Fox DL; University of Minnesota, University of New Mexico</td>
<td>Morphological Similarity in the Dentition of Competing and Non-Competing Rodents</td>
</tr>
<tr>
<td>8:30 am</td>
<td>35-3</td>
<td>Vitek NS, McDaniel SF, Bloch JI; Stony Brook University, University of Florida, Florida Museum of Natural History</td>
<td>Is variation in molar tooth crown morphology of the Grasshopper Mouse (<em>Onychomys leucogaster</em>) a reflection of selection or drift?</td>
</tr>
<tr>
<td>8:45 am</td>
<td>35-4</td>
<td>Eddins HMS, Kligman BT, Nesbitt SJ, Marsh A, Parker W, Stocker MR; Virginia Tech, Petrified Forest National Park</td>
<td>New Triassic Reptile Reveals Oldest Record of a Complete Envenomation Apparatus</td>
</tr>
<tr>
<td>9:00 am</td>
<td>35-5</td>
<td>Kay DJ, Sincag PM, O’Brien HD; Oklahoma State University</td>
<td>Do sockets shape teeth in non-mammalian thecodonts? A case study in <em>Alligator mississippiensis</em></td>
</tr>
<tr>
<td>9:15 am</td>
<td>35-6</td>
<td>Kim SL, Yeakel JD, Eberle JJ, Zeichner SS; University of California, Merced, University of Colorado, Boulder, California Institute of Technology</td>
<td>Impacts of Environmental Gradients on Shark Body Size: a Comparison from Fossil Evidence and Demographic Modeling of Sand Tigers</td>
</tr>
<tr>
<td>9:30 am</td>
<td>35-7</td>
<td>Colombero CR, Wainwright DK, Lauder GV; Harvard University, Yale University</td>
<td>Shark Dermal Denticles: Loss and Regeneration Patterns Vary with Body Position and Ecotype</td>
</tr>
<tr>
<td>9:45 am</td>
<td>35-8</td>
<td>Square TA; University of California, Berkeley</td>
<td>Stem Cell Markers Reveal Conservation of Tooth and Hair Regeneration</td>
</tr>
</tbody>
</table>

#### 10:00 am  
**Coffee Break**  
Grand Ballroom

### 8:00 AM – 9:30 AM  
**Session 36**  
**Lone Star B**

**Comparative Genomics and Phylogenetics in Vertebrates**  
*Chair: Dave Blackburn*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>36-1</td>
<td>Hill EC, Jarman MJ, Butler MA; University of Hawai‘i</td>
<td>The Resolution Solution: Increasing Nodal Support in the Problematic Phylogeny for a Large Adaptive Radiation of Papuan Asterothryne Frogs</td>
</tr>
<tr>
<td>8:15 am</td>
<td>36-2</td>
<td>Blackburn DC, Nielsen SV, Barej M, Rödel MO; University of Florida, Museum für Naturkunde</td>
<td>Systematics and Biogeography of the African Slippery Frogs (genus <em>Conraua</em>), including the World’s Largest Living Frog</td>
</tr>
<tr>
<td>8:30 am</td>
<td>36-3</td>
<td>Marshall TL, Davis DR, Hills DM; University of Texas at Austin, University of Texas Rio Grande</td>
<td>Mitonuclear Discordance in the North American corn snakes (<em>Pantherophis guttatus</em> complex)</td>
</tr>
<tr>
<td>8:45 am</td>
<td>36-4</td>
<td>Osmanski AB, Johnson M, Gongora J, Densmore III LD, Ray DA; Texas Tech University, University of Sydney</td>
<td>Genomic Signatures of Selection Detection Across the Order Crocodylia</td>
</tr>
<tr>
<td>9:00 am</td>
<td>36-5</td>
<td>Perry BW, Schield DR, Mackessy SP, Castoe TA; University of Texas Arlington, University of Northern Colorado</td>
<td>Mechanisms Driving Venom Gene Regulation in Rattlesnakes Revealed Through Integrative Analyses of Genome Structure and Function.</td>
</tr>
<tr>
<td>9:15 am</td>
<td>36-6</td>
<td>Simpson DY, Telemeco R, Langkilde T, Schwartz TS; Auburn University, California State University, Pennsylvania State University</td>
<td>Differential Gene Expression to heat or fire ant envenomation in <em>Sceloporus undulatus</em></td>
</tr>
</tbody>
</table>

#### 9:30 am  
**Coffee Break**  
Grand Ballroom

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2020 Final Program  
61
### Sunday 5 January 2020

#### 8:00 AM – 10:00 AM  **Session 37**  Lone Star C

**Macroevolution and Evolutionary Paleobiology**  
*Chair: Tom Stewart*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>37-1</td>
<td>Predicting habitat preferences of Hesperornis (Aves: Hesperornithiformes) in the Western Interior Seaway through occupancy modeling</td>
<td>Chapman BR, Wilson LE; Fort Hays State University</td>
</tr>
<tr>
<td>8:15 am</td>
<td>37-2</td>
<td>A New, Small Arboreal Reptile from the Upper Permian of Tanzania</td>
<td>Stocker MR, Nesbitt SJ, Angielczyk K, Sidor C, Fortner J, Olroyd S, Lungmus J, Smith R; Virginia Tech, Field Museum, University of Washington, Southern Methodist University, University of Chicago, University of the Witwatersrand</td>
</tr>
<tr>
<td>8:30 am</td>
<td>37-3</td>
<td>The evolution of dermal rays in tetrapodomorph paired fins</td>
<td>Stewart TA, Lemberg JB, Shubin NH; University of Chicago</td>
</tr>
<tr>
<td>8:45 am</td>
<td>37-4</td>
<td>Living on the edge: ecology of the extinct Noble marten as determined by morphological and isotopic evidence</td>
<td>Lynch LM, McKenna ME, Dudgeon JV; Washington University, Idaho State University, Center for Archaeology, Materials, and Applied Spectroscopy Center</td>
</tr>
<tr>
<td>9:00 am</td>
<td>37-5</td>
<td>Changes in central Texas fossil herpetofauna</td>
<td>Leducas D, Kemp M; University of Texas, Austin</td>
</tr>
<tr>
<td>9:15 am</td>
<td>37-6</td>
<td>Crocodyliform Cranial Constraint and Convergence</td>
<td>Felice RN, Pol D, O’Connor PM, Goswami A; UCL, CONICET, Ohio University, NHM</td>
</tr>
<tr>
<td>9:30 am</td>
<td>37-7</td>
<td>What does it take to make an eel? Convergence and adaptation in the evolution of an eel-like body plan</td>
<td>Stayton CT, Price SA, Wainwright PC, Friedman ST; Bucknell University, Clemson University, UC Davis</td>
</tr>
<tr>
<td>9:45 am</td>
<td>37-8</td>
<td>The Evolutionary Origin of the Filter-feeding Larval Phase in Lampreys</td>
<td>Miyashita T, Gess RW, Coates MI; University of Chicago, Albany Museum</td>
</tr>
<tr>
<td>10:00 am</td>
<td></td>
<td><strong>Coffee Break</strong></td>
<td></td>
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</tbody>
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#### 8:00 AM – 9:30 AM  **Session 38**  Lone Star E

**Fire When Ready: Muscle Activity**  
*Chair: David Carrier*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
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<tbody>
<tr>
<td>8:00 am</td>
<td>38-1</td>
<td>How do Muscle Length and Activation Interact to Determine Muscle Force Production?</td>
<td>Rice N, Jeong S, Nishikawa K; Northern Arizona University</td>
</tr>
<tr>
<td>8:15 am</td>
<td>38-2</td>
<td>Regionalized contributions of the epaxial musculature to swimming and suction feeding in bluegill sunfish</td>
<td>Jimenez YE, Brainerd EL; Brown University</td>
</tr>
<tr>
<td>8:30 am</td>
<td>38-3</td>
<td>A Specialized Muscular System Enables Highly Dynamic Wing Motions in Passerine Birds</td>
<td>Wood LJ, Tobalske BW, Altshuler DL; University of British Columbia, University of Montana</td>
</tr>
<tr>
<td>8:45 am</td>
<td>38-4</td>
<td>Synchronous Muscle Recruitment for Stable Flight Control in Egyptian Fruit Bats</td>
<td>Bortoni A, Morris AT, Young IR, Breuer KS, Swartz SM; Brown University</td>
</tr>
<tr>
<td>9:00 am</td>
<td>38-5</td>
<td>Function of cervical muscles during human running</td>
<td>Boynton AM, Carrier DR; University of Utah</td>
</tr>
<tr>
<td>9:15 am</td>
<td>38-6</td>
<td>The Neck is Part of the Human Core</td>
<td>Carrier DR, Boynton AM; University of Utah</td>
</tr>
<tr>
<td>9:30 am</td>
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<td><strong>Coffee Break</strong></td>
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#### 8:00 AM – 10:00 AM  **Session 39**  Lone Star F

**DNNSB Best Student Paper**  
*Chair: Mike Baltzley*

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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>39-1</td>
<td>What in your right mind would make you do that!? Identifying neural components of courtship decisions</td>
<td>Dolphin KE, Fischer EK, Hughes KA, Hoke KL; Colorado State University, Stanford University, Florida State University</td>
</tr>
<tr>
<td>8:15 am</td>
<td>39-2</td>
<td>Ultrastructural Changes of Reproductive Neuroendocrine and Endocrine Responding Cells Associated with Circannual Timing in a Hibernating Mammal</td>
<td>Duncan CM, Christian H, Chmura H, Buck CL, Barnes BM, Loudon A, Williams C; Univ of Alaska Fairbanks, Univ of Oxford, Northern Arizona Univ, Univ of Manchester</td>
</tr>
<tr>
<td>8:30 am</td>
<td>39-3</td>
<td>Can you feel me now?: The lateral line system mediates reproduction in an African cichlid</td>
<td>Anselmo CM, Butler JM, Maruska KP; Louisiana State University, Baton Rouge</td>
</tr>
</tbody>
</table>
Sunday 5 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:45 am</td>
<td>39-4</td>
<td>Visual Target Information Encoding Mechanisms in the Dragonfly</td>
<td>Ko D, Haddad A, Lin HT, Imperial College London</td>
</tr>
<tr>
<td>9:00 am</td>
<td>39-5</td>
<td>Haltere synchrony in flies</td>
<td>Yarger AM, Smith AJ, Razmi AN, Fox JL; Case Western Reserve University</td>
</tr>
<tr>
<td>9:15 am</td>
<td>39-6</td>
<td>Social Context Affects Learning and Neural Activity Patterns in Dynamic Social Groups</td>
<td>Rodriguez-Santiago M, Jordan LA, Hofmann HA; University of Texas at Austin, University of Konstanz</td>
</tr>
<tr>
<td>9:30 am</td>
<td>39-7</td>
<td>Early integration of multisensory information in the Drosophila larva</td>
<td>Kanwel JK, De Bivort BL, Samuel A, Harvard University</td>
</tr>
<tr>
<td>9:45 am</td>
<td>39-8</td>
<td>Collective movements of mound-building termites</td>
<td>Raja SV, Sane SP; National Centre for Biological Sciences, Tata Institute of Fundamental Research</td>
</tr>
<tr>
<td>10:00 am</td>
<td>Coffee Break</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8:00 AM – 9:45 AM  
Session 40  
Lone Star G

Walking in Water

- **8:00 am** 40-1  
  Hale ME, Goolsbee AW, University of Chicago  
  Substrate-based locomotion in young octopuses.

- **8:15 am** 40-2  
  Heydari S, Po T, McHenry MJ, Kano S; University of Southern California, University of California, Irvine  
  Sea Star Inspired Crawling and Bouncing

- **8:30 am** 40-3  
  Gassler TR, Flammang BE; New Jersey Institute of Technology  
  Animated “Foot” Control During Walking in Skates

- **8:45 am** 40-4  
  Travis KG, Kawano SM; California State University, Long Beach, George Washington University  
  Comparative biomechanics of submerged and emerged walking in the epaulette shark (*Hemiscyllium ocellatum*)

- **9:00 am** 40-5  
  Crawford CH, Cerrato-Morales CL, Flammang BE; New Jersey Institute of Technology  
  Comparative Kinematics of Terrestrial Walking in Two Balitorid Loaches

- **9:15 am** 40-6  
  Amplo HE, Flammang BE; Rutgers University-Newark, New Jersey Institute of Technology  
  Frogfish Pectoral Fin Functional Morphology

- **9:30 am** 40-7  
  Palecek-McClung AM, Blob RW, Clemson University  
  Wading through water: The influence of water depth on the locomotion of the Chilean Flamingo (*Phoenicopterus chilensis*)

9:45 am  
Coffee Break  
Grand Ballroom

8:15 AM – 10:00 AM  
Session 41  
Rooms 301-302

What I Need: A Good Immune Defense

- **8:15 am** 41-1  
  Dearborn DC, Warren S, Hailer F; Bates College, Cardiff University  
  Meta-analysis of Diversity and Selection at MHC Class II A Genes: the Neglected Half of the Vertebrate Immune System’s Heterodimer

- **8:30 am** 41-2  
  Tylan C, Langkilde T; Pennsylvania State University  
  Immune Function Changes in Response to Consumption of and Stings from Fire Ants, an Invasive Predator and Prey of Native Lizards

- **8:45 am** 41-3  
  Love AC, Durant SE*, Wilder SM, Youseff NH; U Arkansas, Ok State  
  Macronutrients, the microbiome, and illness-induced feeding behavior: Are birds shaping immune responses through selective feeding?

- **9:00 am** 41-4  
  Becker DJ, Schultz EM, Atwell JW, Hall RJ, Ketterson ED; Indiana University, Wittenberg University, University of Georgia  
  Urban residency, host immunity, and infectious disease dynamics in a traditionally migratory songbird

- **9:15 am** 41-5  
  Downs CJ, Schoenle LA, Martin LB; SUNY College of Environmental Science & Forestry, Hamilton College, University of South Florida  
  How Does Microbicidal Capacity of Serum Scale with Body Mass in Mammals?

- **9:30 am** 41-6  
  Love AC, Grisham K, Durant SE; University of Arkansas, Oklahoma State University  
  Perception of Infection: Public Information about Disease Influences Immunity in Songbirds

- **9:45 am** 41-7  
  Buckley KM; Auburn University  
  Immune Responses in Sea Urchin Larvae Highlight Fundamental Aspects of Animal Immunity

10:00 am  
Coffee Break  
Grand Ballroom
### Sunday 5 January 2020

#### Session 42

**Morphology and Function: A Rocky Relationship**

**Chair:** Mark Westneat

<table>
<thead>
<tr>
<th>Time</th>
<th>Item</th>
<th>Authors</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>42-1</td>
<td>Westneat MW, Gartner SM, Cooper WJ, University of Chicago, Washington State Univ</td>
<td>JawsModel 2020: Tracking the Transmission of Force and Motion in Fish Cranial Linkage Systems Through Phylogenetic History</td>
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<tr>
<td>8:15 am</td>
<td>42-2</td>
<td>Larouche O, Friedman ST, Corr KA, Martinez CM, Wainwright PC, Price SA; Clemson University, University of California, Davis</td>
<td>Does Habitat Complexity Affect the Direction of Body Shape Evolution in Marine Fishes?</td>
</tr>
<tr>
<td>8:30 am</td>
<td>42-3</td>
<td>Pos KM, Kolmann MA, Gao T, Hernandez LP, Gidmark NJ; George Washington University, University of Chicago, Knox College</td>
<td>Morphological evolution within minnows exhibits decoupling of form &amp; function during periods of climate change in North America</td>
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<tr>
<td>8:45 am</td>
<td>42-4</td>
<td>Juarez BH, Moen DS, Adams DC; Iowa State University, Oklahoma State University</td>
<td>Morphology Predicts Interspecific Jumping Performance in Frogs</td>
</tr>
<tr>
<td>9:00 am</td>
<td>42-5</td>
<td>Gray JA, Sherratt E, Hutchinson MN, Jones MEH; Oklahoma State University, University of Adelie; South Australian Museum, University College London</td>
<td>Dragons of the trees, the rocks, and the ground: the evolution of cranial shape in a continental-scale evolutionary radiation of lizards (Lepidosauria: Agamidae)</td>
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<tr>
<td>9:15 am</td>
<td>42-6</td>
<td>Quinn BL, Morales AE, Simmons NB, Temple University, American Museum of Natural History</td>
<td>Predicting Foraging Strategies from Morphological Traits in Myotis</td>
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<tr>
<td>9:30 am</td>
<td>42-7</td>
<td>Lungmus JK, Angieleyczk KD, Luo ZX; University of Chicago, Field Museum of Natural History</td>
<td>Limb Ecometrics Show Limited Applicability for Quantifying Ecological Novelty in the Deep Evolution of Synapsida</td>
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<td>9:45 am</td>
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#### Coffee Break

**Grand Ballroom**

#### Session 43

**Adaptation and Changes in Environment**

**Chair:** Carla Madelaire

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<thead>
<tr>
<th>Time</th>
<th>Item</th>
<th>Authors</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>43-1</td>
<td>Sirovy KA, Kelly MW, Johnson KM; Louisiana State University</td>
<td>Intraspecific variation in the stress response of the Eastern Oyster, <em>Crassostrea virginica</em>, to salinity changes within the northern Gulf of Mexico</td>
</tr>
<tr>
<td>8:15 am</td>
<td>43-2</td>
<td>Bontrager M, Muir CD*, Mahony C, Gamble DE, Germain RM, Hargreaves AL, Kleyhans EJ, Thompson KA, Angert AL; University of British Columbia, University of California, Davis, University of Hawai‘i, McGill University</td>
<td>Climate anomalies are altering local adaptation</td>
</tr>
<tr>
<td>8:30 am</td>
<td>43-3</td>
<td>Grimes CJ, Paiva PC, Petersen L, Schulze A; Texas A&amp;M University at Galveston, Universidade Federal do Rio de Janeiro</td>
<td>How fireworms, <em>Hermodice carunculata</em>, react to hypoxia: morphological, physiological and gene expression responses</td>
</tr>
<tr>
<td>8:45 am</td>
<td>43-4</td>
<td>Sharpe SL, Ungerer MC, Nippert JB; Kansas State University</td>
<td>Effects of Abiotic Stress Across Population in Wild Foxtail Millet <em>Setaria viridis</em></td>
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<tr>
<td>9:00 am</td>
<td>43-5</td>
<td>Velotta JP, Robertson CE, Schweizer RM, McClleland GB, Cheviron ZA; University of Montana, McMaster University</td>
<td>A developmental delay in thermogenesis is associated with adaptive shifts in gene expression in high-altitude deer mice</td>
</tr>
<tr>
<td>9:15 am</td>
<td>43-6</td>
<td>Madelaire CB, Barsotti AMG, Wagener C, Sugano Y, Baxter-Gilbert J, Gomes FR, Measey J; Northern Arizona University, University of São Paulo, Stellenbosch University</td>
<td>Invasive toads shift behavioral traits to find water</td>
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<td>9:45 am</td>
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#### Coffee Break

**Grand Ballroom**
## Sunday 5 January 2020

### Session 44

**Hot Flashes to Molecular Modulation – Thermo and Chemical Ecology**

*Chair: Tim Wollesen*

<table>
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<tr>
<td>8:00 am</td>
<td>44-1</td>
<td>Rooms 203-204</td>
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<tr>
<td>8:15 am</td>
<td>44-2</td>
<td>Rooms 203-204</td>
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<td>8:30 am</td>
<td>44-3</td>
<td>Rooms 203-204</td>
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<td>44-6</td>
<td>Rooms 203-204</td>
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<td>9:30 am</td>
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<td>Coffee Break</td>
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**8:00 AM – 9:45 AM**

**Session 45 Brazos**

**Special Session: Celebrating the Scientific Contributions of Rosemary Knapp: Hormones and Alternative Reproductive Tactics, Part I**

*Chairs: Ignacio Moore, Sarah Woodley*

<table>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>45-1</td>
<td>Grand Ballroom</td>
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<td>8:15 am</td>
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<td>8:30 am</td>
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<td>Grand Ballroom</td>
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<tr>
<td>8:45 am</td>
<td>45-4</td>
<td>Grand Ballroom</td>
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<td>9:00 am</td>
<td>45-5</td>
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<td>9:15 am</td>
<td>45-6</td>
<td>Grand Ballroom</td>
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<td>Coffee Break</td>
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**8:00 AM – 9:45 AM**

**Session 46**

**Devo-evo**

*Chair: Emily Setton*

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<th>Time</th>
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<tr>
<td>8:00 am</td>
<td>46-1</td>
<td>Rooms 402-403</td>
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<tr>
<td>8:15 am</td>
<td>46-2</td>
<td>Rooms 402-403</td>
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</table>
Sunday 5 January 2020

8:30 am 46-3 Setton EVW, Sharma PP; University of Wisconsin - Madison
The fly cannot save us: Using developmental transcriptomes to probe the genetic architecture of spider spinnerets

8:45 am 46-4 Oel AP, Lamanna F, Hervas-Sotomayor F, Kaessmann H, Arendt D; EMBL Heidelberg, ZMBH, University of Heidelberg
Evolution of retinal cell types in the sea lamprey, Petromyzon marinus

9:00 am 46-5 Kimura J, Ricci L, Luo YJ, Srivastava M; Harvard University
Development of the acoel worm Hofstenia miamia and the embryonic origin of neoblasts

9:15 am 46-6 Hulett RE, Potter D, Luo YJ, Ricci L, Srivastava M; Harvard University
Identifying regulators of neural cell-type diversity during regeneration in the acoel Hofstenia miamia

9:30 am 46-7 Lochab AK, Extavour CG; Harvard University
Traveling Without a Destination: Primordial Germ Cell Migration in a Hemipteran Insect

9:45 am Coffee Break

10:00 AM – 12:00 PM Session 47 Lone Star A

Complementary to S2: Epigenetic Variation in Endocrine System
Chairs: Vania R. Assis, Sebastian G. Alvarado

10:30 am 47-1 Alvarado SG, Krupakar H; Queens College CUNY, GE Healthcare
Developing an automated pipeline for quantifying animal pigmentation using deep learning

10:45 am 47-2 Teixeira RV, Titon SCM, Titon Jr. B, Gomes FR, Assis VR*; University of Sao Paulo
Trace elements and amphibian’s immunity - what can we expect?

11:00 am 47-3 Stevenson TJ; University of Glasgow
Rhythmic Epigenetics and the Neuroendocrine Regulation of Reproduction in a Seasonal Rodent.

11:30 am 47-5 Ragsdale AK, Dutoit L, Besson AA, King T, Gemmell NJ, Hore T, Johnson SL; University of Otago, University of Alberta
Paternal hypoxia exposure primes offspring for increased hypoxia resistance

11:45 am 47-6 Schrey A, Miller K, Laggins F, Wieczorek P, McCoy E, Mushinsky H; Georgia Southern University, Dartmouth College, University of South Florida
Epigenetic and Genetic Characteristics of Dispersal of the Florida Sand Skink

12:00 pm Lunch Break

10:00 AM – 12:00 PM Session 48 Lone Star B

DIZ Best Student Paper Session
Chairs: Ken Halanych, Linda Walters

10:00 am 48-1 Conkling ME, Hesp K, Munroe S, Sandoval K, Martens DE, Skippe M, Wiffels RH, Pomponi SA; Florida Atlantic University, Wageningen University
Breakthrough in Marine Invertebrate Cell Culture: Sponge Cells Divide Rapidly in Improved Nutrient Medium

10:15 am 48-2 Webb SJ, Sebright Z, Taylor JRA; Scripps Institution of Oceanography, UCSD
Roles pH and Temperature May Play in the Life History of the Tuna Crab, Pleuroncodes planipes

10:30 am 48-3 Ligouri AL; Stony Brook University
Exploring local adaptation to salinity and temperature variability in the copepod Tigriopus californicus

10:45 am 48-4 Bedgood SA, Bracken MES; University of California Irvine
Making it Big and Losing Friends: Algal Symbiont Contributions are Shaped by Sea Anemone Life History

11:00 am 48-5 Coelho JC, Poole AZ; Berry College
The Evolution and Role of GTPases of Immunity Associated Proteins (GIMAPs) in Cnidarians

11:15 am 48-6 Barnes DK, Allen JD; William & Mary
Predator-induced plasticity across echinoderm life history stages

11:30 am 48-7 Mack JM, De Carle D, Kvist S; University of Toronto, University of Maryland College Park
Prey, Populations, and the Pleistocene: Evidence for Low COI Variation in a Widespread North American Leech

11:45 am 48-8 Varney RM, Speiser DI, Kokot KM; Univ of Alabama, Univ of South Carolina
The genome of the chiton Acanthopleura granulata: perspectives on biomineralization from polyplacophorans

12:00 pm Lunch Break
Sunday 5 January 2020

10:30 AM – 12:00 PM  Session 49  Lone Star C

Special Session: Digestive Physiology: A Session in Honor of Bill Karasov, Part I
Chairs: Kevin Kohl, Denise Dearing

10:30 am  49-1  Trevelline BK, Martínez-Mota R, Derting T, Darracq A, Pasch B, Dearing MD, Kohl KD*; Univ of Pittsburgh, Univ of Utah, Murray State Univ, Northern Arizona Univ

Nutrient manipulation differentially affects microbiome structure and host physiology in rodents with distinct dietary niches

10:45 am  49-2  McWilliams S, Karasov W, Bauchinger U; University of Rhode Island, University of Wisconsin, Jagellonian University

Spare capacity and phenotypic flexibility in the digestive system of a migratory bird: defining the limits of animal design

11:00 am  49-3  Tracy CR, McWhorter TJ; University of California Riverside, University of Adelaide Roseworthy

Paracellular absorption in the slow(er) lane: a brief review of reptilian paracellular nutrient absorption

11:15 am  49-4  Price ER, Jara RF; University of North Texas

A “Dispersal Syndrome” Approach for Relating High Paracellular Absorption in Birds and Bats to Plant Ecology

11:30 am  49-5  Fassbinder-Orth CA; Creighton University

Effects of Arbovirus Infections on Digestive Physiology, Growth, and Survival in Young Animals

11:45 am  49-6  Secor SM; University of Alabama

Underlying Mechanisms that Drive an Adaptive Interplay in Digestive Physiology

12:00 pm  Lunch Break

10:00 AM – 12:00 PM  Session 50  Lone Star E

DVM Best Student Paper: D. Dwight Davis Award
Chair: Patricia Hernandez

10:00 am  50-1  Capano JG, Cieri RL, Weller HL, Brainerd EL; Brown University, University of Utah

Modular Lung Ventilation in Snakes

10:15 am  50-2  Sellers KC, Middleton KM, Holliday CM; University of Missouri

Joint Loading and Transformation in Suchian Evolution

10:30 am  50-3  George AB, Westnent MW; University of Chicago

Swimming Performance Informs Patterns of Evolutionary Ecomorphology Among Triggerfishes and Filefishes (Superfamily: Balistoidea)

10:45 am  50-4  Rupp AE, Moon B; University of Louisiana Lafayette

Feeding and Digestive Anatomy of Mud Snakes

11:00 am  50-5  Garner AM, Wilson MC, Wright C, Russell AP, Niewiarowski PH, Dhinojwala A; University of Akron, University of Calgary

Adhesive Setal Morphology and Setal Field Configuration in Anolis equestris

11:15 am  50-6  Phillips JR, Hewes AE, Schwenk K; University of Connecticut

Novel Air-breathing Modes in Anuran Tadpoles

11:30 am  50-7  Hewes A, Schwenk K; University of Connecticut

A Comparative Study of Lingual Prey Capture in Iguanian and Scincid Lizards

11:45 am  50-8  Diamond KM, Griner JG, Lagarde R, Ponton D, Powder KE, Schoenfuss HL, Walker JA, Blob RW, Clemson Univ, Univ Perpignan Via Domitia, Univ La Réunion, St Cloud State Univ, Univ Southern Maine

Linking morphology, performance, and behavior in the migration of stream goby fishes

12:00 pm  Lunch Break

10:15 AM – 12:00 PM  Session 51  Lone Star F

Neuroethology & Visual Sensing
Chair: Clement Vinauger

10:15 am  51-1  Wynne NE, Fryzlewicz LH, Vinauger C; Virginia Polytechnic Institute and State University

Navigating Towards Defensive Hosts: Mosquito Visual Avoidance Behavior

10:30 am  51-2  Chappell DR, Speiser DI; University of South Carolina

Neural processing in distributed visual systems – many eyes, many solutions

10:45 am  51-3  Feller KD, Supple J, Gonzalez-Bellido PT, Univ of Minnesota, Univ of Cambridge

Multimodal sensory responses from descending neurons in Squilla stomatopod crustaceans
### Sunday 5 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 am</td>
<td>51-4</td>
<td>Palermo NA, Siddiqui SG, Theobald JC; Florida International University</td>
<td>Drosophila melanogaster uses its regional attention to maximize spatial information during flight.</td>
</tr>
<tr>
<td>11:30 am</td>
<td>51-6</td>
<td>Chandrasegaran K, Wynne N, Vinauger C; Virginia Tech</td>
<td>Visual Avoidance Behavior in Mosquito Larvae and Adults.</td>
</tr>
<tr>
<td>11:45 am</td>
<td>51-7</td>
<td>Ruiz CA, Theobald JC; Florida International University</td>
<td>Fruit Flies Respond to Ventral Parallax During Strong Sideslip Disturbances.</td>
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<tr>
<td>12:00 pm</td>
<td></td>
<td><strong>Lunch Break</strong></td>
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**10:15 AM – 12:00 PM  Session 52  Lone Star G**

**Getting Real: Effects of Multiple Stressors on Organisms**

*Chairs: John VandenBrooks, Carrie Coy*

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>52-1</td>
<td>Padda SS, Johnson DJ, Glass JR, Stahlschmidt ZR; U Pacific, Ariz State U</td>
<td>Alter Investment or Conserve? Assessing animal strategies to limit costs from concurrent weather extremes</td>
</tr>
<tr>
<td>10:30 am</td>
<td>52-2</td>
<td>Vandenbrooks JM, Vimmerstedt J, Huffaker M, Angilletta M, Midwestern University, Arizona State University</td>
<td>Oxygen limits the thermal tolerance in embryos of terrestrial endothermic and ectothermic animals</td>
</tr>
<tr>
<td>10:45 am</td>
<td>52-3</td>
<td>Ackerly KL, Esbaugh AJ; University of Texas at Austin</td>
<td>Impacts of temperature acclimation and oil exposure on aerobic performance in red drum, <em>Sciaenops ocellatus</em></td>
</tr>
<tr>
<td>11:00 am</td>
<td>52-4</td>
<td>McTernan MR, Sears MW; Clemson University</td>
<td>Thermal and hydric balance: how salamanders respond to interacting stressors.</td>
</tr>
<tr>
<td>11:15 am</td>
<td>52-5</td>
<td>Rennolds CW, Bely AE; University of Maryland</td>
<td>Injury improves short-term environmental stress tolerance in a freshwater annelid.</td>
</tr>
<tr>
<td>11:30 am</td>
<td>52-6</td>
<td>Berlow M, Phillips JN, Derryberry EP; University of Tennessee, California Polytechnic State University</td>
<td>Effects of Urbanization and Landscape on Wild Avian Gut Microbiomes.</td>
</tr>
<tr>
<td>11:45 am</td>
<td>52-7</td>
<td>Coy CO, Moore PA, Belanger RM, Newcomb TJ; Bowling Green State University, University of Michigan Biological Station, University of Detroit-Mercy, Michigan Department of Natural Resources</td>
<td>Perfluoroalkyl Substances in Bluegill (<em>Lepomis macrochirus</em>) and Their Relationship to Histology and Swimming Performance</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td><strong>Lunch Break</strong></td>
<td></td>
</tr>
</tbody>
</table>

**10:30 AM – 11:45 AM  Session 53  Rooms 301-302**

**Immune-based Tradeoffs**

*Chairs: Matthew Steffenson, Emily Cornelius Ruhs*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 am</td>
<td>53-1</td>
<td>Vargas R, Valentini A, Garcia M, Steffenson M; St Edward's University</td>
<td>The Immunological Response of Leg Autotomy in <em>Tigrosa helluo</em> Involving Hemocyte Protein Analysis</td>
</tr>
<tr>
<td>10:45 am</td>
<td>53-2</td>
<td>Chang Van Oordt DA, Taft CC, Ryan TA, Vitousek MN; Cornell University</td>
<td>Raising Defenses: Are There Costs to Stronger Immunity in Breeding Tree Swallows?</td>
</tr>
<tr>
<td>11:00 am</td>
<td>53-3</td>
<td>Moreno KR, Weinberg M, Yovel Y, Harten L, Czirják SL, Salinas-Ramos VB, Herrera Montalvo LG, Tel Aviv University, Leibniz Institute for Zoo and Wildlife Research, University of Naples Federico II, Universidad Nacional Autónoma de México</td>
<td>Sickness in Fruit Bats: Unique Immune Reaction Reflects a Unique Social Behavior.</td>
</tr>
<tr>
<td>11:15 am</td>
<td>53-4</td>
<td>Hudson SB, Virgin EV, Smith GD, Brodie Jr. ED, French SS; Utah State University, Dixie State University</td>
<td>Energetic strategy, oxidative cost, and performance outcome vary according to magnitude of an integrative immune challenge</td>
</tr>
<tr>
<td>11:30 am</td>
<td>53-5</td>
<td>Steffenson M, Garcia M, Valentini A, Vargas R; St Edward's University</td>
<td>The Effect of Elevated Temperature on Basal Immunological Activity in The Wolf Spider <em>Tigrosa helluo</em></td>
</tr>
<tr>
<td>11:45 am</td>
<td></td>
<td><strong>Lunch Break</strong></td>
<td></td>
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</table>
**Sunday 5 January 2020**

### Session 54

**Adaptation and Genes**  
**Chairs:** Jennifer Kovacs, Zac Cheviron

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
<th>Abstract</th>
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</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>Genomic signatures of selection across the oxygen transport cascade in high-altitude deer mice</td>
<td>Schweizer RM, Jones MR, Bradburd GS, Wolf CJ, Senner NR, Storz JF, Cheviron ZA*; University of Montana, Michigan State University, University of South Carolina, University of Nebraska</td>
<td>Genomic signatures of selection across the oxygen transport cascade in high-altitude deer mice</td>
</tr>
<tr>
<td>10:30 am</td>
<td>Horizontal Gene Transfer as a Mechanism for Convergent Evolution in Arthropods</td>
<td>Kovacs JL, Werren J; Spelman College, University of Rochester</td>
<td>Horizontal Gene Transfer as a Mechanism for Convergent Evolution in Arthropods</td>
</tr>
<tr>
<td>10:45 am</td>
<td>Adaptation to Life in Acid Mine Drainage: Transcriptomics and Molecular Evolution in Western Mosquitofish</td>
<td>Coffin JL, Kelley JL, Tobler M; Kansas State University, Washington State University</td>
<td>Adaptation to Life in Acid Mine Drainage: Transcriptomics and Molecular Evolution in Western Mosquitofish</td>
</tr>
<tr>
<td>11:00 am</td>
<td>Integrating Phenotypes and Genomes in a Fine-Scale Study of Lake-Stream Divergent Rainbow Darters</td>
<td>Oliveira DR, Foster SA, Fitzpatrick SW; Clark University, Michigan State University</td>
<td>Integrating Phenotypes and Genomes in a Fine-Scale Study of Lake-Stream Divergent Rainbow Darters</td>
</tr>
<tr>
<td>11:15 am</td>
<td>Venom Resistance in an Eastern Colorado Rodent Community</td>
<td>Balchan NR, Mackessy SP; University of Northern Colorado</td>
<td>Venom Resistance in an Eastern Colorado Rodent Community</td>
</tr>
<tr>
<td>11:30 am</td>
<td>Comparative analysis of venom complexity and diet diversity in rattlesnakes using a novel, genome-wide phylogeny</td>
<td>Holding ML., Strickland JL, Rautsaw RM, Mason AJ, Hofmann EP, Hogan MP, Colston TJ, Nystrom G, Gazzinetti F, Gibbs HL., Roktya DR, Parkinon CL; Florida State University, Clemson University, Instituto Butantan, Ohio State University</td>
<td>Comparative analysis of venom complexity and diet diversity in rattlesnakes using a novel, genome-wide phylogeny</td>
</tr>
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</table>

### Session 55

**Growth Factors & Neuropeptides**  
**Chairs:** Kendra Sewall, Elizabeth Addis

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
<th>Abstract</th>
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</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>Relationships Among Neuropeptides, Territorial Aggression, and Urbanization in Male Song Sparrows</td>
<td>Sewall KB, Davies S, Beck ML; Virginia Tech, Quinnipiac University, Rivier University</td>
<td>Relationships Among Neuropeptides, Territorial Aggression, and Urbanization in Male Song Sparrows</td>
</tr>
<tr>
<td>10:15 am</td>
<td>A Role of Insulin-Like Growth Factors in Mediating Trade-Offs Between Growth and Reproduction in Painted Turtles</td>
<td>Beatty AE, Schwartz TS; Auburn University</td>
<td>A Role of Insulin-Like Growth Factors in Mediating Trade-Offs Between Growth and Reproduction in Painted Turtles</td>
</tr>
<tr>
<td>10:30 am</td>
<td>Body size sensing in the tobacco hornworm, Manduca sexta: the role of TGF-beta/Activin signaling in metamorphic timing</td>
<td>Addis AE, Janzen FJ, Bronikowski AM; Gonzaga University, Iowa State University</td>
<td>Body size sensing in the tobacco hornworm, Manduca sexta: the role of TGF-beta/Activin signaling in metamorphic timing</td>
</tr>
<tr>
<td>11:00 am</td>
<td>Effect of Diet Restriction on Insulin-like Growth Factor 1 and 2 Expression in Female Green Anoles (Anolis carolinensis)</td>
<td>Cordova KL, Bersin TV, Saenger EK, Journey ML, Beckman BR, Lema SC; Cal Poly, San Luis Obispo, Northwest Fisheries Science Center</td>
<td>Effect of Diet Restriction on Insulin-like Growth Factor 1 and 2 Expression in Female Green Anoles (Anolis carolinensis)</td>
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</table>

### Session 56

**Beat it (the Heat)- Combating Stress in Coral Reefs, Part I**  
**Chair:** Nicola Kriefall

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
<th>Abstract</th>
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</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>Time Course Physiology of Caribbean Corals Reveals Divergent Responses to Global Change Stressors</td>
<td>Aichelman HE, Dove CB, Castillo KD, Boulton JM, Knowlton AC, Nieves OC, Ries JB, Davies SW; Boston University, UNC Chapel Hill, Northeastern University</td>
<td>Time Course Physiology of Caribbean Corals Reveals Divergent Responses to Global Change Stressors</td>
</tr>
<tr>
<td>10:15 am</td>
<td>Familial effects on the thermal tolerance of the brooding coral Porites astreoides during early life stages</td>
<td>Zhang Y, Barnes SJ, Kenkel C; University of Southern California</td>
<td>Familial effects on the thermal tolerance of the brooding coral Porites astreoides during early life stages</td>
</tr>
<tr>
<td>10:30 am</td>
<td>Viral Reefscapes: Microbial Interactions with Threatened Coral Hosts and Reef Ecosystems</td>
<td>Correa AMS, Grupstra CGB, Howe-Kerr LI, Veglia AJ, Bryant RL., Conetta D; Rice University, University of Rhode Island</td>
<td>Viral Reefscapes: Microbial Interactions with Threatened Coral Hosts and Reef Ecosystems</td>
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</table>
### Session 56 10:45 am – 12:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Title</th>
<th>Presenters</th>
<th>Abstract</th>
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</thead>
<tbody>
<tr>
<td>10:45 am</td>
<td>56-4</td>
<td>Kriefall NG, Matz MV, Kanke M, Davies SW; Boston University, UT Austin, Cornell University</td>
<td>Symbiotic partners diverge across reef environments in a panmictic coral population</td>
<td></td>
</tr>
<tr>
<td>11:00 am</td>
<td>56-5</td>
<td>Abbott EA, Dixon GB, Matz MV; University of Texas</td>
<td>Disentangling coral stress and bleaching responses by comparing gene expression in symbiotic partners</td>
<td></td>
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<tr>
<td>11:15 am</td>
<td>56-6</td>
<td>Reich HG, Rodriguez IB, Tripp SE, Warner ME, Kemp DW, Ho TY, Lajeunesse TC; Penn State University, University of the Philippines, University of Delaware, University of Alabama at Birmingham, Academia Sinica</td>
<td>Symbiotic dinoflagellates pump iron (and other trace metals) to beat the heat</td>
<td></td>
</tr>
<tr>
<td>11:30 am</td>
<td>56-7</td>
<td>Matsuda SB, Chakraverti L.J, Cunning JR, Van Oppen MJH; Gates RD; Hawaii Institute of Marine Biology, Australian Institute of Marine Science, Shedd Aquarium</td>
<td>Coral (Acropora tenuis) background symbiont, Gerakladium, competes with Durusdinium as dominant symbiont at elevated temperatures in multiple-genus symbiont-choice</td>
<td></td>
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<tr>
<td>11:45 am</td>
<td>56-8</td>
<td>Benson BE, Aichelman HE, Baumann JH, Nieves OC, Stanizzi DA, Castillo KD, Davies SW*; Boston University, UNC CH</td>
<td>Diel thermal variation supports growth and symbiosis in a reef-building coral</td>
<td></td>
</tr>
</tbody>
</table>

Lunch Break 12:00 pm

### Session 57 10:15 AM – 12:00 PM

**Special Session: Celebrating the Scientific Contributions of Rosemary Knapp: Hormones and Alternative Reproductive Tactics, Part II**

**Chairs:** Sarah Woodley, Ignacio Moore

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Title</th>
<th>Presenters</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>57-1</td>
<td>Hews D, Lisiuè D, Glogoó Ki M, Blažević SA, Hraniloviè D; Indiana State Univ, Univ Zagreb</td>
<td>Behavior and Neuroendocrine Differences in Island and Mainland Populations of Wall Lizards (Podarcis sicula); Do They Mirror Typical Within-Population Variation in Stress-Coping Styles?</td>
<td></td>
</tr>
<tr>
<td>10:30 am</td>
<td>57-2</td>
<td>Maney DL; Emory University</td>
<td>Evolution of alternative behavioral phenotypes: A story of genes and bird brains</td>
<td></td>
</tr>
<tr>
<td>10:45 am</td>
<td>57-3</td>
<td>Thaker M, Batayabal A, Amdekar M; Indian Institute of Science</td>
<td>Alternative strategies and the dynamism of color</td>
<td></td>
</tr>
<tr>
<td>11:00 am</td>
<td>57-4</td>
<td>Pradhan DS, Grober MS, White KJ; Idaho State University, Georgia State University</td>
<td>Onset and maintenance of male-typical parenting behavior during protogynous sex change</td>
<td></td>
</tr>
<tr>
<td>11:15 am</td>
<td>57-5</td>
<td>Gabar CR, Aspbury AS, Ujhegyi N, Bókony V; Texas State University, Plant Protection Institute Centre for Agricultural Research</td>
<td>Environmental Variation From Land Use Conversion Affects Stress in Tadpoles</td>
<td></td>
</tr>
<tr>
<td>11:30 am</td>
<td>57-6</td>
<td>Forlano PM, CUNY Brooklyn College, CUNY Graduate Center</td>
<td>Evidence for Monoamines as Neurochemical Substrates Underlying Alternative Reproductive Tactics</td>
<td></td>
</tr>
<tr>
<td>11:45 am</td>
<td>57-7</td>
<td>Bonier F, Cox RM; Queen’s University, University of Virginia</td>
<td>To each their own? Meta-analysis of evidence of optimality of endocrine phenotypes</td>
<td></td>
</tr>
</tbody>
</table>

Lunch Break 12:00 pm

### Session 58 10:15 AM – 11:30 AM

**Evo-devo**

**Chair:** Arkhat Abzhanov

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Title</th>
<th>Presenters</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>58-2</td>
<td>Tews VH, Barnett AA; DeSales University</td>
<td>Examining the Evolution of Epidermal Growth Factor (EGF) Pathway Ligands in Insects</td>
<td></td>
</tr>
<tr>
<td>10:30 am</td>
<td>58-3</td>
<td>Zakas C, Rockman M; North Carolina State University, New York University</td>
<td>How Maternal Genetic Effects Shape Developmental Evolution</td>
<td></td>
</tr>
<tr>
<td>10:45 am</td>
<td>58-4</td>
<td>Lopez Juarez J, Ventura D, Zhang L, Davidson BJ; Swarthmore College</td>
<td>Developmental systems drift in tunicate neural gene regulatory elements</td>
<td></td>
</tr>
<tr>
<td>11:00 am</td>
<td>58-5</td>
<td>Abzhanov A; Imperial College London, Natural History Museum</td>
<td>Phylogenetic Principles and Morphogenetic Mechanisms for Evolvability in Adaptive Radiations</td>
<td></td>
</tr>
<tr>
<td>11:15 am</td>
<td>58-6</td>
<td>Long JH, Aaron E, Livingston K, Hawthorne-Madell J; Vassar College, Colby College</td>
<td>Evo-Devo Biorobotics: Masquerading Genomes and the Mapping of Genotype to Phenotype in Embodied Agent Models</td>
<td></td>
</tr>
</tbody>
</table>

Lunch Break 11:30 am
## Sunday Program Afternoon Sessions

### Sunday 5 January 2020

**Note:** Presenter is first author unless noted by an asterisk (*).

### 1:30 PM – 3:00 PM  
**Session 59**

**Complementary to S1: New Frontiers in Antarctic Marine Biology**  
**Chairs:** Brad Seibel, Prashant P. Sharma

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 59</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>59-2</td>
<td>Thermal Sensitivity of Early Life History Stages of Antarctic Invertebrates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toh MWA, Lobert GT, Moran AL; University of Hawai‘i at Mānoa</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>59-4</td>
<td>Dwarf minke whales along the Antarctic Peninsula: Evidence of climate migration or historic misidentification?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bierlich KC, Dale JD, Friedlaender AS, Goldbogen JA, Johnston DJ, Duke University, University of California Santa Cruz, Stanford University</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>59-5</td>
<td>Feast and Famine: Copepod metabolic condition during summer along the West Antarctic Peninsula</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tarrant AM, Berger C, Steinberg DK; Woods Hole Oceanogr Inst, Virginia Inst Marine Sci</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>59-6</td>
<td>Foraging Behavior and Movement Patterns of the Leopard Seal in the Antarctic Peninsula</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Costa DP, Kienle SS, Trumble SS, Kanatous S, Goebel ME, Borras R, Crocker DE, University of California at Santa Cruz, Baylor University, Colorado State University, National Marine Fisheries Service-NOAA, Chilean Antarctic Program, Sonoma State University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>59-7</td>
<td>Characterizing the Hypoxia-Inducible Factor-1 Pathway in Response to Acute Thermal Stress and Hypoxia in Antarctic Notothenioid Fishes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rix AS, O’Brien KM; University of Alaska Fairbanks, Institute of Arctic Biology</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>59-8</td>
<td>Phylogenomic resolution of sea spider relationships via integration of phylogenetic data classes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sharma PP, Arango CP, Ballesteros JA, Brenneis G, Dilly GF, Setton EVW, Wheeler WC; University of Wisconsin-Madison, Queensland Museum, University of Greifswald, California State University-Channel Islands, American Museum of Natural History</td>
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#### 3:00 pm  
**Coffee Break**  
**Grand Ballroom**

### 1:30 PM – 3:30 PM  
**Session 60**

**The Biology Underground**  
**Chairs:** Ben McInroe, Kory Evans

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 60</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>1:30 pm</td>
<td>60-1</td>
<td>Reconfigurable control modules enable rapid burrowing in a decapod crustacean</td>
</tr>
<tr>
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<td></td>
<td>McInroe BW, Bolas T, Ko I, Full RJ; UC Berkeley</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>60-2</td>
<td>Robophysical Investigation of Root Nutation through Heterogeneous Environments</td>
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<tr>
<td></td>
<td></td>
<td>Murray-Cooper M, Ozkan-Aydin Y, Aydin E, Naclerio N, McCaskey EN, Hawkes E, Goldman DL; Georgia Tech, UC Santa Barbara</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>60-3</td>
<td>Functional Recovery of Burrowing Behavior in Sea Lampreys After Spinal Cord Injury</td>
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<tr>
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<td>Katz HR, McCarthy NA, Fouke KE, Morgan JR; Marine Biological Laboratory, Carthage College</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>60-4</td>
<td>Evolutionary Convergence and Constraints on the Skull Shape of Burrowing Wrasses</td>
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<tr>
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<td>Evans KM, Sperstad ZE, Westneat MW; Brown University, University of Minnesota, University of Chicago</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>60-5</td>
<td>Using your head! Finite Element Analysis of head-first burrowing Pygopodids (Gekkota)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gurgis GP, Daza JD, Brennan IG, Hutchinson M, Bauer AM, Oloni JC; SUNY Oswego, Sam Houston State University, Australian National University, South Australian Museum, Villanova University</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>60-6</td>
<td>Lateral bending and buckling aids earthworm locomotion in confined environments</td>
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<tr>
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<td></td>
<td>Carruthers Ferrero A, Ozkan-Aydin Y, Goldman DL; Georgia Tech</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>60-7</td>
<td>Steering Behaviors of C. elegans Locomotion in Heterogeneous Environments</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>60-8</td>
<td>A bioinspired compressible soft robot for studying terrestrial crawling</td>
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<tr>
<td></td>
<td></td>
<td>Scibelli AE, Trimmer BA; Tufts University</td>
</tr>
</tbody>
</table>

#### 3:30 pm  
**Coffee Break**  
**Grand Ballroom**
### Sunday 5 January 2020

#### 1:30 PM – 2:45 PM  
**Session 61**  
**Lone Star C**  

**Special Session: Digestive Physiology: A Session in Honor of Bill Karasov, Part II**  
*Chairs: Kevin Kohl, Denise Dearing*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 61-1</th>
<th>Deer Mouse Lungs as Flexible Environmental Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>Hammond KA, Dolan JE, Sawaya M; University of California Riverside</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 61-2</th>
<th>Dietary Adaptation to High Starch Involves Increased Abundance of α-Glucosidase and its mRNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:45 pm</td>
<td>Caviedes-Vidal E, Brun A, Magallanes ME, Barret-Wilt GA, Karasov WH; Consejo Nacional de Investigaciones Científicas y Técnicas, Universidad Nacional de San Luis, University of Wisconsin-Madison</td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Session 61-3</th>
<th>Stable Isotope Assisted Labeling Reveals Seasonal Influence on Microbial Metabolite Incorporation in Ground Squirrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>Carey HV, Regan MD, Chiang E, Suen G, Assadi-Porter F; University of Wisconsin-Madison</td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Session 61-4</th>
<th>The Karasov effect: functional studies of nutrient absorption in endotherms at the extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:15 pm</td>
<td>McWhorter TJ; University of Adelaide</td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Session 61-5</th>
<th>Mechanisms of detoxification in herbivorous mammals</th>
</tr>
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<tbody>
<tr>
<td>2:30 pm</td>
<td>Dearing MD; University of Utah</td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Coffee Break</th>
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<tbody>
<tr>
<td>2:45 pm</td>
<td>Grand Ballroom</td>
</tr>
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</table>

#### 1:30 PM – 3:15 PM  
**Session 62**  
**Lone Star E**  

**Animals in Compliance: Structural Mechanics**  
*Chairs: Ruijie Zhu, Janne Pfeiffenberger*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 62-1</th>
<th>Fish Fin Compliance: A Perturbation Technique to Determine Compliance During Free Swimming</th>
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<tbody>
<tr>
<td>1:30 pm</td>
<td>Seth D, Lauder GV, Flammang BE, Tangorra JL; Villanova University, Harvard University, New Jersey Institute of Technology, Drexel University</td>
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<tr>
<th>Time</th>
<th>Session 62-2</th>
<th>Effects of Peduncle Stiffness on Propulsive Performance of Tuna-shaped Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:45 pm</td>
<td>Zhu R, Matthews DG, Wang J, Lauder GV, Dong H, Bart-Smith H; University of Virginia, Harvard University</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 62-3</th>
<th>Active muscular changes in the effective mechanical properties of fish bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>Pfeiffenberger JA, Tytell ED; Tufts University</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 62-4</th>
<th>Grasping Behavior in Birds Drives Pedal Adaptations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:15 pm</td>
<td>Struble MK, Gardner J, Gibb AC; Northern Arizona University, Montana State University</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 62-5</th>
<th>Examining the evolution of range of motion helps resolve gaps between form and function in the avian wing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:30 pm</td>
<td>Baliga VB, Szabo I, Altschuler DL; University of British Columbia</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 62-6</th>
<th>Humeral Strains During Climbing in Green Iguanas: Testing Biomechanical Release as a Mechanism Promoting Morphological Transitions in Arboreal Vertebrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:45 pm</td>
<td>Munteanu VD, Diamond KM, Mayerl CJ, Blob RW; Clemson University, NEOMED</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 62-7</th>
<th>Evaluating limb bone stresses of early tetrapods in the context of the evolutionary invasion of land</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 pm</td>
<td>Kawano SM, Blob RW; George Washington Univ, Clemson Univ</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Coffee Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:15 pm</td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

#### 1:30 PM – 3:15 PM  
**Session 63**  
**Lone Star F**  

**DAB Best Student Paper: Marlene Zuk Award**  
*Chairs: Scott MacDougall-Shackleton, Erica Westerman*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 63-1</th>
<th>Male Contest Limits Assortative Female Preference in a Color Polymorphic Poison Frog</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>Yang Y, Richards-Zawacki CL; University of Pittsburgh</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 63-2</th>
<th>Navigating the Ocean Floor: Magnetic Compass Orientation of a Marine Flatfish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:45 pm</td>
<td>Naisbett-Jones L, Tsai E, Lohmann C, Lohmann K; University of North Carolina, Chapel Hill</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 63-3</th>
<th>Females Prefer to Associate with the Chemical Cues of Aggressive, Winning Males After Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>Mitchem LM, Vilella-Pacheco Z, Fornica VA, Brodie III ED; University of Virginia, University of Puerto Rico - Arecibo, Swarthmore College</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 63-4</th>
<th>The Role of Magnetic Field Detection in Foraging Site Fidelity of Sea Turtles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:15 pm</td>
<td>Goforth KM, Lohmann CMF, Lohmann KJ; University of North Carolina at Chapel Hill</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 63-5</th>
<th>The evolution of autotomy in leaf-footed bugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:30 pm</td>
<td>Emberts Z, St. Mary CM, Forthman M, Miller CW; University of Florida</td>
<td></td>
</tr>
</tbody>
</table>
### Sunday 5 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:45 pm</td>
<td>63-6</td>
<td>Assessing Your Opponent: Snapping Shrimp Use Indirect Cues to Settle Ritualized Contests</td>
<td>Dinh JP, Azza J, Patek SN; Duke University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>63-7</td>
<td>Epigenetic effects of paternal perception of predation risk on offspring phenotypes</td>
<td>Brass KE, Herndon N, Gardner S, Grindstaff J, Campbell P; Oklahoma State University, University of California, Riverside</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>1:30 PM – 3:15 PM</td>
<td>Session 64</td>
<td>You Got the Touch (and Sight and Sound)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Chair: Simon Walker</td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td>64-1</td>
<td>Aerodynamic and Structural Modelling and Simulation of Dragonfly Wing: Towards the Understanding of “Fly-by-Feel”</td>
<td>Maeda M, Walker SM, Fabian JM, Lin HT, Bomphrey RJ; Royal Veterinary College, University of Leeds, Imperial College London</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>64-2</td>
<td>Haltere kinematic and dynamics measured using time-resolved microtomography</td>
<td>Walker SM, Christen P, Taylor GK; University of Leeds, University of Applied Sciences and Arts Northwestern Switzerland, University of Oxford</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>64-3</td>
<td>Context Dependent Sensing and Robust Integration of Visual and Mechanosensory Stimuli in Hover-Feeding Hawk Moths</td>
<td>Sharma VP, Sponberg SN; Georgia Institute of Technology</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>64-4</td>
<td>Sensorimotor integration in the control of dorsal fin movements during swimming</td>
<td>Mekdara PJ, Nasimi F, Tytell ED; Tufts University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>64-5</td>
<td>Exploring Reaction Time in Desert Kangaroo Rats</td>
<td>Christensen BA, Schwaner MJ, Freymiller GA, Clark RW, McGowan CP; University of Idaho, San Diego State University</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>64-6</td>
<td>Effects of binocular field size on leaping performance in small bodied primates</td>
<td>Kemp AK; Duke University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>64-7</td>
<td>The Largest Migration on Earth: Sensory Adaptations of a Bioluminescent Deep-sea Vertical Migrator</td>
<td>Deleo DM, Bracken-Grissom HD; Florida International University</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>1:30 PM – 3:15 PM</td>
<td>Session 65</td>
<td>Education and External Partnerships</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Chairs: Nicoline Chambers, Sebastian Echeverri</td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td>65-1</td>
<td>De-Jargonizing SciComm: Does having to use simple words make students better at writing for most people?</td>
<td>Echeverri SA, Wetzel DP, Brouwer NL; University of Pittsburgh</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>65-2</td>
<td>The Beetle Project: Bringing Authentic Research Into High School Classrooms</td>
<td>Chambers NM, Williams CM; West High School, University of California, Berkeley</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>65-3</td>
<td>Building Collaborations with Local Community Colleges to Increase Diverse Students’ Access to STEM Fields</td>
<td>Taylor LD, White LD; University of California, Berkeley</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>65-4</td>
<td>The Importance of Natural History Collection Clubs in Preserving and Using University Collections</td>
<td>Hawkins RK, Stocker MR, Metzgar JS; Virginia Tech</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>65-5</td>
<td>Designing Multifaceted Research Experiences for Undergraduates in Integrative Biology</td>
<td>Tran MV, Miller A, Odaka Y, Owen P, Wilson K; University of Cincinnati Blue Ash College</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>65-6</td>
<td>Community-engaged Learning in a Summer Undergraduate Research Program</td>
<td>Woodley SK, Casco M, Koiber BJ, Mihalescu MR, Tidgewell KJ; Duquesne University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>65-7</td>
<td>Development of an Interactive Model of a Snake Jaw for Natural and Applied Science Education</td>
<td>Seth D; Villanova University</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>
### Thermoregulation

**Chairs:** Victoria Dahlhoff, Michael Dillon

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>66-1</td>
<td>Feeling out your Food: A histological analysis of the vibrissal system in pinnipeds</td>
<td>Cooper C, Keeling E, Liwanag H; California Polytechnic State University</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>66-2</td>
<td>Induced flow cools hovering bumble bees</td>
<td>Dillon ME, Petranek C; University of Wyoming</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>66-3</td>
<td>Sonoran desert bats show modest capacities for thermoregulation in the heat</td>
<td>Talbot WA, Wolf BO; University of New Mexico</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>66-4</td>
<td>Unravelling the reptilian thermoregulatory paradigm</td>
<td>Franklin CE, University of Queensland</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>66-5</td>
<td>Capturing behavioral thermoregulation in the western tent caterpillar Malacosoma californicum pluviale using thermal imaging</td>
<td>Dahlhoff VC, Larkin B, Woods HA; University of Montana</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>66-6</td>
<td>Integrated behavioral and physiological strategies allow Gryllus lineaticeps crickets to fly on cool nights</td>
<td>Sun BJ, Huebner C, Treidel LA, Clark R, Roberts KT, Williams CM; Chinese Academy of Sciences, University of California, Berkeley, Sienna College</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>66-7</td>
<td>Comparative Thermal Ecology of Coastal and Inland Populations of Pacific Rattlesnake Crotalus oreganus</td>
<td>Crowell HL, Taylor EN; University of Michigan, California Polytechnic State University</td>
</tr>
</tbody>
</table>

**3:15 pm**  Coffee Break

### Molecular Evolution

**Chair:** Sally Chang

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>67-1</td>
<td>Diverse patterns of human disease gene emergence and loss across the Metazoa</td>
<td>Chang ES, Gonzalez P, Schnitzler CE, Baxevanis AD; NHGRI/NIH, U Florida</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>67-2</td>
<td>Characterizing the class II major histocompatibility complex in wild mandrills</td>
<td>Weber AC, Guibinga Mickala A, Lighten J, Van Oosterhout C, Abernethy KA, Ntie S, Mickala P, Lehmann D, Anthony NM; University of New Orleans, Université des Sciences et Techniques de Masuku, University of Exeter, University of East Anglia, University of Stirling, Agence Nationale des Parcs Nationaux du Gabon</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>67-3</td>
<td>Innate immunity evolution in underrepresented metazoans and the implications when opting for similarity-metrics vs. hidden Markov models</td>
<td>Tassia MG, David KT, Halanych KM; Auburn University</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>67-4</td>
<td>When You Need a Miracle: Amplifying and Sequencing Degraded DNA Through Touchdown and Nested PCR Techniques.</td>
<td>Jarman MJ, Hill EC, Butler MA; University of Hawaii, Honolulu</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>67-5</td>
<td>A Transition to XY Sex Chromosomes Associated with Y-lined Duplication of a Male Hormone Gene in a Terrestrial Isopod</td>
<td>Russell A, Borrelli S, Fontana R, Lanichiu J, Pascare J, Becking T, Giaud I, Cordaux R, Chandler CH; SUNY Oswego, Syracuse University, Université de Potiers</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>67-7</td>
<td>Modularity in Gene Regulation: Evolution of Combinatorial Cis-Regulatory Inputs</td>
<td>Scepanovic J, Kolchenko S, Plessier F, Lowe C, Spitz F, Marlow H; University of Chicago, Pasteur Institute, École normale supérieure, Sorbonne Université, Stanford University</td>
</tr>
</tbody>
</table>

**3:00 pm**  Coffee Break

### Beat it (the Heat) – Combating Stress in Coral Reefs, Part II

**Chair:** Rachel Wright

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>68-1</td>
<td>Gene Expression in Response to Experimental Low Dissolved Oxygen Supports the Hypothesis that Hypoxia Contributed to a Natural Coral Mortality Event</td>
<td>Wright RM, Nuttall M, Davies SW; Smith College, Flower Garden Banks National Marine Sanctuary, Boston University</td>
</tr>
</tbody>
</table>
Sunday 5 January 2020

1:45 pm 68-2 Poole AZ, Bailey GF; Berry College
GTPases of Immunity Associate Proteins (GiMAP) gene expression in response to induction of apoptosis and autophagy in the sea anemone Exaiptasia pallida

2:00 pm 68-3 Wall CB, Ritson-Williams R, Popp BN, Gates RD; University of Hawai‘i at Mānoa, California Academy of Sciences, Hawai‘i Institute of Marine Biology
Spatial variation in biochemical and isotopic composition of corals during bleaching and recovery

2:15 pm 68-5 Shore A, Sanders K, Conetta D, Correa AMS; Rice University
Hypoxia and coral microbiomes: Linking field and experimental data

2:30 pm 68-6 Bove CB, Davies SW, Ries JB, Umbanhowar J, McCoppin J, Farquhar E, Castillo KD; UNC-Chapel Hill, Boston University, Northeastern University
Physiological and transcriptomic responses of coral hosts and algal symbionts of four Caribbean corals under global change

2:45 pm 68-7 Drew JA, McKeon MG; State University of New York College of Environmental Science and Forestry, Columbia University
Shark-based tourism presents opportunities for facultative dietary shift in coral reef fish

3:00 pm Coffee Break

1:30 PM – 3:15 PM Session 69 Brazos

DCE Best Student Paper - Aubrey Gorbman Award
Chairs: Loren Buck, Kathleen Hunt

1:30 pm 69-1 Crain DD, Userko S, Mansouri F, Winfield ZC, Zerbini AN, Gabriele C, Sabin R, Potter C, Trumble SJ; Baylor University, Marine Mammal Laboratory, Glacier Bay National Park and Preserve, Natural History Museum, Smithsonian Institution

1:45 pm 69-2 Munley KM, Deyoe JE, Adania CH, Nowakowski AM, Ren CC, Murphy GV, Reinhart JM, Demas GE; Indiana University
Melatonin modulates seasonal changes in neurosteroid levels and territorial aggression in male Siberian hamsters (Phodopus sungorus)

2:00 pm 69-3 Gormally BMG, Estrada RS, McVey M, Romero LM; Tufts University
Expanding the acute stress phenotype: DNA damage rapidly increases in house sparrows

2:15 pm 69-4 Khalil S, Enbody ED, Weiklin JF, Schwabl H, Webster MS, Karubian J, Tulane University, Uppsala University, Cornell University
Testosterone Regulates Gene Expression Associated with Carotenoid-Based Plumage Ornamentation in the Red-backed Fairywren

2:30 pm 69-5 Lane SJ, Emmerson MG, Vandenbark UC, Beek ML, Davies S, Gilbert ER, Sewall KB; Virginia Tech, Rivier University, Quinnipiac University
Urbanization lowers hippocampal glucocorticoid receptor expression but not clearance of glucocorticoids in male Song Sparrows.

2:45 pm 69-6 Giglio EM, Tripp JA, Phelps SM; University of Texas at Austin
The role of leptin in social signal decisionmaking in neotropical singing mice ( Scotinomys teguina)

3:00 pm 69-7 Boersma J, Jones JA, Karubian J, Schwabl H; Washington State University, Tulane University
Sex-specific causes and consequences of variable testosterone circulation in a tropical songbird

3:15 pm Coffee Break

1:30 PM – 3:15 PM Session 70 Rooms 402-403

Sensory Biology & Neuroethology
Chair: Alex Kingston

1:30 pm 70-1 Wardill TJ, Feord RC, Sumner ME, Pusdekar S, Kalra L, Gonzalez-Bellido PT; University of Minnesota, University of Cambridge
Binocular stereopsis in cuttlefish improves prey targeting.

1:45 pm 70-2 Johnsen S, Caves EM; Duke Univ, Exeter Univ
How our perceptual and cognitive biases may influence our study of animal vision

2:00 pm 70-3 Palavalli-Nettimi R, Theobald JC; Florida International University
Light intensity and eye size dependent spatio-temporal visual abilities in Drosophila melanogaster

2:15 pm 70-4 Kingston ACN, Speiser DI; University of South Carolina
Snapping shrimp see through transparent armor
### Sunday 5 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Title</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:30 pm</td>
<td>70-5</td>
<td>70-5</td>
<td>Vision and Bioluminescence in Deep-sea Shrimps: Implications for Conspecific Recognition</td>
<td>Schweikert LE, Davis AL, Johnsen S, Bracken-Grissom HD; Florida International University, Duke University</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>70-6</td>
<td></td>
<td>On the Laws of Haller and Leuckart OR Does visual resolution scale with velocity and size in animals?</td>
<td>Heesy CP; Midwestern University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>70-7</td>
<td></td>
<td>Measurement of cephalopod polarization patterns with color video-polarimetry and computer vision techniques.</td>
<td>Brady PC, Garcia M, Hernandez T, Aalund M, Gruev V, Cummings ME; University of Texas at Austin, University of Illinois at Urbana Champaign</td>
</tr>
<tr>
<td>3:15 pm</td>
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<td>Coffee Break</td>
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**Grand Ballroom**

<table>
<thead>
<tr>
<th>Time</th>
<th>Lecture</th>
<th>Location</th>
<th>Title</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 PM – 8:00 PM</td>
<td>AMS Lecture</td>
<td>Rooms 301-302</td>
<td>The Art of Seeing: Using Microscopy to Power STEAM Learning in Biology</td>
<td>Lindsay SM; University of Maine</td>
</tr>
<tr>
<td>7:00 PM – 8:00 PM</td>
<td>BERN Lecture</td>
<td>Salons D-E</td>
<td>A Bird’s Eye View of Reproductive Endocrinology</td>
<td>Bentley GE; UC Berkeley</td>
</tr>
</tbody>
</table>
Sunday POSTER SESSION P2  
Grand Ballroom, 3:30-5:30 PM  
Poster Set Up: 7:00-8:00 am; Poster Teardown: 5:30-6:00 pm  
Even # - Authors present from 3:30-4:30 pm; Odd # - Authors present from 4:30-5:30 pm  

**DIZ BSP: Alan Kohn Award**

**P2-1**  
Sidebottom RB, Martin GG; Occidental College  
Is That a Basal Lamina Lining the Open Circulatory System of a Shrimp?

**P2-2**  
Glover AR, Brannock PM; Rollins College  
Genetic analysis of invasive Pomacea sp. in Florida

**P2-3**  
Pierce ER, Geller JB; Moss Landing Marine Laboratories  
Molluscan Waste is not a Load of Crap: Comparing Environmental DNA Accumulation and Degradation Rates from Mussels, Limpets, and Abalone

**P2-4**  
Powers MM, Ellison C, Madrid M, Rodríguez L, Maslakova S; University of Iowa, University of Oregon, Smithsonian Tropical Research Institute  
Nemertean diversity in Colón, Panama assessed by DNA-barcoding

**P2-5**  
Lownds BI, Topping NE, Jost JA; Bradley University  
The Effect of Clumping Behavior on the Survival, Growth, and Cellular Physiology of the Zebra Mussel (Dreissena polymorpha) in a Central Illinois Population

**P2-6**  
Caine PB, Gibson JD; Bucknell University, Georgia Southern University  
Colonial Recognition and Aggression in Invasive Argentine Ants (Linepithema humile) of Georgia

**P2-7**  
Johnson LE, Treible LM; Trinity University, Georgia Southern University  
Synergistic Effects of UVA and UVB Radiation on Moon Jellyfish Proliferation and Potential Coping Mechanisms

**P2-8**  
Topping NE, Jost JA; Bradley University Peoria Il  
Investigating the seasonal patterns of zebra mussel (Dreissena polymorpha) growth and physiology using field enclosures in central Illinois

**P2-9**  
Peterson BN, Yeo AC, Allen JD; William & Mary  
Attack of the Clones: Examining the Factors that Influence Cloning in Echinoderm

**P2-10**  
Hannon MC, Hilliard J, Garbuglio De Oliveira A, Schulze A; Texas A&M University, University of São Paulo  
Annelid Bioluminescence: The Search for Luciferases in Annelid Transcriptomes

**P2-11**  
Breen CJ, Cahill AE; Albion College  
Survivability and Reproduction in Daphnia, Copepods, and Ostracods Under Changing Salinities

**P2-12**  
Yeo AC, Richardson EL, Deaker D, Garcia A, Byrne M, Allen JD; William and Mary, Monash University, University of Sydney, Université Libre de Bruxelles  
Effects of gamete age on development in broadcast spawning marine invertebrates

**P2-13**  
Ritmeester-Loy SA, Martin GG, Appy R; Occidental College  
A Trypanorhynch Cestode in Shrimp and Skates: Morphology and Partial Life Cycle

**P2-14**  
Varney RM, Kingston ACN, Kocot KM, Speiser DI; Univ of Alabama, Univ of S Carolina  
Localized physiological changes regulate the biomineralization of magnetite in the radula of the chiton Acanthopleura granulata

**P2-15**  
Urban-Gedamke E, Conkling M, Munroe S, McCarthy PJ, Wills PS, Pomponi SA; Florida Atlantic University  
Evaluation of 3-D Cell Culture Methods for Marine Sponges

**P2-17**  
Curtis MD, McClintock JB; University of Alabama at Birmingham  
Potential impacts of near-future climate-induced ocean warming on the stomach microbiome of the common soft-bottom sea star Luidia clathrata

**P2-18**  
Cline NW, Brothers CJ, Morrow CD, Curtis MD, Anderson SM, Amsler CD, Shilling AJ, McClintock JB; Walla Walla University, University of Alabama at Birmingham, University of South Florida  
Characterizing the Digestive Microbiome of Antarctic Sea Stars

**P2-19**  
Canaday EJ, Brothers CJ, Smith KE, Amsler MO, Aronson RB, Singh H, McClintock JB; Southern Adventist University, Walla Walla University, University of Exeter, University of Alabama at Birmingham, Florida Institute of Technology, Northeastern University  
Underwater Islands: The Influence of Surrounding Sediment on Dropstone Ecology
### Posters

#### Sunday 5 January 2020

<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title and Authors</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-20</td>
<td>Porter NA, Jost JA; Bradley University</td>
<td>Seasonal Variation in Oxidative Stress for Zebra Mussels Exposed to an Acute Thermal Challenge</td>
</tr>
<tr>
<td><strong>Species and Speciation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2-21</td>
<td>Dohr SD, Hahn KH, Tufield MS, Ward RS, Boyer SL; Macalester College</td>
<td>New species of New Zealand Mite Harvestmen in the Genus <em>Aoraki</em> (Arachnida, Opiliones, Cyphophthalmi, Pettalidae)</td>
</tr>
<tr>
<td>P2-22</td>
<td>McDonnell AJ, Weretheich H, Cantley JC, Jobson P, Martine CT; Chicago Botanic Garden, Bucknell University, San Francisco State University, Northern Territory Herbarium</td>
<td>Solanum plastisexum, an enigmatic new bush tomato from the Australian Monsoon Tropics exhibiting breeding system fluidity.</td>
</tr>
<tr>
<td>P2-23</td>
<td>Spinelli JMC, Huynh AV, Rice AM; Lehigh University</td>
<td>Vocal Learning in Hybrids: How Does Hybridization Affect Call Learning and Learning Biases in Chickadees?</td>
</tr>
<tr>
<td>P2-24</td>
<td>Rice AM, Huynh AV, Spinelli JMC, Roth TC, Taylor SA; Lehigh University, Franklin &amp; Marshall College, University of Colorado Boulder</td>
<td>Effects of hybridization on cognition in chickadees: A common garden approach</td>
</tr>
<tr>
<td>P2-26</td>
<td>Cobb BA, Gibson JD, Botnaru L; Georgia Southern University</td>
<td>Exploring the lethality of genetic incompatibility in jewel wasp hybrids</td>
</tr>
<tr>
<td><strong>Evolutionary Morphology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2-27</td>
<td>Tunnell Wilson WT, Jackson K, Jacobs JL, Sekits N, Smith EN; Whitman College, University of Texas at Arlington</td>
<td>Insights into the Evolutionary History of Lamprophid Snakes from Vertebral Morphology Using Computed Tomography</td>
</tr>
<tr>
<td>P2-28</td>
<td>Law CJ; American Museum of Natural History, UC Santa Cruz</td>
<td>Evolution of carnivoran body plans</td>
</tr>
<tr>
<td>P2-29</td>
<td>Watson SJ, Evans KM; New Mexico Institute of Mining and Technology, Brown University</td>
<td>Party in the Front, Business in the Back: Mosaic Evolution of Skull Asymmetry in Flatfishes</td>
</tr>
<tr>
<td>P2-30</td>
<td>Carson IR, Hall HR, Kahrl AF, Johnson MA, Trinity University, University of Virginia, Stockholm University</td>
<td>Intraspecific Variation in Lizard Sperm and Testis Morphology</td>
</tr>
<tr>
<td>P2-31</td>
<td>Moore AJ; Stony Brook University</td>
<td>Empty Space &amp; Morphospace: Vertebral Pneumatization is Correlated with Serial Variation in Vertebral Shape</td>
</tr>
<tr>
<td>P2-32</td>
<td>Scanlan LG, Hernandez AI, Schmitz L.; Claremont McKenna, Scripps, and Pitzer Colleges</td>
<td>Eye Size Evolution in Mudskippers and Related Gobiid Fishes</td>
</tr>
<tr>
<td>P2-33</td>
<td>Watanabe J; University of Cambridge</td>
<td>Contingency in the Functional Convergence of the Musculoskeletal System in Wing-propelled Diving Birds</td>
</tr>
<tr>
<td>P2-33.5</td>
<td>Feo TJ, Matloff LY, Lentink D; Smithsonian Natural History Museum, Stanford University</td>
<td>The structure and function of feather microstructures related to silent flight in owls.</td>
</tr>
<tr>
<td>P2-34</td>
<td>Kim LN, Capano JG, Mayerl C.J, Blob RW, Wynenek J, Brainerd EL; Brown University, Northeast Ohio Medical University, Clemson University, Florida Atlantic University</td>
<td>XROMM analysis of pectoral girdle motions during locomotion and ventilation in the loggerhead sea turtle</td>
</tr>
<tr>
<td>P2-35</td>
<td>Crowe-Riddell JM, Pieterman L, Simeos BF, Nankivell JH, Ford M, Ludington A, Allen L, Sanders KL; University of Michigan, University of Adelaide, Venom Supplies</td>
<td>Ontogenetic change in hue and structure of caudal lure reflects dietary shift in Australian death adders (Elapidae)</td>
</tr>
<tr>
<td>P2-36</td>
<td>Picciani N, Musser JM, Oel AP, Garm AL, Arendt D, Oakley TH; University of California Santa Barbara, European Molecular Biology Laboratory, University of Copenhagen</td>
<td>Organ Complexity and Cell History: a Case of Eye Evolution in Cnidaria</td>
</tr>
<tr>
<td>P2-37</td>
<td>Garrick SR, Westnate MW, George AB; University of Chicago</td>
<td>Evolutionary Morphometrics of Body Form and Fin Shape in Sharks</td>
</tr>
<tr>
<td>P2-38</td>
<td>Farjo MN, George AB, Westnate MW; University of Chicago</td>
<td>Tail Wagging or Fin Flapping? Alternative Locomotor Strategies Drive Body and Fin Shape Evolution in the Surgeonfishes</td>
</tr>
<tr>
<td>P2-39</td>
<td>Early CM, Iwanuk AN, Ridgely RC, Witmer LM; University of Florida, University of Lethbridge, Ohio University</td>
<td>A Quantitative Framework for Inferring Vision-related Neuroanatomy from the Endocasts of Extinct Birds</td>
</tr>
<tr>
<td>P2-41</td>
<td>Byrne MZ, Rosenbloom JE, Bhalodi JA, Gignac PM, Bidmark NU; Knox College, Vanderbilt University, Oklahoma State University Center for Health Sciences</td>
<td>Reconciling Anatomical and Physiological Models of Feeding Biomechanics Through Evolution in Centrarchid Fishes</td>
</tr>
<tr>
<td>Poster Number</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>P2-42</td>
<td>Anatomy of the Respiratory System of the African Grey Parrot</td>
<td>Lawson AB, Echols MS, Hedrick BP, Schachner ER; Louisiana State University HSC, Echols Veterinary Services</td>
</tr>
<tr>
<td>P2-43</td>
<td>Color Morph Distribution of Western Ribbon Snakes</td>
<td>Thompson ML, McIntyre KD; Trinity University</td>
</tr>
<tr>
<td>P2-44</td>
<td>Convergence can you hear me? A Phylogenetic Comparative Study of the Conductive Hearing Apparatus of Desert-Adapted Rodents</td>
<td>Kramer L, Collins C, Gignac P, O’Brien H; Holland Hall High School, Sacramento State University, OSU Center for Health Sciences</td>
</tr>
<tr>
<td>P2-47</td>
<td>Evolutionary transformation along orthogonal anatomical axes in blennioid fishes</td>
<td>Collar DC, Dipaolo E, Mehta RS, Christopher Newport University, University of Rhode Island, University of California Santa Cruz</td>
</tr>
<tr>
<td>P2-48</td>
<td>Stress, Asymmetry, and Evolutionary Change in a Population of Threespine Stickleback (Gasterosteus aculeatus) with Respect to a Novel Predator</td>
<td>McHugh KA, Stevens DR, Baker JA, Foster SA; Clark University</td>
</tr>
<tr>
<td>P2-49</td>
<td>Anatomy of the crocodylian bronchial tree and implications for the ancestral archosaurian lung</td>
<td>Schachner ER, Diaz RE, Hedrick BP; Louisiana State University Health Sciences Center, California State University Los Angeles</td>
</tr>
<tr>
<td>P2-50</td>
<td>Predation Effects on the Evolutionary Trajectory of Brain Morphology in the Threespine Stickleback Fish</td>
<td>Mason JN, Stevens II DR, Graham MA, Foster SA, Baker JA; Clark University</td>
</tr>
<tr>
<td>P2-51</td>
<td>Earliest known material of Amia, bowfin, from the Sentinel Butte Formation (Paleocene), Medora, North Dakota</td>
<td>Moore AG, Newbrey MG, Martín-Abad H, Boyd C, Hoganson J, Bar MA; Columbus State University, Universidad Autónoma de Madrid, North Dakota Geologic Survey, Emergeis Curator at North Dakota Heritage Center</td>
</tr>
<tr>
<td>P2-52</td>
<td>Evolutionary Regime Shifts in Crocodylian Neuroanatomy</td>
<td>Beyl AR, Smaers JB, Gignac PM, Watanabe A, Wilberg EW, Turner AH; Stony Brook University, Oklahoma State University Center for Health Sciences, New York Institute of Technology College of Osteopathic Medicine</td>
</tr>
<tr>
<td>P2-53</td>
<td>Learning to swim: evolutionary transition from terrestrial to aquatic life in South American coralsnakes</td>
<td>Jacobs JL, Hall AS, Smith EN, University of Texas at Arlington, Thermo Fisher Scientific</td>
</tr>
<tr>
<td>P2-54</td>
<td>Investigating How Ecological Traits Influence the Evolution and Diversity of Armadillo Armor</td>
<td>Stapp C, Stankowich T, Paig-Tran M; CSU Long Beach, CSU Fullerton</td>
</tr>
<tr>
<td>P2-55</td>
<td>Gut Feeling: Characterizing the Origin and Divergence of Cell Types in the Light Organ of Bioluminescent Ostracods.</td>
<td>Mesrop LM, Goodheart JG, Leung NL, Oakley TO; University of California Santa Barbara</td>
</tr>
<tr>
<td>P2-55.5</td>
<td>Diversity and evolution of trigeminal branching patterns in sauropsids</td>
<td>Lessner EJ, Holliday CM; University of Missouri</td>
</tr>
</tbody>
</table>

**Complementary to S4: Reproduction: the female perspective from an integrative and comparative framework**

<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-56</td>
<td>Effects of Bisphenol-S and Estrogen on p53 Expression in Ovarian Tissue of Zebrafish (Danio rerio)</td>
<td>Fairbanks J, Demaraís A; University of Puget Sound</td>
</tr>
<tr>
<td>P2-57</td>
<td>Dorsal pattern polymorphism in female Brown Anoles: testing the “male-mimicry hypothesis”</td>
<td>Cook TO, Fargeville A*, Warner DA; Auburn University</td>
</tr>
<tr>
<td>P2-58</td>
<td>Linguistic Bias in Reproduction</td>
<td>Torres B, Jelken M, Omane H, Bellesia G, Hayssen V; Smith College</td>
</tr>
<tr>
<td>P2-59</td>
<td>The operational sex ratio and reproductive state influence female aggression and competition in a conventional lek-like mating system</td>
<td>MacLeod PF, Renn SCP; Reed College</td>
</tr>
<tr>
<td>P2-60</td>
<td>More is not always better: Yolk supplementation decreases rate of yolk deposition in Japanese quail, Coturnix japonica</td>
<td>Navara KJ, Graden K, Mendonça MT; University of Georgia, Auburn University</td>
</tr>
<tr>
<td>P2-61</td>
<td>Influences of chronic testosterone treatment on follicle growth rates in laying hens</td>
<td>Dean CR, Mendonça MT, Navara KJ; University of Georgia, Auburn University</td>
</tr>
<tr>
<td>P2-63</td>
<td>Understanding Sex and Gender as a Scientist: Why It Matters Now More Than Ever</td>
<td>Lewis AK; University of Florida</td>
</tr>
</tbody>
</table>
Sunday 5 January 2020

Posters

P2-64 Roncalli V, Cieslak MC, Hopcroft RR, Lenz PH; University of Barcelona, University of Hawai‘i at Mānoa, University of Alaska
Capital Breeding In a Diapausing Copepod: a Transcriptomics Analysis

P2-65 Karachiwalla Z, Decarlovalho T, Burns M; UMBC
Three-dimensional Visualization of Harvestman Spermaphacae using Confocal Microscopy

P2-66 Baker JA, Heins DC, King RW, Foster SA; Clark University, Tulane University
The search for the Holy Grail: an explanation for the relationship between offspring size and maternal size

Comparative & Environmental Endocrinology

P2-67 Wade K, Monceaux C, Close M; Grubb O, Stickland T, O’Brien S, Radford University
Trenbolone Half-life and Metabolism in Gambusia

P2-68 Greives T, Esteve M, Galante H, Deimel C, Hau S; North Dakota State University, Max Planck Institute for Ornithology
Testosterone peaks in the early evening and GnRH-induced testosterone is correlated with this peak

P2-69 Abernathy AL, Klar EA, Jordan CH, Joshi MM, Newbrey MG; Columbus State University
Comparison of intersex severity between two types of histological sections using testes of Largemouth Bass (Micropterus salmoides) and Spotted Bass (M. punctulatus) from the Chattahoochee River, Georgia

P2-70 Joshi MM, Klar EA, Abernathy AL, Sibley AL, Belt JM, Newbrey MG; Columbus State University
Background levels of intersex in Largemouth Bass (Micropterus salmoides) revealed through histological evaluation of gonadal tissue from three interconnected water bodies

P2-71 Molina EM, Mendoza MT; Auburn University
Inhibition pattern of testicular steroidogenesis by dichlorodiphenyldichloroethylene (DDE) during chronic and acute exposure

P2-72 Axid EG, Minicozzi MR, Buck CL, Von Hippel FA; Northern Arizona University, Minnesota State University
Does Sodium Perchlorate Act as an Obesogen in Developing Zebrafish?

P2-73 Clowser D, Wilson C, Petersen A, Postlethwait J; Oregon State University, University of Oregon
Is it an Androgen, Estrogen, Obesogen, or all of the above? Perchlorate Exposure Causes Different Pathologies in Different Fishes

P2-74 Myre B, Guentzel N, Mackenzie DS; TAMU
A Novel Approach to an Old Question: Evaluation of Ecological Breeding Strategies in Sea Turtles

P2-75 Zahra E, Griffin L, Minicozzi M, Mass M*; SUNY New Paltz, Minnesota State University
Endocrine disruption and planarian regeneration

P2-76 Starkey JM, White KJ, Pradhan DS; Idaho State University
Androgen levels in sexually dimorphic musculature of a sex changing fish, Lythrypnus dalli

P2-77 Feingold SR, Roark AM; Furman University
Skin Deep: The Estrogenicity of Sunscreens and Moisturizers

P2-78 Scobell SK, Gibson BL, Gibbs S, Forlano PM, Wilson AB; St Edward’s University, University of North Carolina, City University of New York
Comparative prolactin expression in the pituitary of the Northern pipefish and lined seahorse using immunofluorescent markers

Behavioral Development

P2-79 Hope SF, Kennamer RA, Grimaudo A, Hallagan JJ, Hopkins WA; Virginia Tech, University of Georgia, Stockton University
Does Within-Nest Variation in Incubation Temperature Lead to Differences in Competitive Ability Within Avian Broods?

P2-80 González K, Warkentin KM, Güell BA; Purdue University, Boston University, Smithsonian Tropical Research Institute, Boston University
Effects of hydration on the arboreal eggs of gliding treefrogs: even small reductions in humidity induce premature hatching, reduce hatching size, and kill embryos

P2-81 Guevara Molina SC, Ribeiro Gomes F, Warkentin KM*; University of São Paulo, Brazil, Boston University, Smithsonian Tropical Research Institute
The VTMax of embryos: interacting effects of warming and dehydration on hatching behavior in red-eyed treefrogs, Agalychnis calidryas (Anura: Phyllomedusidae)

P2-82 Fletcher SJ, De-Jesus Soto MG, Rodriguez SD, Pretends Eagle TJ, Petenoud T, Tscheulin T, Barthell J, Giray T, Abramson CI; Oklahoma State University, University of Puerto Rico, St Philip’s College, North Dakota State University, University of the Aegean, University of Central Oklahoma
Memory of the cap pushing response in honey bees (Apis mellifera cecropia)

P2-83 Fletcher SJ, De-Jesus Soto MG, Rodriguez SD, Pretends Eagle TJ, Petenoud T, Tscheulin T, Barthell J, Giray T, Abramson CI; Oklahoma State University, University of Puerto Rico, St Philip’s College, North Dakota State University, University of the Aegean, University of Central Oklahoma
Discriminate punishment of the cap pushing response in honey bees (Apis mellifera cecropia)
<table>
<thead>
<tr>
<th>Presentation ID</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-84</td>
<td>Multimodal mechanosensing for escape-hatching decisions of red-eyed treefrogs</td>
<td>Serrano-Rojas S, Jung J, Warkentin KM; Glasgow University, Boston University, Smithsonian Tropical Research Institute</td>
</tr>
<tr>
<td>P2-85</td>
<td>Behavioral responses to acute and persistent heat stress in nesting tree swallows (<em>Tachycineta bicolor</em>)</td>
<td>Sermersheim LO, Woodruff MJ, Rosvall KA; Indiana University</td>
</tr>
<tr>
<td>P2-86</td>
<td>House Sparrows Show Wide and Repeatable Individual Variation in Behavioral Responses to Novel Objects and Foods</td>
<td>Vinson A, Lattin C; Louisiana State University</td>
</tr>
<tr>
<td>P2-87</td>
<td>Extended training and punishment reduced extraneous errors of the cap pushing response in honey bees (<em>Apis mellifera</em>)</td>
<td>Rodriguez SD, De Jesus-Soto MG, Fletcher SJ, Pretends Eagle TJ, Pentandio T, Tscheulin T, Barthell J, Giray T, Abramson CI; St Philip’s College, University of Puerto Rico, SE Okla St Univ, North Dakota State University, University of the Aegean, University of Central Oklahoma</td>
</tr>
<tr>
<td>P2-88</td>
<td>A Comparison of Stereotypic and Anticipatory Behavior in Cougars (<em>Puma concolor</em>) and Lions (<em>Panthera leo</em>) from Zoo to Sanctuary</td>
<td>Babb MH, Lohmann C; University of North Carolina at Chapel Hill</td>
</tr>
</tbody>
</table>

**Foraging, Predators, and Prey**

<table>
<thead>
<tr>
<th>Presentation ID</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-89</td>
<td>Understanding the sources of variation that contribute to differences in decision making outcomes</td>
<td>Burns MP, Saltz JB; Rice University</td>
</tr>
<tr>
<td>P2-90</td>
<td>Lizards Modulate Foraging Behavior in Response to Environmental Variation</td>
<td>Adams DR, Gifford M; Vilonia High School, University of Central Arkansas</td>
</tr>
<tr>
<td>P2-91</td>
<td>Behavioral Conditioning of <em>Astatotilapia burtoni</em> Without Overtraining</td>
<td>Harman AR, Sjoblom NP, Renn SCP; Reed College</td>
</tr>
<tr>
<td>P2-92</td>
<td>Sex, Food, and Friends in Daily Life: Learning and Transmission of Knowledge in Captive Zebra Finches</td>
<td>Carty T, Philson C, Davis J; Redford University</td>
</tr>
<tr>
<td>P2-93</td>
<td>Outbreaking Locusts (<em>Schistocerca cancellata</em>) in Paraguay are Carbohydrate Hungry which Increase their Performance</td>
<td>Talal S, Youngblood J, Farington R, Cease AJ, Harrison JF; Arizona State University</td>
</tr>
<tr>
<td>P2-94</td>
<td>Consistent Foraging Niche Partitioning Between Two Peruvian Seabirds Under Varying El Niño-La Niña Conditions</td>
<td>Wang SY, Zavalaga CB, Polo M; Louisiana State University, Universidad Científica del Sur</td>
</tr>
<tr>
<td>P2-95</td>
<td>Incentive Contrast vs Optimal Foraging in Honey Bee Decision Making</td>
<td>Fletcher SJ, De-Jesus Soto MG, Abramson CI, Barthell J, Petandio T, Tscheulin T, Giray T; Oklahoma State University, University of Puerto Rico, University of Central Oklahoma, University of the Aegean</td>
</tr>
<tr>
<td>P2-96</td>
<td>Scaling of Lunge Feeding Kinematics in Baleen Whales</td>
<td>Gough WT, Cade DE, Potvin J, Kahane-Rapport SR, Goldbogen JA; Stanford University, University of California Santa Cruz, Saint Louis University</td>
</tr>
<tr>
<td>P2-97</td>
<td>Large-scale analysis of ant foraging dynamics enabled by Deep Convolutional Neural Networks</td>
<td>Plum F, Labonte D; Imperial College London</td>
</tr>
<tr>
<td>P2-98</td>
<td>Lobster Behavioral Responses to Different Prey and Bait Types</td>
<td>Webber RL, Hodgson ML, McGaw LJ, Wyeth RC; St Francis Xavier University, Memorial University</td>
</tr>
<tr>
<td>P2-99</td>
<td>The Role of Predation Threat in the Development of Antipredator Behavior</td>
<td>Bardjis C, Stevens DR, Graham M, Foster SA, Baker JA; Clark University</td>
</tr>
<tr>
<td>P2-100</td>
<td>Can problem-solving during natural foraging give insight into behavioural innovation by the American Lobster, <em>Homarus americanus</em>?</td>
<td>Hodgson ML, Webber RL, McGaw LJ, Wyeth RC; St Francis Xavier University, Memorial University</td>
</tr>
<tr>
<td>P2-101</td>
<td>Food Choices of Rusty Crayfish (<em>Faxonius rusticus</em>) Maintained on Fiber-rich and Protein-rich Diets Relative to Changes in Their Gut Microbiomes</td>
<td>Owen P, Agyei D, Julian C, Joshi D, Miller A, Odaka Y, Tran M, Wilson K; University of Cincinnati</td>
</tr>
<tr>
<td>P2-102</td>
<td>Ants Build Defensively Against Ant Traps in the Field</td>
<td>Pretends Eagle TJ, Rodriguez SD, Gonzales V, Abramson CI; North Dakota State University, Saint Philip’s College, University of Kansas, Oklahoma State University</td>
</tr>
<tr>
<td>P2-103</td>
<td>The Effect Of Extended Training Cap Pushing Response, Extinction In Honey Bees (<em>Apis Mellifera</em>)</td>
<td>Pretends Eagle TJ, De Jesus-Soto MG, Rodriguez SD, Fletcher SJ, Pentandio T, Tscheulin T, Barthell J, Giray T, Abramson CI; North Dakota State University, University of Puerto Rico, Saint Philips College, Oklahoma State University, University of the Aegean, University of Central Oklahoma</td>
</tr>
<tr>
<td>P2-104</td>
<td>Implication of Choice of Burrow Location in the Thirteen-Lined Ground Squirrel (<em>Ictidomys tridecemlineatus</em>)</td>
<td>Armstrong TBK, Davis E, Dickerson H, Healy JE; Austin College</td>
</tr>
</tbody>
</table>
Sunday 5 January 2020 Posters

P2-105 Pendleton LP, Cornelius JM, Chapple TC, Wikelski M, Hahn TP, Hunt KE; Eastern Michigan University, University of Oregon, Max Planck Institute of Animal Behavior, University of California Davis, Northern Arizona University

Food Availability and Its Effects on Spatial Habitat Use in Breeding and Nonbreeding Red Crossbills (Loxia curvirostra)

P2-106 Horvath T, Bergey L, Ritchie L, Semanchik P; Centenary University

Competitive interaction and foraging speed in the invasive shrimp, Palaemon macrodactylus, and three species of native Palaemon shrimp in New Jersey Waters.

P2-108 Khoja A, Kwitny M, Staples AE, Schürch R; Virginia Tech

Development of an Open Source Implementation of Automated Honey Bee Waggle Dance Decoding Using Particle Image Velocimetry

P2-109 Brady PC, Garcia M, Hernandez T, Aalund M, Eiler R, Gruev V, Cummings ME; University of Texas at Austin, University of Illinois at Urbana Champaign, Texas A&M University

A comparison of two distinct pelagic camouflage strategies in teleosts

Neuroethology

P2-111 Caron DP, Scibelli AE, Trimmer BT; Tufts University

Nociceptive strike behavior in Manduca sexta is mediated by multimodal sensory neurons

P2-112 Lozier NR, Sisneros JA; University of Washington

Changes in Saccular Hair Cell Density During Ontogeny of the Plainfin Midshipman Fish

P2-113 Naughton LF, Cannizzaro DN, Pask GM; Bucknell University

One Big, Smelly Family: Decoding the Olfactory Receptors in the Indian Jumping Ant

P2-114 Zeng R, Brown A, Sisneros J; University of Washington

Age-related change in the auditory sensitivity of zebrafish (Danio rerio)

P2-115 Lefaucheux MK, Hernandez LP, George Washington University

Early Ontogeny of Sensory Processing Regions in the Brain of the Grass Carp

P2-116 Dang H, Martinez Acosta V, Univ of the Incarnate Word

Immunohistochemical Analysis of Synaptic Proteins During Regeneration

P2-117 Johnston M, Finton C, Brass K, Ophir AG, Campbell P; Oklahoma State University, Cornell University, University of California Riverside

Central oxytocin and vasopressin receptor distributions in the house mouse, Mus domesticus, and non-commensal congeners, M. spretus and M. spicilegus

P2-119 Stewart H, Hayes D, O’Brien S, Radford University

Exploring the Efficacy of Opiates on PTSD Through a Fish Model

P2-120 Hardy AR, Hale ME; University of Chicago

A new sensory ending in the paired fins of damselfish

P2-121 Dunton AD, Bautista NM, Crespel A, Burggren WW; University of North Texas

Transgenerational Neurological and Behavioral Effects of Combined Exposure to Crude Oil and Hypoxia

P2-122 Woods CE, Padilla G, Todd K; Westminster College

Behavioral and Electrophysiological Response of Medicinal Leeches to UV Light

P2-123 McConnell I, Schulz J, Medina K; Occidental College

Analysis of synthetic cone snail venom through a novel zebrafish spinal motility assay

P2-124 Oberman W, Kondrashov P, Maisano J, Young BA; Kirkville College of Osteopathic Medicine, University of Texas at Austin

Meningeal Structure in Reptiles

P2-125 Frazer RE, Currea JP, Theobald JC, Wasserman SM; Wellesley College, Florida International University

Anatomical and behavioral differences in Drosophila melanogaster and Drosophila mojavensis suggest divergence of visual circuits

Neuroanatomy & Neurobiology

P2-126 Cannizzaro D, Naughton L, Pask G; Bucknell University

Making Sense of Evolution: Deciphering the Rapid Expansion of Ant Pheromone Receptors

P2-127 Ahmed MA, Deora T, Brunton BW, Daniel TL; University of Washington

Multi-modal feedback in insect flight control

P2-128 Faber-Hammond JJ, Renn SCP; Reed College

Transcriptomics of Haplochromis burtoni parental and fasting behavior reveals extensive differentiation between stocks

P2-129 Maier MA, Maruska KP; Louisiana State University

GnRH as a Neuromodulator in Midbrain Sensory Regions during the Female Cichlid Reproductive Cycle
<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-130</td>
<td>Hale ME, Menelaou E, Vasquez E; University of Chicago</td>
<td>Median fin innervation of the zebrafish, <em>Danio rerio</em>, and implications for function</td>
<td></td>
</tr>
<tr>
<td>P2-131</td>
<td>Dugan Z, Van Breugel F*; University of Nevada Reno</td>
<td>The Role of Temporal and Spatial Memory in Food Search in <em>Drosophila</em></td>
<td></td>
</tr>
<tr>
<td>P2-132</td>
<td>Mboog RM, Williams J, Krajniak KG; Southern Illinois University Edwarsville</td>
<td>The effects of temperature on contraction of smooth muscle in the earthworm <em>Lumbricus terrestris</em> and its action in response to acetylcholine</td>
<td></td>
</tr>
<tr>
<td>P2-133</td>
<td>Gonzalez BD, Martinez Acosta VG; Univ of the Incarnate Word</td>
<td>Overexpression of Beta-catenin During Regeneration in <em>Lumbricus variegatus</em></td>
<td></td>
</tr>
<tr>
<td>P2-134</td>
<td>Barkan CL, Zomik E, Leininger EC*; Reed College, New College of Florida</td>
<td>Identifying neuronal properties underlying the evolution of divergent vocal behaviors</td>
<td></td>
</tr>
<tr>
<td>P2-136</td>
<td>Han JW, Friesen CN, Young RL, Hofmann HA; UT Austin</td>
<td>Social Regulation of Neural Transcriptomes</td>
<td></td>
</tr>
<tr>
<td>P2-137</td>
<td>Lent DD, Mendoza A; CSU Fresno</td>
<td>Navigating in the face of change: Modeling how changes in the visual environment of ants disrupts navigation.</td>
<td></td>
</tr>
<tr>
<td>P2-138</td>
<td>Khawaja Y, Husak J; University of St Thomas</td>
<td>Effects of Triiodothyronine on Metabolism in Lizards</td>
<td></td>
</tr>
<tr>
<td>P2-139</td>
<td>Go M, Notar JC, Johnsen S; Duke University</td>
<td>Associative learning in the brittle star <em>Ophioderma brevispinum</em></td>
<td></td>
</tr>
<tr>
<td>P2-140</td>
<td>Nourbakhsh_Rey M, Markham MR; University of Oklahoma</td>
<td>Metabolism Sensing Mechanisms in the Electric Organ Cells of a Weakly Electric Fish</td>
<td></td>
</tr>
<tr>
<td>P2-141</td>
<td>Havens LT, Lohmann KJ; University of North Carolina, Chapel Hill</td>
<td>A model for directional magnetic field processing in the Caribbean spiny lobster <em>Panulirus argus</em></td>
<td></td>
</tr>
<tr>
<td>P2-142</td>
<td>Kazmi JS, Bukowski-Thall GL, Tsang RH, Miller Al, Christie AE, Dickinson PS, Bowdoin College, University of Hawaii Manoa</td>
<td>The role of behavioral diversity in determining the extent to which neural patterns are modulated</td>
<td></td>
</tr>
<tr>
<td>P2-143</td>
<td>Wong BH, Kaye RJ, Christie AE, Dickinson PS, Bowdoin College, University of Hawaii Manoa</td>
<td>Differential modulation of pattern generating networks by multiple members of a single neuropeptide family</td>
<td></td>
</tr>
<tr>
<td>P2-143.5</td>
<td>Brittain CB, Smith T, Still SE, Menon A, Cristol DA, Wada H; Auburn University, William &amp; Mary</td>
<td>Effects of Dietary Methylmercury on Songbird Hippocampal Neuroanatomy</td>
<td></td>
</tr>
<tr>
<td>P2-144</td>
<td>McCue MD, Lighton JRB, Sable Systems International</td>
<td>13C-Glucose oxidation testing in laboratory mice: effects of dose, temperature, and nutritional state</td>
<td></td>
</tr>
<tr>
<td>P2-145</td>
<td>Duong P, Riley GF, Romero MF, Piermarini PM, Gillen CM*; Kenyon College, Mayo Clinic, Ohio State University</td>
<td>Immunohistochemical Localization of aeCCC2 in <em>Aedes aegypti</em> Larvae</td>
<td></td>
</tr>
<tr>
<td>P2-146</td>
<td>Pary HA, Yap KN, Gladden LB, Hill GE, Hood WR, Kavazis AN; Auburn University</td>
<td>MitoMobile Validation: Taking a Molecular Physiology Lab to the Field</td>
<td></td>
</tr>
<tr>
<td>P2-147</td>
<td>Glidden CA, Deakin JE, Desimone JG, Elowe CR, Groom DJE, Slezacek J, Gerson AR, University of Massachusetts Amherst, University of Western Ontario</td>
<td>Assessment of Novel Biomarkers of Kidney Function and Damage in Migratory Songbirds After Long-duration Flight</td>
<td></td>
</tr>
<tr>
<td>P2-148</td>
<td>Reardon KM, Husak JF, University of St Thomas</td>
<td>Effects of aerobic exercise training on mitochondrial function in lizards</td>
<td></td>
</tr>
<tr>
<td>P2-149</td>
<td>Ibera JN, Whittemore KS, Naquin TE, Silva MA, Cho A, Teeple JB, Schenk HJ, Mocko K, Burnaford JL, Hoeve WJ; California State University Fullerton</td>
<td>Salinity Responses of the Desert Shrubs <em>Isocoma acradenia</em> and <em>Larrea tridentata</em></td>
<td></td>
</tr>
<tr>
<td>P2-150</td>
<td>Yamada KYH, Zikeli SL, Yap KN, Zhang Y, Kiaris H, Kavazis AN, Hood WR; Auburn University, University of South Carolina</td>
<td>The relationship between the unfolded protein response and mitochondrial performance in deer mice maintained in a natural context</td>
<td></td>
</tr>
<tr>
<td>P2-151</td>
<td>Harris JC, Rees BB; University of New Orleans</td>
<td>HIF-1α Protein Levels in Tissues of <em>Fundulus grandis</em> During Hypoxia</td>
<td></td>
</tr>
<tr>
<td>P2-152</td>
<td>Hubert DL, Bentz EJ, Mason RT; Oregon State University</td>
<td>Transcriptional Response to Acute Thermal Stress in the Red-sided Garter Snake (<em>Thamnophis sirtalis parietalis</em>)</td>
<td></td>
</tr>
<tr>
<td>P2-153</td>
<td>Shah AA, Woods HA; University of Montana</td>
<td>Who can take the heat? Microclimates mediate heat tolerance in wasp-caterpillar interactions</td>
<td></td>
</tr>
</tbody>
</table>
**Deery SW, Haro D, Gunderson A; Tulane University**

Are Introduced Species More Plastic? A Comparison of the Heat-Hardening Capacity of Native and Non-Native Anolis Lizards

**Marroquin-Flores RA, Mortimer NT, Paiz RT, Bowden RM; Illinois St U**

Thermal fluctuations produce ecologically relevant expression profiles for temperature-responsive genes

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Assessing the concept and thermal sensitivity of the Pcrit in the mayfly *N. triangulifer*
<table>
<thead>
<tr>
<th>Posters</th>
<th>Biomaterials - Adhesion</th>
<th>Eco/evomorphology - Limbs, shells and tails</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-176</td>
<td>Marroquin CM, Munoz-Garcia A; Ohio State University</td>
<td>Energy Expenditure Among Different Roost Types and Colony Sizes Observed in Chiroptera</td>
</tr>
<tr>
<td>P2-177</td>
<td>Cavey LT, Secor SM; University of Alabama</td>
<td>Larger Meals Generate a Disproportionate Greater Cost of Digestion</td>
</tr>
<tr>
<td>P2-178</td>
<td>Gefen E, Raviv D; University of Haifa-Oranim</td>
<td>Post-feeding metabolic response and thermal preference in the scorpion Hottentotta judaicus</td>
</tr>
<tr>
<td>P2-179</td>
<td>Quintanilla Ramirez GS, Treidel LA, Williams CM; Univ of California Berkeley</td>
<td>Aerobic Scope is increased to support flight in wing-polymorphic female crickets, Gryllus firmus</td>
</tr>
<tr>
<td>P2-180</td>
<td>Groom DJE, Elove CE, Slezacek J, Gerson AR; University of Massachusetts Amherst, University of Western Ontario</td>
<td>Whole-animal Metabolic Phenotype Before and After a Migratory Flight in the Yellow-rumped Warbler (Setophaga coronata)</td>
</tr>
<tr>
<td>P2-181</td>
<td>Cornelius JM, Cameron R, Bradley D; Oregon State University, Eastern Michigan University</td>
<td>Activity drives investment in hematocrit recovery versus fat storage in food-restricted captive red crossbills Loxia curvirostra</td>
</tr>
<tr>
<td>P2-182</td>
<td>Minow PM, Parlin A, Do Amaral JPS, Schaeffer PJ; Elmhurst College, University of Cincinnati, Clermont College, Miami University</td>
<td>How does diet composition affect thermal preference and the aerobic scope of digestion?</td>
</tr>
<tr>
<td>P2-183</td>
<td>Pamfilie AM, Garner AM, Niewiarowski PH; University of Akron</td>
<td>Watch Your Step: A Comparison of Digital Morphology Across Ecomorphs in Anolis Lizards</td>
</tr>
<tr>
<td>P2-184</td>
<td>Seleb B, Thatcher M, Lieb J, Noel A; Georgia Institute of Technology, Georgia Tech Research Institute</td>
<td>Sure-Footed in Slippery Situations: Underwater Grip with Otter Paws</td>
</tr>
<tr>
<td>P2-185</td>
<td>Kaimaki DM, Attipoe AEL, Stoukidi MN, Labonte D; Imperial College London</td>
<td>Temperature-Induced Viscosity Changes of the Insect Pad Secretion</td>
</tr>
<tr>
<td>P2-186</td>
<td>Falso MS, Gustafson KL, Marshall LV, Falso PG; Slippery Rock University</td>
<td>Investigation of Nuptial Pads in Xenopus laevis Exposed to the Pesticide Imidacloprid</td>
</tr>
<tr>
<td>P2-187</td>
<td>Ringenwald BE; Bogacki EC, Stark AY; Villanova University</td>
<td>Crawl or Fall: The Effect of Variable Temperature and Humidity on Gecko Locomotion</td>
</tr>
<tr>
<td>P2-188</td>
<td>Bogacki EC, Ringenwald BE, Stark AY; Villanova University</td>
<td>Stick and Run: Locomotor Behavior of Tokay Geckos on Wet and Dry Substrates</td>
</tr>
<tr>
<td>P2-189</td>
<td>Satterlie RA, Hermans CO, Norekian TN; University of North Carolina Wilmington, Sonoma State University, Whitney Laboratory for Marine Bioscience</td>
<td>Ultrastructure of Adhesive Papillae on the Buccal Cones of the Pteropod Mollusc Clione limacina: Evidence for a Duo-Gland Adhesive System</td>
</tr>
<tr>
<td>P2-190</td>
<td>Implicito CJ, Stark AY; Villanova University</td>
<td>The Effect of Surface Temperature on Adhesion of a Temperate Ant</td>
</tr>
<tr>
<td>P2-192</td>
<td>Lang KL, Gifford ME; University of Central Arkansas</td>
<td>Multivariate analyses of performance tradeoffs and phenotypic integration in the prairie lizard (Sceloporus consobrinus)</td>
</tr>
<tr>
<td>P2-193</td>
<td>Chevalier-Horgan C, Pierce SE; Hutchinson JR, Diogo R, Molnar JL; NYITCOM, Harvard University, Royal Veterinary College, Howard University</td>
<td>Biomechanical modelling of tetrapods: the structural and functional adaptation from aquatic to terrestrial life</td>
</tr>
<tr>
<td>P2-194</td>
<td>Robin H, Stayton CT; Bucknell University</td>
<td>Are there common patterns of ontogenetic shell shape changes between aquatic and terrestrial emydid turtles?</td>
</tr>
<tr>
<td>P2-195</td>
<td>Young VKH, Stamer MK, Baeza JA, Blob RW; Saint Mary’s College, Clemson University</td>
<td>Comparative Limb Bone Scaling and Shape in Emydid Turtles</td>
</tr>
<tr>
<td>P2-196</td>
<td>Kubicek KM, Britz R, Conway KW; Texas A&amp;M University, Natural History Museum</td>
<td>Ontogeny of the Pectoral-fin Radials in Catfishes</td>
</tr>
<tr>
<td>P2-197</td>
<td>Woldt KM, Sustaita D; California State University San Marcos</td>
<td>Preliminary analysis of climbing morphology and performance of the salt marsh harvest mouse and co-occurring species in the Suisun Marsh, California</td>
</tr>
<tr>
<td>P2-198</td>
<td>Rivera G, Neely CMD; Creighton University</td>
<td>Patterns of fluctuating asymmetry in the limbs of freshwater turtles</td>
</tr>
</tbody>
</table>
**Morphology and mechanics - muscles and tendons**

P2-199  **McCue MD, Klokk JC, Lighton JRB, Hammond KA; Sable Systems International, University of California Riverside**

Energetics of Peromyscus treadmill running at different speeds, inclines, and environmental temperatures

P2-200  **Stover KK, Roberts TJ, Azizi E; University of California Irvine, Brown University**

The shape of things to come: Age-related restriction in muscle shape change during shortening

P2-201  **Huynh G, Duman A, Azizi E; University of California Irvine**

Effects of Caffeine on Jump Performance in *Rhinella marina*

P2-202  **Asencio AM, Powers JD, Williams CD, Molingen SA, Daniel TL; University of Washington, University of California, Allen Institute of Cell Science**

Predicting complex modulus of active muscle from models of elastically coupled molecular motors

P2-203  **Panessiti CE, Rickards G, Rull M, Konow N; UMass Lowell, Andover High**

Does the contribution of elastic recoil vary with temperature and between strike and chewing behaviors in axolotl feeding?

P2-204  **Valencia MM, Ashzand BA, Bowens JL, Monroy JA, Horner JM; California State University San Bernardino, Claremont Colleges**

The effects of different exercise regimes on tendon remodeling in mice (*Mus musculus*)

P2-205  **Glass JR, Harrison JF; Arizona State University**

Testing the limits: Physiological responses of honeybees (*Apis mellifera*) during flight in variable-density gases

P2-206  **Delep SJC, Rimkus B, Shehaj A, Konow N; UMass Lowell**

The effect of stimulation intensity on the range of optimal lengths of mouse hindlimb muscles

P2-207  **Mendoza E, Schwaner J, Freymiller G, McGowan C, Clark R, Azizi E; University of California Irvine, University of Idaho, San Diego State University**

Kinematics of kangaroo rat foot-drumming

P2-208  **Hatcher M, Florendo J, Maia A; Rhode Island College, University of Rhode Island**

Rising Ocean Temperatures Affect Red and White Muscle Recruitment in Fish Species

P2-209  **Cox SM, Deboef A, Salzano MQ, Katugam K, Piazza SJ, Rubenson J; Penn State, Georgia Tech**

Elastic System Shows No Plasticity to Different Functional Demands During Growth

P2-210  **Hernandez LP, Prado MA*, Mendoza-Castillo JM; George Washington University**

Histological diversification in the muscular anatomy of the palatal organ with Cypriniformes

P2-211  **Kimball D, Minicozzi M, Gibb A; Northern Arizona University, Minnesota State University**

Bonytail, the Arizona tuna, convergence in muscle and tendon anatomy in scombrids and Gila cypha

P2-212  **Lin K, Feiler A, Chu W, Garcia N, Ilton M; Harvey Mudd College**

Understanding the Elastic Efficiency of Biological Springs

P2-213  **Cook A, Ilton M; Harvey Mudd College**

Computational Modeling of Latch-Spring Systems

P2-213.5  **Schulz AK, Rincon C, Hu DL; Georgia Institute of Technology**

Elephant Trunks Behave like Telescoping Poles

**Locomotion - Legs, joints and stability**

P2-214  **Unsworth CK, Astley HC; University of Akron**

Quantifying the compliance of the millipede body while traversing irregular terrain

P2-216  **McNamara A, Dunham NT, Young JW, Stanton DW, Wood J, Shapiro LJ; University of Texas Austin, Cleveland Metroparks Zoo, Northeast Ohio Medical University**

Comparative platyrhine walking kinematics across natural, discontinuous substrates

P2-217  **Ilijima M, Munteanu VD, Diamond KM, Blob RW; Clemson University**

Locomotor mechanics of juvenile alligators reveals ontogenetic changes in the roles of the fore- and hindlimbs

P2-218  **Mannava A, Schapker N, Lewis C, German R, Young JW, NEOMED**

Effects of preterm birth on locomotor performance in infant pigs

P2-219  **Flores E, Duman A, Azizi E; University of California Irvine**

The effects of extrinsic loading on the coordinated landings of *Rhinella marina*

P2-220  **Po T, Heydar S, Kanso E, McHenry MJ; UC Irvine**

The neuromechanics of locomotion in sea stars (*Protoreaster nodosus*)

P2-221  **Saintsing AJ, Full RJ; University of California Berkeley**

Running endurance after leg loss in cockroaches

P2-223  **Maisonneuve MC, Schiebel PE, Goldman DI; Georgia Institute of Technology**

A robophysical snake with bio-inspired actuation to explore the role of passive mechanics in limbless locomotors.

P2-224  **Vick CP, Gifford ME; University of Central Arkansas**

Climbing Performance as a Physical Cost of Reproduction in Prairie Lizards (*Sceloporus consobrinus*)
<table>
<thead>
<tr>
<th>ID</th>
<th>Title</th>
<th>Authors</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-226</td>
<td>Lateral Undulation Aids Soft Earthworm Robot Anchoring and Locomotion in Heterogeneous Environments</td>
<td>Bonnan MF, Moore CL*, Barton A, Dizinno J, Muller K, Smith J, Weiker J, Stockton University, Red Bank Veterinary Hospital</td>
<td></td>
</tr>
<tr>
<td>P2-227</td>
<td>The effect of enclosure type on locomotion and energy expenditure in captive lemurs</td>
<td>Ozkan-Aydin Y, Liu B, Goldman Di, Hammond Ill FL; Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>P2-228</td>
<td>Complementary to S5: Form, structure and function: How plants vs. animals solve physical problems</td>
<td>Owerkowicz T; Univ of California Irvine, CSU San Bernardino, Rockefeller Wildlife Refuge</td>
<td></td>
</tr>
<tr>
<td>P2-233</td>
<td>More is not necessarily better: Physical therapy differentially influences crawl quality and quantity in Hirudo verbana</td>
<td>Reppe F, Huss JC, Fratzl P, Eder M; Max-Planck-Institute of Colloids and Interfaces</td>
<td></td>
</tr>
<tr>
<td>P2-234</td>
<td>Building a mechanical model of a tiny suction feeder to explore its performance landscape</td>
<td>Hansen AK, Lent DD, Muller UK*, California State University Fresno</td>
<td></td>
</tr>
<tr>
<td>P2-235</td>
<td>The infection of young-of-year threespine stickleback by a cestode parasite</td>
<td>Miller FM, Geller JB, Kahn AS, Connolly TP; Moss Landing Marine Laboratories</td>
<td></td>
</tr>
<tr>
<td>P2-236</td>
<td>Prevalence of Microsporidia and Wolbachia infection in the amphipod Gammarus fasciatus</td>
<td>O’Leary NE, Stark AY; Villanova University</td>
<td></td>
</tr>
<tr>
<td>P2-237</td>
<td>Investigating the dissemination of antibiotic resistant Enterobacteriaceae microorganisms via a migratory bird species</td>
<td>Mulins H, Davis J, Aronson N; Radford University, Uniformed Services University</td>
<td></td>
</tr>
<tr>
<td>P2-238</td>
<td>Using ecological niche modeling to predict the suitable habitat for Trichinella species in cougars (Puma concolor) from Colorado</td>
<td>Anderson HB, Hutchinson M, Corbin CE, Hranitz JM; Bloomsburg University of Pennsylvania, Pennsylvania Department of Agriculture</td>
<td></td>
</tr>
<tr>
<td>P2-239</td>
<td>Distribution of Oocysts of Two Neogregarines (Mattesia sp. and Ophryocystis elektroscirrha), which Infect the Hypodermis of Fire Ants, Solenopsis, and Milkweed Butterflies, Danaini</td>
<td>Watson LAR, Musgrove CM, Hinds AD, Ambardar M, Carvalho CM; Fort Hays State University</td>
<td>Jungle Pharmacy: Exploring the Antibacterial and Antitrypanosomal Properties of Ficus insipida</td>
</tr>
<tr>
<td>P2-240</td>
<td>Generalized Environmental Stress Response in Acropora corals</td>
<td>Dixon G, Matz MV; University of Texas at Austin</td>
<td></td>
</tr>
<tr>
<td>P2-241</td>
<td>Distribution of Oocysts of Two Neogregarines (Mattesia sp. and Ophryocystis elektroscirrha), which Infect the Hypodermis of Fire Ants, Solenopsis, and Milkweed Butterflies, Danaini</td>
<td>Mullins H, Davis J, Aronson N; Radford University, Uniformed Services University</td>
<td>Jungle Pharmacy: Exploring the Antibacterial and Antitrypanosomal Properties of Ficus insipida</td>
</tr>
<tr>
<td>P2-242</td>
<td>Using ecological niche modeling to predict the suitable habitat for Trichinella species in cougars (Puma concolor) from Colorado</td>
<td>Shannon RP, Naden L, Bolek MG; Oklahoma State University</td>
<td></td>
</tr>
<tr>
<td>P2-243</td>
<td>Investigating the dissemination of antibiotic resistant Enterobacteriaceae microorganisms via a migratory bird species</td>
<td>Koch RW, Reichard M; Oklahoma State University</td>
<td></td>
</tr>
<tr>
<td>P2-244</td>
<td>Distribution of Oocysts of Two Neogregarines (Mattesia sp. and Ophryocystis elektroscirrha), which Infect the Hypodermis of Fire Ants, Solenopsis, and Milkweed Butterflies, Danaini</td>
<td>Watson LAR, Musgrove CM, Hinds AD, Ambardar M, Carvalho CM; Fort Hays State University</td>
<td>Jungle Pharmacy: Exploring the Antibacterial and Antitrypanosomal Properties of Ficus insipida</td>
</tr>
<tr>
<td>P2-245</td>
<td>Investigating the dissemination of antibiotic resistant Enterobacteriaceae microorganisms via a migratory bird species</td>
<td>Dixon G, Matz MV; University of Texas at Austin</td>
<td></td>
</tr>
</tbody>
</table>

Sunday 5 January 2020

Posters
<table>
<thead>
<tr>
<th>ID</th>
<th>Authors</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-245</td>
<td>Rippe JP, Baumann JH, Bove CB, Aichelman HE, Davies SW, Castillo KD; University of Texas at Austin, University of North Carolina Chapel Hill, Boston University</td>
<td>Environmental drivers of coral growth across the western Caribbean Sea and Florida Keys</td>
</tr>
<tr>
<td>P2-246</td>
<td>Aichelman HE, Wuitchik DM, Atherton KF, Kriefall NG, Davies SW; Boston University</td>
<td>Do Facultative Coral Hosts Buffer Their Symbionts in Response to Thermal Extremes?</td>
</tr>
<tr>
<td>P2-247</td>
<td>Bedwell H, Bay L, Fuller Z, Przeworski M, Matz MV; University of Texas at Austin, Australian Institute of Marine Science, Columbia University</td>
<td>Mitochondrial introgression and its role in coral thermal tolerance</td>
</tr>
<tr>
<td>P2-250</td>
<td>Hanes SD, Hubbuch J; Martin Methodist College</td>
<td>Descriptive analysis of cellular organization in the Aiptasia-Symbiodinium model system</td>
</tr>
</tbody>
</table>

Sunday 5 January 2020

88 The Society for Integrative and Comparative Biology
Monday Schedule of Events

Events take place in the JW Marriott Austin, unless otherwise noted

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poster Session 3 Set Up</td>
<td>7:00 AM – 8:00 AM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Speaker Ready Room</td>
<td>7:00 AM – 5:00 PM</td>
<td>Room 405</td>
</tr>
<tr>
<td>Registration</td>
<td>7:30 AM – 3:00 PM</td>
<td>Grand Ballroom Foyer</td>
</tr>
<tr>
<td>Coffee Break AM</td>
<td>9:30 AM – 10:30 AM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Exhibit Hall</td>
<td>9:30 AM – 5:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Coffee Break PM</td>
<td>3:30 PM – 4:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 3 Even Numbers Authors Present</td>
<td>3:30 PM – 4:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 3 Odd Numbers Authors Present</td>
<td>4:30 PM – 5:30 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>Poster Session 3 Teardown</td>
<td>5:30 PM – 6:00 PM</td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

**SYMPOSIUM ORAL PRESENTATIONS**

S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models
Chair: Karen Burnett, Jonathon Stillman, Donald Mykles, David Durica
7:45 AM – 3:30 PM Lone Star D

Chair: Henry Astley
7:45 AM – 3:30 PM Lone Star H

Chair: Lance McBrayer, Eric McElroy, Diego Sustaita
7:45 AM – 3:30 PM Brazos

**CONTRIBUTED PAPER ORAL PRESENTATIONS**

**MORNING**

Session 71: Communication Mechanisms
8:00 AM – 9:45 AM Lone Star A

Session 72: Evolutionary Morphology
8:00 AM – 9:45 AM Lone Star B

Session 73: Get in My Belly: Feeding on a Variety of Foods
8:00 AM – 9:45 AM Lone Star C

Session 74: Chchchchanging Climate, Part I
8:00 AM – 9:45 AM Lone Star E

Session 75: Building a Better Muscle
8:00 AM – 9:30 AM Lone Star F

Session 76: The Way That I Walk
8:00 AM – 10:00 AM Lone Star G

Session 77: Ecophysiology of Oxygen Delivery
8:00 AM – 10:00 AM Rooms 301-302

Session 78: Complementary to S10: Melding Modeling and Morphology: Integrating Approaches to Understand the Evolution of Form and Function, Part I
8:00 AM – 9:30 AM Rooms 303-304

Session 79: Parental Care & Reproduction
8:00 AM – 9:45 AM Room 205

Session 80: S.T.R.E.S.S. 1
8:00 AM – 9:45 AM Rooms 201-202

Session 81: Where Do We Go From Here? Biogeography
8:00 AM – 9:45 AM Rooms 203-204

Session 82: Bio-Physical Fascination-Biophysical Environment, Part I
8:00 AM – 10:00 AM Rooms 402-403

Session 83: Complementary to S4: Reproduction: the Female Perspective From an Integrative and Comparative Framework, Part I
10:15 AM – 11:45 AM Lone Star A

Session 84: Awesome Adaptations
10:15 AM – 11:45 AM Lone Star B

Session 85: Chew on This
10:15 AM – 11:45 AM Lone Star C

Session 86: Chchchchanging Climate, Part II
10:30 AM – 12:00 PM Lone Star E

Session 87: (Don't) Trip, Stumble and Fall
10:00 AM – 12:00 PM Lone Star F

Session 88: Morphology of the Senses
10:30 AM – 12:00 PM Lone Star G

Session 89: Host-pathogen Interactions
10:30 AM – 12:00 PM Rooms 301-302

Session 90: Complementary to S10: Melding Modeling and Morphology: Integrating Approaches to Understand the Evolution of Form and Function, Part II
10:15 AM – 12:00 PM Rooms 303-304

Session 91: Sensory Basis of Organismal Interactions
10:15 AM – 12:00 PM Room 205

Session 92: S.T.R.E.S.S. 2
10:15 AM – 11:45 AM Rooms 201-202

Session 93: Migration and Navigation
10:30 AM – 12:00 PM Rooms 203-204

Session 94: Bio-“Physical Fascination”-Biophysical Environment, Part II
10:30 AM – 11:30 AM Rooms 402-403
## Afternoon

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>Complementary to S4: Reproduction: the Female Perspective from an Integrative and Comparative Framework, Part II</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star A</td>
</tr>
<tr>
<td>96</td>
<td>Complementary to S5: Form, Structure and Function: How Plants vs. Animals Solve Physical Problems</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star B</td>
</tr>
<tr>
<td>97</td>
<td>Everything Sucks</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star C</td>
</tr>
<tr>
<td>98</td>
<td>Population Genetics</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star E</td>
</tr>
<tr>
<td>99</td>
<td>Pulling and Tugging: Musculo-Skeletal Architecture</td>
<td>1:30 PM – 3:15 PM</td>
<td>Lone Star F</td>
</tr>
<tr>
<td>100</td>
<td>Physiology Through the Seasons</td>
<td>1:30 PM – 3:30 PM</td>
<td>Lone Star G</td>
</tr>
<tr>
<td>101</td>
<td>Two to tango: Host-parasite interactions</td>
<td>1:30 PM – 3:30 PM</td>
<td>Rooms 301-302</td>
</tr>
<tr>
<td>102</td>
<td>Ecophysiology of Diet</td>
<td>1:30 PM – 3:30 PM</td>
<td>Rooms 303-304</td>
</tr>
<tr>
<td>103</td>
<td>Sensing and Navigation</td>
<td>1:30 PM – 3:15 PM</td>
<td>Room 205</td>
</tr>
<tr>
<td>104</td>
<td>Comparative Endocrinology</td>
<td>1:30 PM – 3:00 PM</td>
<td>Rooms 201-202</td>
</tr>
<tr>
<td>105</td>
<td>The Evolution of Morphology</td>
<td>1:30 PM – 3:30 PM</td>
<td>Rooms 203-204</td>
</tr>
<tr>
<td>106</td>
<td>The Evolution of Physiology</td>
<td>1:30 PM – 3:30 PM</td>
<td>Rooms 402-403</td>
</tr>
</tbody>
</table>

## Committee and Board Meetings

<table>
<thead>
<tr>
<th>Committee</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student/Postdoc Affairs Committee</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 406</td>
</tr>
<tr>
<td>SICB Division Secretaries</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 401</td>
</tr>
<tr>
<td>POs, ICB editor and Symposium Organizers for Washington DC Meeting</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 409</td>
</tr>
<tr>
<td>Development Committee</td>
<td>12:00 PM – 1:30 PM</td>
<td>OP Italian Restaurant, Hotel</td>
</tr>
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</table>

## Business Meetings

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SICB Society Meeting &amp; Awards Presentation</td>
<td>5:30 PM – 6:30 PM</td>
<td>Lone Star D</td>
</tr>
</tbody>
</table>

## Workshops and Programs

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Postdoctoral Affairs Committee: “How-To?” Daily Booth</td>
<td>9:15 AM – 5:00 PM</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>NSF Program Officers: Funding Opportunities, Integrative Research and Education, and Q&amp;A</td>
<td>12:00 PM – 1:30 PM</td>
<td>Lone Star C</td>
</tr>
<tr>
<td>Round-table discussion: Overcoming Challenges for Testing Gene Function in Post-Embryonic Life Stages</td>
<td>12:00 PM – 1:30 PM</td>
<td>Rooms 211-212</td>
</tr>
<tr>
<td>Student Support Committee Brown Bag Workshop for Graduate Students: Writing a competitive GIAR/FGST grant proposal</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 404</td>
</tr>
<tr>
<td>Workshop: Parenting Through Academia</td>
<td>12:00 PM – 1:30 PM</td>
<td>Rooms 402-403</td>
</tr>
<tr>
<td>Podcast: Live Recording of Big Biology with Dr. Molly Cummings</td>
<td>3:30 PM – 4:30 PM</td>
<td>Room 407</td>
</tr>
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</table>

## Social Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning Run</td>
<td>6:00 AM</td>
<td>JW Marriott Lobby</td>
</tr>
<tr>
<td>Broadening Participation Social</td>
<td>7:00 PM – 9:00 PM</td>
<td>Room 401</td>
</tr>
<tr>
<td>DVM/DCB Social</td>
<td>9:00 PM – 12:00 AM</td>
<td>South-East Lobbies</td>
</tr>
</tbody>
</table>
**Monday Program Symposia**

Note: Presenter is first author unless noted by an asterisk (*).

### Building Bridges from Genome to Phenome: Molecules, Methods and Models

**Chairs:** Karen Burnett, Jonathon Stillman, Donald Mykles, David Durica

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45 am</td>
<td>S7-1</td>
<td>Burnett KG, Durica DS, Mykles DL, Stillman JH; College of Charleston, University of Oklahoma, Colorado State University, San Francisco State University</td>
<td>Lone Star D</td>
</tr>
<tr>
<td>8:00 am</td>
<td>S7-2</td>
<td>Mauro AA, Ghalambor CK; Colorado State University</td>
<td></td>
</tr>
<tr>
<td>8:30 am</td>
<td>S7-3</td>
<td>Lyko F; German Cancer Research Center (DKFZ)</td>
<td></td>
</tr>
<tr>
<td>9:00 am</td>
<td>S7-4</td>
<td>Li J, Levitan BB, Kultz D; University of California Davis</td>
<td></td>
</tr>
<tr>
<td>9:30 am</td>
<td>Coffee Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 am</td>
<td>S7-5</td>
<td>Havird JC; University of Texas Austin</td>
<td></td>
</tr>
<tr>
<td>10:30 am</td>
<td>S7-6</td>
<td>Sharbrough J, Montooth K, Neiman M; Colorado State University, University of Nebraska, University of Iowa</td>
<td></td>
</tr>
<tr>
<td>11:00 am</td>
<td>S7-7</td>
<td>Santos SR, Hoffman SK, Seitz KW, Havird JC, Weese DA, Auburn University, Green River College, University of Texas at Austin, Georgia College and State University</td>
<td></td>
</tr>
<tr>
<td>11:30 am</td>
<td>S7-8</td>
<td>Milligan-Myhre KCA; University of Alaska Anchorage</td>
<td></td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td>S7-9</td>
<td>Schaefer RJ, Baxter I, McCue ME; University of Minnesota, Donald Danforth Plant Science Center</td>
<td></td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S7-10</td>
<td>Gust KA; US Army</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S7-11</td>
<td>Hahn DA; University of Florida</td>
<td></td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S7-12</td>
<td>Garrett AD, Brennan RS, Steinhart A, Pelletier A, Pespeni MH; University of Vermont</td>
<td></td>
</tr>
<tr>
<td>3:30 pm</td>
<td>Coffee Break</td>
<td></td>
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</table>

### Long Limbless Locomotors: The Mechanics and Biology of Elongate, Limbless Vertebrate Locomotion

**Chair:** Henry Astley

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45 am</td>
<td>S8-1</td>
<td>Astley HC; University of Akron</td>
<td></td>
</tr>
<tr>
<td>8:00 am</td>
<td>S8-2</td>
<td>Astley HC; University of Akron</td>
<td></td>
</tr>
<tr>
<td>8:30 am</td>
<td>S8-3</td>
<td>Jayne BC; University of Cincinnati</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
<td>Speaker(s) &amp; Affiliation</td>
<td>Title</td>
</tr>
<tr>
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</tr>
<tr>
<td>9:00 am</td>
<td>S8-4</td>
<td>Fu Q, Gart SW, Mitchel TW, Kim JS, Chinkijean GS, Li C*; Johns Hopkins University</td>
<td>Body lateral deformation and compliance help snakes and snake robots stably traverse large steps</td>
</tr>
<tr>
<td>9:30 am</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>10:00 am</td>
<td>S8-5</td>
<td>Ward AB, Redmann E, Alqahtani A, Sheikh A, Mehta RS, Aderpilz Univ, UC Santa Cruz</td>
<td>East Coast Travel Is An Uphill Battle: Terrestrial locomotion in American Eels</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S8-6</td>
<td>Bergmann P, Mann SDW, Morinaga G, Freitas ES, Siler CD; Clark University, Oklahoma State University, University of Oklahoma</td>
<td>Convergent evolution of vertebral morphology and locomotion in snake-like lizards</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S8-7</td>
<td>Tingle JL; University of California Riverside</td>
<td>Prevalence of Facultative Sidewinding Locomotion in Non-specialist Snake Species</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S8-8</td>
<td>Capano JG, Brainerd EL; Brown University</td>
<td>Reaction Forces and Rib Function During Locomotion in Snakes</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td>S8-9</td>
<td>Zamore SA, Araujo N, Socha JJ; University of Colorado Boulder, Virginia Tech</td>
<td>Visual behavior in flying snakes: measurement and exploration with virtual reality</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S8-10</td>
<td>Schiebel PE, Lin B, Hubbard AM, Chen L, Blekherman G, Goldman DI; Georgia Institute of Technology</td>
<td>Specialization of control strategies in terrestrial slithering snakes.</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S8-11</td>
<td>Choset HM; Carnegie Mellon University</td>
<td>Geometric Methods for Locomotion in Limbless and Legged Systems</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S8-12</td>
<td>Kano T, Ishiguro A; Tohoku University</td>
<td>Decoding Decentralized Control Mechanism Underlying Adaptive and Versatile Locomotion of Snakes</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>7:45 am</td>
<td>S9-1</td>
<td>McBryer L, McElroy E; Sustaita D; Georgia Southern University, College of Charleston, University of California at San Marcos</td>
<td>Introduction: Applied Functional Biology: linking ecological morphology to conservation and management</td>
</tr>
<tr>
<td>8:00 am</td>
<td>S9-2</td>
<td>Thompson CL, Williams SH, Glender KE, Teaford MF, Vinyard CJ; Grand Valley State University, Ohio University, Duke University, Touro University, Northeast Ohio Medical University</td>
<td>Getting Humans Off Monkeys’ Backs; Can Ecophysiological Research Inform Primate Conservation and Habitat Management Efforts?</td>
</tr>
<tr>
<td>9:00 am</td>
<td>S9-4</td>
<td>Wilson RS, Pavlic T, Wheatley R, Cameron SF; University of Queensland, Arizona State University</td>
<td>Using performance to predict the survival of threatened mammals</td>
</tr>
<tr>
<td>9:30 am</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>10:00 am</td>
<td>S9-5</td>
<td>Wynken J, Salmon M; Florida Atlantic Univ</td>
<td>Science, Sea Turtles, and Links to Conservation Management</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S9-7</td>
<td>McBryer L, Orton RW, Neel LK, Kaunert MD, Tucker DB, Williams SC; Georgia Southern University, University of Texas Arlington, Arizona State University, Ohio University</td>
<td>Integrating Studies of Function and Ecology to Inform Conservation and Management</td>
</tr>
</tbody>
</table>
# Monday Program Morning Sessions

Note: Presenter is first author unless noted by an asterisk (*).

## Monday 6 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 am</td>
<td><strong>S9-8</strong></td>
<td>Mendelson III JR; Zoo Atlanta &amp; Georgia Institute of Technology</td>
<td>The Interface of Taxonomy, Systematics, Genetics, and Conservation</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td><strong>S9-9</strong></td>
<td>De Meyer J, Verhelst P, Adriaens D; University of Ghent</td>
<td>The role of understanding the eel’s morphology in stopping its decline</td>
</tr>
<tr>
<td>2:00 pm</td>
<td><strong>S9-10</strong></td>
<td>Ryerson WG; Saint Anselm College</td>
<td>Captive breeding alters head morphology and behavior in reptiles: implications for headstarting and reintroduction programs</td>
</tr>
<tr>
<td>2:30 pm</td>
<td><strong>S9-11</strong></td>
<td>Mehta RS, Dale KE; University of California Santa Cruz</td>
<td>Linking Fitness and Functional Roles Inside and Outside a Marine Protected Area Around Catalina Island</td>
</tr>
<tr>
<td>3:00 pm</td>
<td><strong>S9-12</strong></td>
<td>Moran CJ, Gibb AC, Ward DL; Citadel, Northern Arizona University, United States Geological Survey</td>
<td>Integrating studies of anatomy, physiology and behavior into conservation of imperiled cyprinid fishes of the Southwestern United States</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

### Communication Mechanisms

**Session 71**

**Chair: Fadeke Adeola**

<table>
<thead>
<tr>
<th>Time</th>
<th><strong>71-1</strong></th>
<th>Adeola FI, Lailvaux SP; University of New Orleans</th>
<th>The Influence of Dampered Locomotor Function on Calling Structure in the house cricket <em>Acheta domestica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td><strong>71-2</strong></td>
<td>Provini P; Centre for Research and Interdisciplinarity</td>
<td>Birdsong for human(e) voices: Building efficient voice prostheses inspired from bird vocal system</td>
</tr>
<tr>
<td>8:15 am</td>
<td><strong>71-3</strong></td>
<td>Burkhard TT, Phelps SM; University of Texas at Austin</td>
<td>Evidence for heritable variation in the songs of Alston’s singing mouse</td>
</tr>
<tr>
<td>8:30 am</td>
<td><strong>71-4</strong></td>
<td>Rodriguez-Saltos CA, Ramsay G, Maney DL; Emory University, Children’s Healthcare of Atlanta</td>
<td>An R package to measure the similarity of natural sounds via mutual information</td>
</tr>
<tr>
<td>8:45 am</td>
<td><strong>71-5</strong></td>
<td>Steele TJ, Barkan CL, Baas-Thomas N, Zomik E; Reed College</td>
<td>Investigating the neuronal basis of sex-specific vocal behavior</td>
</tr>
<tr>
<td>9:00 am</td>
<td><strong>71-6</strong></td>
<td>Fialko KY, Price TP; University of Chicago</td>
<td>Comparative kinematics of <em>Phylloscopus</em> warbler territorial display behaviors</td>
</tr>
<tr>
<td>9:15 am</td>
<td><strong>71-7</strong></td>
<td>Bloomston NA, Prather JF; University of Wyoming</td>
<td>Neural Circuits Underlying Decision Making</td>
</tr>
<tr>
<td>9:30 am</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

### Evolutionary Morphology

**Session 72**

**Chairs: Edward Burress, Stephanie Baumgart**

<table>
<thead>
<tr>
<th>Time</th>
<th><strong>72-1</strong></th>
<th>Burress ED, Wainwright PC; University of California, Davis</th>
<th>Are Oral and Pharyngeal Jaw Diversification Rates Correlated in Cichlid Fishes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td><strong>72-2</strong></td>
<td>Camarillo H, Muñoz MM; Yale University</td>
<td>Macroevolutionary patterns of morphological diversification in wrasses</td>
</tr>
<tr>
<td>8:15 am</td>
<td><strong>72-3</strong></td>
<td>Ford KL, Albert JS; University of Louisiana at Lafayette</td>
<td>Convergent evolution of craniofacial morphologies in aperonotid and mormyrid electric fishes</td>
</tr>
<tr>
<td>8:30 am</td>
<td><strong>72-4</strong></td>
<td>Godoy PL; Stony Brook University</td>
<td>Cranial shape variation in Crocodylomorpha and the influence of ecological transitions during its evolutionary history</td>
</tr>
<tr>
<td>8:45 am</td>
<td>Coffee Break</td>
<td></td>
<td>Grand Ballroom</td>
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</tbody>
</table>
Monday 6 January 2020

9:00 am 72-5  Hedrick BP, Brocklehurst N, Mitchell JS, Benson RBJ; Louisiana State University Health Sciences Center, University of Oxford, West Virginia University  Functional Constraints and Disparity in Bird Limb Proportion Evolution

9:15 am 72-6  Baumgart SL, Claessens LPA; University of Chicago, Maastricht University  Avian sternum disparity and ecomorphological implications

9:30 am 72-7  Anderson CV, Reiter PA, Roberts TJ; Univ South Dakota, Brown University  Examining the early stages of adaptive radiation in Anolis roquet from Martinique

9:45 am  Coffee Break  Grand Ballroom

8:00 AM – 9:45 AM  Session 73  Lone Star C

Get in My Belly: Feeding on a Variety of Foods  Chairs: Ashley Peterson, Dylan Wainwright

8:00 am 73-1  Kolmann MA, Hughes LC, Evans K, Huie JM, Orti G, Hernandez LP; George Washington University, Brown University, University of Washington  Carnivorous grazers? How to build scale-feeding and fin-feeding fishes from less egregious relatives

8:15 am 73-2  Navon D, Rogers SM, Higraph TE; University of California Riverside, University of Calgary  Behavioral Variation in Feeding Strikes across Five Populations of Threespine Stickleback (Gasterosteus aculeatus)

8:30 am 73-3  Peterson AN, McHenry MJ; Univ of California, Irvine  Slow and steady wins the prey: The persistent predation strategy of the red lionfish (Pterois volitans)

8:45 am 73-4  Perevolotsky T, Genin A, Holzman R; Tel Aviv University  Work That Body: Thrust generated by the fins and body contributes to the feeding success of herbivorous reef fish

9:00 am 73-5  Cooper WJ, Kniatskaya K, Nixon A, Devers M, Ringo D, Barber E; Washington State University  Using genetically modified zebrafish to investigate the evolution and development of feeding in other minnows

9:15 am 73-6  Marshall CD, Raley LN, Peredo CM, Pynson ND; Texas A&M University, Portland State University, University of Michigan, Smithsonian Institution  Implications for The Antiquity of Raptorial Biting in Pinnipeds: Exploring Mandible Morphology in the Callorhinus Lineage

9:30 am 73-7  Wainwright DK, Summers D; Yale University, Harvard University  Crushing prey in the open ocean: the pharyngeal jaws of lanternfishes

9:45 am  Coffee Break  Grand Ballroom

8:00 AM – 9:45 AM  Session 74  Lone Star E

Changing Climate, Part I  Chair: Robert Srygley

8:00 am 74-2  Lenard A, Diamond S, Case Western Reserve University  Butterfly Traits Resolve Variation in Range Shift Responses to Recent Climate Change

8:15 am 74-3  Srygley RB; USDA-Agricultural Research Service  Diapause plasticity allows insects to cope with drought at high and low elevations

8:30 am 74-4  Riddell EA, Iknayan KJ, Wolf BO, Beissinger SR; University of California Berkeley, University of New Mexico  Thermoregulatory costs drive responses of mammal and bird communities to climate change in the Mojave Desert

8:45 am 74-5  Anderson RA; Western Washington University  Using among-year climate conditions and climate indices to predict consequences for multiple trophic levels: plants, insects and lizards

9:00 am 74-6  Breitenbach AT, Paitz RT, Bowden RM; Illinois State University  Let’s Do the Time-lag Again: Ecologically Relevant Incubation Temperatures Delay the Response of Sex-determining Genes in a Turtle with TSD

9:15 am 74-7  Carter AW, Sheldon KS; University of Tennessee  The Climate Variability Hypothesis Predicts Thermal Plasticity Across Life Stages of Onthophagus taurus Dung Beetles

9:30 am 74-8  Bovo RP, Simon MN, Provete DB, Navas CA, Andrade DV; University of Sao Paulo, University of California Santa Cruz, Federal University of Mato Grosso do Sul  Intraspecific Variation in Thermal Tolerance and Water Balance of Amphibians Across Subtropical Elevational Gradients

9:45 am  Coffee Break  Grand Ballroom
**Monday 6 January 2020**

### Building a Better Muscle

**Chairs:** Alexis Noel, Stephanie Ross

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 75</th>
<th>Topic</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>75-1</td>
<td>Nguyen KD, Venkadesan M, Yile University</td>
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<tr>
<td>8:15 am</td>
<td>75-2</td>
<td>Cooper AN, Martin JC, McDermott WJ, Dulaney SO, Carrier DR, University of Utah, Orthopedic Specialty Hospital</td>
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<td>8:30 am</td>
<td>75-3</td>
<td>Wold ES, Roberts TJ, Sieboda DA, Brown University</td>
</tr>
<tr>
<td>8:45 am</td>
<td>75-4</td>
<td>Ross SA, Rimkus B, Konow N, Biewener AA, Wakeling JM, Simon Fraser University, University of Massachusetts Lowell, Harvard University</td>
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<tr>
<td>9:00 am</td>
<td>75-5</td>
<td>Arias AA, Ball AM, Azizi E, University of California, Irvine</td>
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<tr>
<td>9:15 am</td>
<td>75-6</td>
<td>Noel A, Nadler J, Georgia Tech Research Institute</td>
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<tr>
<td>9:30 am</td>
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### The Way That I Walk

**Chairs:** Rob Siddall, Christine Vega

<table>
<thead>
<tr>
<th>Time</th>
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<tr>
<td>8:00 am</td>
<td>76-1</td>
<td>Wang Y, Othayoth R, Li C, Johns Hopkins University</td>
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<td>8:15 am</td>
<td>76-2</td>
<td>Zhong B, Schiebel P, Ozkan-Aydin Y, Brown M, Carruthers A, Rieser J, Sponberg S, Goldman D, Georgia Tech</td>
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<td>8:30 am</td>
<td>76-3</td>
<td>Vega CM, Ashley-Ross MA, Wake Forest University</td>
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<tr>
<td>8:45 am</td>
<td>76-4</td>
<td>Turner ML, Gatesy SM, Brown University</td>
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<td>9:00 am</td>
<td>76-5</td>
<td>Michel KB, Bishop PJ, Cuff AC, Allen V, Hutchinson JR, Royal Vet College UK</td>
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<td>9:15 am</td>
<td>76-6</td>
<td>Siddall RJD, Jusufi A, Max Planck Institute for Intelligent Systems</td>
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<tr>
<td>9:30 am</td>
<td>76-7</td>
<td>Kikel M, Gecelter R, Thompson NE; NYIT College of Osteopathic Medicine</td>
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<tr>
<td>9:45 am</td>
<td>76-8</td>
<td>Gecelter R, Kikel M, Thompson NE; NYIT College of Osteopathic Medicine</td>
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<td>10:00 am</td>
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<td>Coffee Break</td>
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### Ecophysiology of Oxygen Delivery

**Chair:** Heather Liwanag

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<thead>
<tr>
<th>Time</th>
<th>Session 77</th>
<th>Topic</th>
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<tr>
<td>8:00 am</td>
<td>77-1</td>
<td>Herndon CJ, Fenton FH, Georgia Institute of Technology</td>
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<tr>
<td>8:30 am</td>
<td>77-3</td>
<td>Negrete Jr B, Ackery KL, Esbaugh AJ; University of Texas Austin Marine Science Institute</td>
</tr>
<tr>
<td>8:45 am</td>
<td>77-4</td>
<td>Martin LM, Esbaugh AJ; University of Texas at Austin, Marine Science Institute</td>
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</tbody>
</table>
Monday 6 January 2020

9:00 am  **77-5**  Dichiera AM, Esbaugh AJ; University of Texas at Austin, Marine Science Institute

Red blood cell carbonic anhydrase dictates oxygen delivery rate in red drum (*Sciaenops ocellatus*)

9:30 am  **77-7**  Harrison JF, Avazian V, Weed M, Munoz E, Vandenbrooks JM; Arizona State University, Midwestern University

Hypermetric scaling of the leg tracheal system in cockroaches

9:45 am  **77-8**  King EE, Stillman JH, Williams CW; University of California, Berkeley, San Francisco State University

New Zealand Mud Snails Continue Respiring During Severe Oxygen Limitation at Warm Temperatures

10:00 am  **Coffee Break**  -------------------------------------------- Grand Ballroom

8:00 AM – 9:30 AM  **Session 78**  Rooms 303-304

Complementary to S10: Melding Modeling and Morphology: Integrating Approaches to Understand the Evolution of Form and Function, Part I

Chairs: Alexander Hoover, Julien Clavel

8:00 am  **78-1**  Hoover AP, Katija K; University of Akron, Monterey Bay Aquarium Research Institute

Manse and Tail: Flow structure and morphological constraints of the filtration feeding mechanisms by giant larvaceans

8:15 am  **78-2**  Clavel J, Morlon H; Natural History Museum, École Normale Supérieure

Phylogenetic Signal and Linear Model for High-Dimensional Multivariate Comparative Data: a case study with the MANOVA

8:30 am  **78-3**  Koehl MAR, Nguyen H, Fauci L; University of California, Berkeley, Trinity University, Tulane University

Effects of Cell Morphology, Attachment to a Surface, and Colony Formation on the Hydrodynamic Performance of Choanoflagellates

8:45 am  **78-4**  Darcy HE, Anderson PSL; University of Illinois Urbana-Champaign

Do aquatic paedomorphs converge in both morphology and performance across phylogeny in Spelerpini Salamanders?

9:00 am  **78-6**  Wehls D, Technion-Israel Institute of Technology

Single Layer Fish Schools- for Hunting and Energy Saving

9:15 am  **78-7**  Naylor ER, Higham TE; University of California, Riverside

Toes for any occasion: morphological covariation and ecological signal within the gecko attachment system

9:30 am  **Coffee Break**  --------------------------------------------- Grand Ballroom

8:00 AM – 9:45 AM  **Session 79**  Room 205

Parental Care & Reproduction

Chair: Rayna Harris

8:00 am  **79-1**  Harris RM, Austin SH, Langcalisi A, MacManes M, Calisi RM; NPB, UC Davis, MCB, UNH

Peaks and valleys of prolactin-related gene expression during the pigeon parental care stage

8:15 am  **79-2**  Alonge MM, Daniels DT, Schobel T, Bentley GE; University of California, Berkeley

Flexible Expression of Sickness Behavior and Parental Care Across Stages of Avian Reproduction

8:30 am  **79-3**  Perez JH, Tolla E, Dunn IC, Meddle SL, Stevenson TJ; University of Glasgow, Roslin Institute, University of Edinburgh

Neuropsin and VA-opsin both facilitate photoinduction of avian seasonal breeding

8:45 am  **79-4**  Vernasco BJ, Dakin R, Sisson Z, Haussmann MF; Ryder TB, Moore IT, Washington State University, Carleton University, Bucknell University, Smithsonian Migratory Bird Center, Virginia Tech

Using Telomeres to Assess Patterns of Biological Aging in a Cooperative Lek-breeding Passerine, the Wire-Tailed Manakin (*Pipra filicauda*)

9:00 am  **79-5**  Sayavong N, Estrada M, Salas H, Gunderson AR, Stillman JH, Tsukimura B; California State University, Fresno, Tulane University, San Francisco State University

Effects of preferred temperature, interspecific interactions, and increased population density on vitellogenesis on intertidal crabs *Petrolisthes cinctipes* and *Petrolisthes manimaculus*

9:15 am  **79-6**  Lasala JA, Hughes C, Wyneken J; Florida Atlantic University

Leatherback Turtle Breeding Sex Ratios are 1:1

9:30 am  **79-7**  Sasson D, Johnson T, Scott E, Fowler-Finn K; Saint Louis University

Water deprivation affects mating behaviors and outcomes in the harvestman, *Leiobunum vittatum*

9:45 am  **Coffee Break**  --------------------------------------------- Grand Ballroom
### Monday 6 January 2020

#### Session 80

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>Lattin CR, Kelly TR; Louisiana State University</td>
<td>Method matters: Considerations for calculating glucocorticoid negative feedback</td>
</tr>
<tr>
<td>8:15 am</td>
<td>Hodinka BL, Ashley NT; Simon Fraser University, Western Kentucky University</td>
<td>Effect of sleep loss on executive function and baseline corticosterone levels in an arctic-breeding songbird, the Lapland longspur (Calcarius lapponicus)</td>
</tr>
<tr>
<td>8:30 am</td>
<td>Krause JS, Reid AMA, Perez JH, Bishop V, Ramenofsky M, Wingfield JC, Meddle SL, UN Reno, UC Davis, U Edinburgh, Roslin Institute</td>
<td>The reduction in negative feedback sensitivity underlies seasonal changes in corticosterone in free-living migrant white-crowned sparrows</td>
</tr>
<tr>
<td>8:45 am</td>
<td>Dantzer B, Van Kesteren F, Palme R, Boutin S, McAdam AG, Lane JE; University of Michigan, University of Veterinary Medicine Vienna, University of Alberta, University of Guelph, University of Saskatchewan</td>
<td>Disentangling how multiple ecological factors impact glucocorticoids in red squirrels</td>
</tr>
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</table>

#### Session 81

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<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 am</td>
<td>Jimeno B, Landry D, Stager M, Wolf C, Prichard M, Cheviron Z, Breuner C, University of Montana</td>
<td>Metabolic traits, but not corticosterone concentrations, are associated with reproductive investment in tree swallows</td>
</tr>
<tr>
<td>9:15 am</td>
<td>Guindre-Parker S; Kennesaw State University</td>
<td>Revisiting glucocorticoid plasticity</td>
</tr>
<tr>
<td>9:30 am</td>
<td>Butler MW, Armour EM, Minnick JA, Rossi ML, Schock SF, Berger SE, Hines JK; Lafayette College</td>
<td>Both Circulating Corticosterone Levels and Heme Oxygenase Expression Are Correlated With Circulating Triglyceride Levels in House Sparrows</td>
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#### Session 82

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<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Title</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>Howey CAF; University of Scranton, Pennsylvania State University</td>
<td>Thermoregulation and Foraging Behavior of Timber Rattlesnakes (Crotalus horridus) in a Disturbed Landscape</td>
</tr>
<tr>
<td>8:15 am</td>
<td>Steele Cabrera S, Hunt TS, Haddad NM, Lucky A, Daniels JC; University of Florida, Michigan State University</td>
<td>Measuring the Outcome of Reintroduction Efforts for an Endangered Butterfly</td>
</tr>
</tbody>
</table>
Monday 6 January 2020

8:30 am 82-3 Lolavar A, Wyneken J; Florida Atlantic University
The impact of sand moisture on the temperature-sex ratio responses of developing loggerhead (Caretta caretta) sea turtles

8:45 am 82-4 Farallo VR, Muñoz MM; Yale University
Out of time and out of room: Are montane salamanders vulnerable to extinction due to climate change?

9:00 am 82-5 Lark R, Sharabi L, Levy O*; Tel Aviv University, Israel
The use of remote sensing and models to understand behavioral thermoregulation in dogs

9:15 am 82-6 Powers DR, Lapsansky AB, Shannon ES, Tobalske BW; George Fox University, University of Montana
Body-Temperature Management by Hovering and Perching Hummingbirds in Cold and Warm Temperatures

9:30 am 82-7 Sears MW, Nussear KE, Simandle ET; Clemson University, University of Nevada, Reno
Biophysical ecology and the evolution of methods: are they deleterious mutations?

9:45 am 82-8 Morales OJ, Walker N, Warne RW, Boyles JG; Southern Illinois University - Carbondale
Consequences of pharmacologically induced corticosterone hormone on body temperature and body condition in the banner-tailed kangaroo rat.

10:00 am Coffee Break

10:15 AM – 11:45 AM Session 83 Lone Star A
Complementary to S4: Reproduction: The Female Perspective From an Integrative and Comparative Framework, Part I
Chairs: Nicole Danos, Daniel J. Stadtmauer

10:15 am 83-1 Bilotta F, Lee M, Danos N; University of San Diego
Pregnancy-induced changes to muscle-tendon morphology and function

10:30 am 83-2 Andreasen VA, Yap KN, Yamada K, Williams A, Zikeli S, Kavezis AN, Hood WR; Auburn University
The impact of maternal corticosterone on offspring morphology and mitochondrial physiology

10:45 am 83-3 Stadtmauer DJ, Chavan AR, Wagner GP; Yale University
Baby Light My Fire: “Cooperative Inflammation” in Marsupial Pregnancy

11:00 am 83-4 Million KM, Proffitt MR, Reese SJ; Indiana University, Bloomington, Howard University
MHC-based Olfactory Signals and Mate Choice in Darters (Etheostoma)

11:15 am 83-5 Reese SJ, Million KM, Proffitt MR; Howard University, Indiana University
Response to Visual and Olfactory Stimuli in Darters (Etheostoma) during Mate Choice Trials

11:30 am 83-6 Stiller AB, Staub NL; Whitman College, Gonzaga University
Not a surprise: Female salamanders (plethodontid species Aneides ferreus) communicate to males during courtship as evidenced by courtship-like glands on their dorsum

11:45 am Lunch Break

10:15 AM – 11:45 AM Session 84 Lone Star B
Awesome Adaptations
Chairs: Anthony Lapsansky, Dana Orbach

10:15 am 84-1 Sombke A, Mueller CHG; University of Vienna, University of Greifswald
Evolutionary transformations of centipede ultimate legs

10:30 am 84-2 Weller Hl, López-Fernández H, McMahan CD, Brainerd EL; Brown University, University of Michigan, Field Museum of Natural History
The spandrels of Satan’s perches: evidence for the co-optation of feeding traits in the convergent evolution of mouthbrooding in Neotropical cichlids

10:45 am 84-3 Freymiller GA, Schwaner MU, Whitford MD, McGowan CP, Higham TE, Clark RW, San Diego State University, University of Idaho, University of California, Riverside
Determining the functional significance of bipedalism in heteromyid rodents through comparisons of morphology and performance

11:00 am 84-4 Smith SM, Angielczyk KD, Kerbis Peterhans JC; Field Museum of Natural History
Vertebral number and spinal regionalization in large shrews (Soricidae)

11:15 am 84-5 Orbach DN, Brennan PLR, Hedrick BP, Keener W, Webber M, Mesnick SL; Texas A&M University, Mount Holyoke College, University of Oxford, Golden Gate Cetacean Research, Southwest Fisheries Science Center
Unique Coevolution of Genital Asymmetry and Lateralized Mating Behavior in A Mammal

11:30 am 84-6 Lapsansky AB, Tobalske BW, University of Montana
The biomechanics of multi-functional wings in diving birds

11:45 am Lunch Break
### Monday 6 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 85</th>
<th>Lone Star C</th>
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<tbody>
<tr>
<td><strong>10:15 AM – 11:45 AM</strong></td>
<td><strong>Session 85</strong></td>
<td><strong>Lone Star C</strong></td>
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<tr>
<td><strong>Chew on This</strong></td>
<td>Konow N, Panessiti C, Schwar D, Bouvier C, Marbel-Rodriguez C, Heiss E, Ross CF, Rull M, UMass Lowell, U Jena, U Chicago</td>
<td>Food processing across the fish-tetrapod split</td>
</tr>
<tr>
<td><strong>10:30 am</strong></td>
<td><strong>85-2</strong> Lomax JJ, Brainerd EL; Brown University</td>
<td>Comparative Skeletal Kinematics of Overbite-Shearing and Compressive Chewing Cycles in a Pacu Fish, <em>Piaractus brachypomus</em></td>
</tr>
<tr>
<td><strong>10:45 am</strong></td>
<td><strong>85-3</strong> Beery SM, Olson RA, Montuelle SJ, Williams SH; Ohio University</td>
<td>Effect of food properties on molar occlusion during chewing in pigs</td>
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<tr>
<td><strong>11:00 am</strong></td>
<td><strong>85-4</strong> Olson RA, Curtis HE, Williams SH; Ohio University</td>
<td>To chew or not to chew: a comparison of the 3D kinematics of feeding and drinking in pigs</td>
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<tr>
<td><strong>11:15 am</strong></td>
<td><strong>85-5</strong> Laurence-Chasen JD, Junod RM, Hatsopoulos NG, Arce-McShane F, Ross CF; University of Chicago</td>
<td>Geometric morphometric analysis of tongue shape dynamics during feeding in <em>Macaca mulatta</em></td>
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<td><strong>11:30 am</strong></td>
<td><strong>85-6</strong> Gould FDH, Lammers A, Mayerl CJ, German RZ; Rowan University, Cleveland State University, Northeast Ohio Medical University</td>
<td>Differential Effect of Superior and Recurrent Laryngeal Nerve Lesion on Kinematics and Performance in Mammalian Swallowing</td>
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<td><strong>11:45 am</strong></td>
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### 10:30 AM – 12:00 PM

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<tr>
<td><strong>Chchchhanging Climate, Part II</strong></td>
<td>Rahman MS, Rahman MS; University of Texas Rio Grande Valley</td>
<td>Effects of Heat Exposure on Antioxidant Expression and Redox Status in the American Oyster: A Laboratory Study</td>
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<tr>
<td><strong>10:30 am</strong></td>
<td><strong>86-1</strong> Rahman MS, Rahman MS; University of Texas Rio Grande Valley</td>
<td>The Effects of Winter Warming Stress on Metabolic Activity in Diapausing <em>Pieris rapae</em> Butterflies</td>
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<td><strong>10:45 am</strong></td>
<td><strong>86-2</strong> Mikucki E, Buchanan J, Julick C, Montooth K, Lockwood B; University of Vermont, Vanderbilt University, University of Nebraska - Lincoln</td>
<td>Beetle Pupae Show Tradeoff Between Metabolic Depression and Body Size in Response to Increased Temperature Mean and Variance</td>
</tr>
<tr>
<td><strong>11:00 am</strong></td>
<td><strong>86-3</strong> Fleming JML, Carter AW, Sheldon KS; University of Tennessee</td>
<td>Past, Present, and Future Distributions of <em>Agkistrodon contortrix</em></td>
</tr>
<tr>
<td><strong>11:15 am</strong></td>
<td><strong>86-4</strong> Lee MA, Densmore III LD; Texas Tech University</td>
<td>Impacts of Climate and Flooding on Current and Future Sea Turtle Nest Survival in the Eastern United States</td>
</tr>
<tr>
<td><strong>11:30 am</strong></td>
<td><strong>86-5</strong> Lyons MP, Von Holle B, Weishampel JF; University of Central Florida, National Science Foundation</td>
<td>Body Size Changes Across Lizards and Crocodylians Correspond to Climatic Changes Through Deep Time</td>
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<tr>
<td><strong>11:45 am</strong></td>
<td><strong>86-6</strong> Elshafie SJ; University of California, Berkeley</td>
<td><strong>12:00 pm</strong></td>
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<tr>
<td><strong>12:00 pm</strong></td>
<td><strong>Lunch Break</strong></td>
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### 10:00 AM – 12:00 PM

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<tr>
<td><em>(Don’t) Trip, Stumble and Fall</em></td>
<td>Vazquez S, Phan A, Joseph M, Pace CM*; Le Moyne College</td>
<td>The aerial righting ability of the brown marmorated stink bug, <em>Halyomorpha halys</em>.</td>
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<tr>
<td><strong>10:00 am</strong></td>
<td><strong>87-1</strong> Vazquez S, Phan A, Joseph M, Pace CM*; Le Moyne College</td>
<td>Maximum Aerodynamic Force Production by the Wandering Glider Dragonfly (<em>Pantala flavescens</em>, Libellulidae)</td>
</tr>
<tr>
<td><strong>10:15 am</strong></td>
<td><strong>87-2</strong> Su GT, Dudley R, Pan TY, Zheng MZ, Peng LS, Li QS; Beihang University, University of California, Berkeley, Xihua University</td>
<td>Wingbeat frequency modulation to large lateral perturbations in hawkmoths</td>
</tr>
<tr>
<td><strong>10:30 am</strong></td>
<td><strong>87-3</strong> Gemilere R, Lds-Vip, Gau JF, Sponberg S; Georgia Tech</td>
<td>Template model reveals mechanism of wing and leg coordination during self-righting of a cockroach-inspired robot</td>
</tr>
<tr>
<td><strong>10:45 am</strong></td>
<td><strong>87-4</strong> Xuan Q, Li C; Johns Hopkins University</td>
<td>Beyond the Kármán Gait: Knifefish swimming responses to complex wakes shed by a free oscillating cylinder</td>
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<tr>
<td><strong>11:00 am</strong></td>
<td><strong>87-5</strong> Ortega-Jimenez VM, Sanford CP, Kennesaw State University</td>
<td><strong>11:00 AM – 12:00 PM</strong></td>
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2020 Final Program 99
<table>
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<th>Time</th>
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</tr>
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<tbody>
<tr>
<td>11:15 am</td>
<td>87-6</td>
<td>Kinematic responses to rolling perturbations during swimming in the bluegill sunfish</td>
<td>Fath M, Nasimi F, Tytell E; Tufts University</td>
</tr>
<tr>
<td>11:30 am</td>
<td>87-7</td>
<td>Lateral line and visual systems in bluegill sunfish (Leopomis macrochirus) contribute to regaining stability in horizontal vortices</td>
<td>Stinson HM, Mukherjee R, Tytell ED, Schwalbe MAB; Lake Forest College, Tufts University</td>
</tr>
<tr>
<td>11:45 am</td>
<td>87-8</td>
<td>Avian wing suspension for gust rejection</td>
<td>Stevenson JPJ, Cheney JA, Durston NE, Usherwood JR, Windsor SP, Bomphrey RJ, University of Bristol, Royal Veterinary College</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td><strong>Lunch Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Session 88</td>
<td><strong>Morphology of the Senses</strong></td>
<td><strong>Chairs: Kelsi Rutledge, Katie Thomas</strong></td>
</tr>
<tr>
<td>10:30 am</td>
<td>88-1</td>
<td>Mechatosensors on Dragonfly Wings for sensing Aeroelasticity</td>
<td>Uhrhan MJ, Fabian JM, Siwanowicz I, Lin HT; Imperial College London, HHMI Janelia Research Campus</td>
</tr>
<tr>
<td>10:45 am</td>
<td>88-2</td>
<td>Hearing Better When Lopsided: Tympanal Asymmetry May Enhance Hearing in the Parasitoid Fly Ormia ochracea</td>
<td>Mikel-Stites MR, Staples AE, Marek P; Virginia Tech</td>
</tr>
<tr>
<td>11:00 am</td>
<td>88-3</td>
<td>Sniffing out batoid nasal morphology: a model for classification with functional implications</td>
<td>Rutledge KM; University of California Los Angeles</td>
</tr>
<tr>
<td>11:15 am</td>
<td>88-4</td>
<td>Ecological Correlates of Eye Size in Frogs and Toads</td>
<td>Thomas KN, Gower DJ, Bell RC, Fujita MK, Schott RK, Streicher JW; Natural History Museum, Smithsonian National Museum of Natural History, University of Texas at Arlington</td>
</tr>
<tr>
<td>11:30 am</td>
<td>88-5</td>
<td>Ancestral Generalization as a Potential Gateway to Rapid Dietary Divergence in Neotropical Leaf-Nosed Bats</td>
<td>Hall RP, Mutumi GL, Hedrick BP, Yohe LR, Sadler A, Davies KTJ, DaValos LM, Rossiter SJ, Sears K, Dumont ER; University of California Merced, Louisiana State University, Yale University, University of California Los Angeles, Queen Mary University of London, Stony Brook University</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td><strong>Lunch Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Session 89</td>
<td><strong>Host-pathogen Interactions</strong></td>
<td><strong>Chairs: Karie Altman, Amberleigh Henschens</strong></td>
</tr>
<tr>
<td>10:30 am</td>
<td>89-1</td>
<td>What role do ephemeral ponds play in the amphibian disease landscape?</td>
<td>Saenz V, Richards Zawacki C; University of Pittsburgh</td>
</tr>
<tr>
<td>10:45 am</td>
<td>89-2</td>
<td>Understanding the Role of Intrinsic Physiological Factors in the Population Recovery of Myotis lucifugus (little brown myotis) from White-nose Syndrome</td>
<td>Richardson CS, Looney C, Ineson K, Foster J, Sillah A, Eisman H; Lesley University, Northeastern University, University of New Hampshire, University of Massachusetts-Amherst, Tufts University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>89-3</td>
<td>Detection and Enumeration of Bacterial Pathogens in the American Oyster, Crassostrea virginica</td>
<td>Billah MM, Rahman MS; University of Texas Rio Grande Valley</td>
</tr>
<tr>
<td>11:30 am</td>
<td>89-5</td>
<td>Effects of pond drying on northern leopard frog development, growth, immune function, and susceptibility to Batrachochytrium dendrobatidis</td>
<td>Altman KA, Hall EM, Rollins-Smith LA, Ohmer MEB, Richards-Zawacki CL; University of Pittsburgh, Vanderbilt University</td>
</tr>
<tr>
<td>11:45 am</td>
<td>89-6</td>
<td>Oxidative damage resistance as a potential mechanism of disease tolerance in a wild host</td>
<td>Henschens AE, Hawley DM, Adelman JS; University of Memphis, Virginia Tech</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td><strong>Lunch Break</strong></td>
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### Monday 6 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 90</th>
<th>Rooms 303-304</th>
</tr>
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<tbody>
<tr>
<td>10:15 am</td>
<td><strong>Session 90</strong></td>
<td></td>
</tr>
<tr>
<td>10:15 am</td>
<td><strong>90-1</strong></td>
<td><strong>Complementary to S10: Melding Modeling and Morphology: Integrating Approaches to Understand the Evolution of Form and Function, Part II</strong>&lt;br&gt;<strong>Chairs: Stacy Farina, Micheal Granatosky</strong>&lt;br&gt;Investigating the Locomotion of an Early Deuterostome through 3D Imaging and Digital Modeling</td>
</tr>
<tr>
<td>10:30 am</td>
<td><strong>90-2</strong></td>
<td>An XROMM and kinetic analysis of underwater walking in the West African lungfish (<em>Protopterus annectens</em>) with implications for the role of quadrupedal gaits during the fin-to-limb transition</td>
</tr>
<tr>
<td>10:45 am</td>
<td><strong>90-3</strong></td>
<td>Hydrodynamics Shed Light on Dinoflagellate Evolution</td>
</tr>
<tr>
<td>11:00 am</td>
<td><strong>90-4</strong></td>
<td>Hydrodynamics of barnacle nauplii shape evolution of body form</td>
</tr>
<tr>
<td>11:15 am</td>
<td><strong>90-5</strong></td>
<td>Kinematic integration of gill chamber pumping with body movements during burial in two morphologically disparate fish species</td>
</tr>
<tr>
<td>11:30 am</td>
<td><strong>90-6</strong></td>
<td>Reverse engineering the “trap-jaw” mechanism in spiders (Araneae, Mecysmaucheniiidae)</td>
</tr>
<tr>
<td>11:45 am</td>
<td><strong>90-7</strong></td>
<td>Constraining the Power Stroke of Premaxillary Protrusion: The Evolution of Diverse Cranial Musculature in Cypriniform Fishes</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Session 91</th>
<th>Room 205</th>
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<tbody>
<tr>
<td>10:15 am</td>
<td><strong>Session 91</strong></td>
<td></td>
</tr>
<tr>
<td>10:15 am</td>
<td><strong>91-1</strong></td>
<td>Sensory Basis of Organismal Interactions&lt;br&gt;<strong>Chair: Rulon Clark</strong>&lt;br&gt;Evaluating Evasion Strategies in Zebrafish Larvae</td>
</tr>
<tr>
<td>10:30 am</td>
<td><strong>91-2</strong></td>
<td>Chemical Landscapes of Fear: Crayfish can Determine the Degree of Predatory Threat by Olfaction Alone</td>
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<tr>
<td>10:45 am</td>
<td><strong>91-3</strong></td>
<td>Using correlated patterns of behavioral and molecular variation to understand individual variation</td>
</tr>
<tr>
<td>11:00 am</td>
<td><strong>91-4</strong></td>
<td>Hunger state modulates the decision of a nudibranch to pursue or evade hazardous prey</td>
</tr>
<tr>
<td>11:15 am</td>
<td><strong>91-5</strong></td>
<td>The Effect of Neurotransmitters on Life History Strategy: How do Increased Dopamine Levels Influence Aggression in Black Widow Spiders?</td>
</tr>
<tr>
<td>11:30 am</td>
<td><strong>91-6</strong></td>
<td>Now You See It, Now You Don’t: Role of Tectal CRF Administration on Visually Guided Feeding Behavior</td>
</tr>
<tr>
<td>11:45 am</td>
<td><strong>91-7</strong></td>
<td>Biochemical Warfare: The Coevolution of Rattlesnake Venom and Venom Resistance in Prey Species</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
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</tr>
<tr>
<td>Time</td>
<td>Session 92</td>
<td>Session 93</td>
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<td>---------------------------------------------------------------------------</td>
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<tr>
<td>10:15 AM</td>
<td><strong>S.T.R.E.S.S. 2</strong>&lt;br&gt;Chairs: Mauren Vitousek, Blake Jones</td>
<td><strong>Migration and Navigation</strong>&lt;br&gt;Chair: Jessica Malisch</td>
</tr>
<tr>
<td>10:15 am</td>
<td>92-1 Enslinger DC, Pritchard C, Gingery T, Langkilde T; University of California Berkeley, Pennsylvania State University</td>
<td>93-1 Taylor LD, Finnegan S, O’Dea A, Bralower TJ; University of California Berkeley, Smithsonian Tropical Research Institute, Pennsylvania State University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>92-2 Kimball MG, Grant AR, Chrisler A, Johnson E, Malisch JL; Louisiana State University, University of Nevada, St Mary’s College of Maryland</td>
<td>93-2 Malisch JL, Hahn TP, Breuner CW; St Mary’s College of Maryland, University of California Davis, University of Montana</td>
</tr>
<tr>
<td>10:45 am</td>
<td>92-3 Wolf SE, Beltran SE, Sanders TL, Rosvall KA; Indiana University, Dominican University, Oklahoma State University</td>
<td>93-3 Ramenofsky M, Pradhan D, Austin SH, Soma K, Schlinger B; University of California Davis, Idaho State University, Oregon State University, University of British Columbia, University of California Los Angeles</td>
</tr>
<tr>
<td>11:00 am</td>
<td>92-4 Choi W, Wada H; Auburn University</td>
<td>93-4 Bowers ME, Kajıura SM*; Florida Atlantic University</td>
</tr>
<tr>
<td>11:15 am</td>
<td>92-5 Da Silva DP, Gomes FR; University of Sao Paulo</td>
<td>93-5 Desimone JG, Tobalske BW, Breuner CW; University of Montana Missoula</td>
</tr>
<tr>
<td>11:30 am</td>
<td>92-6 Jones BC, Duval EH; Florida State University</td>
<td>93-6 Buo C, Taylor E, Bartles J, Christman K, Dayal P, Londraville RL; University of Akron</td>
</tr>
<tr>
<td>11:45 am</td>
<td>Lunch Break</td>
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<td>12:00 pm</td>
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<tr>
<td>10:30 AM</td>
<td><strong>Lunch Break</strong></td>
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<tr>
<td>10:30 AM</td>
<td><strong>Session 93</strong></td>
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</tr>
<tr>
<td>10:30 AM</td>
<td><strong>Migration and Navigation</strong>&lt;br&gt;Chair: Jessica Malisch</td>
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</tr>
<tr>
<td>10:30 am</td>
<td>93-1 Taylor LD, Finnegan S, O’Dea A, Bralower TJ; University of California Berkeley, Smithsonian Tropical Research Institute, Pennsylvania State University</td>
<td>93-1 Taylor LD, Finnegan S, O’Dea A, Bralower TJ; University of California Berkeley, Smithsonian Tropical Research Institute, Pennsylvania State University</td>
</tr>
<tr>
<td>10:45 am</td>
<td>93-2 Malisch JL, Hahn TP, Breuner CW; St Mary’s College of Maryland, University of California Davis, University of Montana</td>
<td>93-2 Malisch JL, Hahn TP, Breuner CW; St Mary’s College of Maryland, University of California Davis, University of Montana</td>
</tr>
<tr>
<td>11:00 am</td>
<td>93-3 Ramenofsky M, Pradhan D, Austin SH, Soma K, Schlinger B; University of California Davis, Idaho State University, Oregon State University, University of British Columbia, University of California Los Angeles</td>
<td>93-3 Ramenofsky M, Pradhan D, Austin SH, Soma K, Schlinger B; University of California Davis, Idaho State University, Oregon State University, University of British Columbia, University of California Los Angeles</td>
</tr>
<tr>
<td>11:15 am</td>
<td>93-4 Bowers ME, Kajıura SM*; Florida Atlantic University</td>
<td>93-4 Bowers ME, Kajıura SM*; Florida Atlantic University</td>
</tr>
<tr>
<td>11:30 am</td>
<td>93-5 Desimone JG, Tobalske BW, Breuner CW; University of Montana Missoula</td>
<td>93-5 Desimone JG, Tobalske BW, Breuner CW; University of Montana Missoula</td>
</tr>
<tr>
<td>11:45 am</td>
<td>Lunch Break</td>
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</tbody>
</table>
**Monday 6 January 2020**

### Monday Program Afternoon Sessions

**Note:** Presenter is first author unless noted by an asterisk (*).

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 95</th>
<th>Lone Star A</th>
</tr>
</thead>
</table>
| 1:30 PM  | **Complementary to S4:** Reproduction: the Female Perspective from an Integrative and Comparative Framework, Part II  
**Chairs:** Ned J. Place, Kristen J. Navara |  |
| 1:30 pm  | 95-1       | Plakke MS, Meslin C, Arikawa K, Clark NL, Morehouse N; University of Kansas, INRA, SOKENDAI, University of Utah, University of Cincinnati |
|          |            | A recent, lineage-specific, co-option event within the female reproductive tract of the Cabbage White butterfly, *Pierisrapae* L. |
| 1:45 pm  | 95-2       | Level ST, Reznick DN; University of California, Riverside |
|          |            | Can Mothers Differentially Allocate Resources to Offspring Sired by Different Males? |
| 2:00 pm  | 95-3       | Rosvall KA, Lipshutz SE; Indiana University, Bloomington |
|          |            | Obligate cavity-nesting shapes the evolution of territorial aggression, but not testosterone, in both female and male birds |
| 2:15 pm  | 95-4       | George EM, Rosvall KA; Indiana University, Bloomington |
|          |            | How social challenges modulate steroid signaling in the female brain |
| 2:30 pm  | 95-5       | McEntee M, Krzyszczyk E, Foroughirad V, Frère C, Mann J, Georgetown University, University of the Sunshine Coast |
|          |            | Fitness and mortality costs to females in a system with allied sexual coercion |
| 2:45 pm  | 95-6       | Crosier AE, Bapodra P, Santiestevan J, Comizzioli P, Place NJ*, Smithsonian Conservation Biology Institute, Columbus Zoo and Aquarium, Cornell University |
|          |            | Anti-Müllerian hormone as a predictor of responses to ovarian stimulation in cheetahs, *Acinonyx jubatus* |
| 3:00 pm  | 95-7       | McDonough CE, Pitnick S, Dorus S; Syracuse University |
|          |            | Molecular evolution and sex-biased expression of *Drosophila melanogaster* female reproductive tract tissues |
| 3:15 pm  | 95-8       | Navara KJ, Wrobel ER, Bentz AB, Lorenz WW, Gardner S, Mendonça MT; University of Georgia, Indiana University, Bloomington, Auburn University |
|          |            | Corticosterone treatment influences expression of gene pathways linked to meiotic segregation in preovulatory follicles of the domestic hen |
| 3:30 pm  | **Coffee Break** |  |

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 96</th>
<th>Lone Star B</th>
</tr>
</thead>
</table>
| 1:30 PM  | **Complementary to S5:** Form, Structure and Function: How Plants vs. Animals Solve Physical Problems  
**Chairs:** James C Liao, Saad Bhamla |  |
| 1:30 pm  | 96-1       | Matthews M, Crowley CJ, Aiello BR, Sikandar UB, Sponberg S; Georgia Tech |
|          |            | The Answer is Blowing in the Wind: Flower Wake Downwash Can Reduce Aerodynamic Forces in Insect Flight |
| 1:45 pm  | 96-2       | Liao JC, Akanyeti O; University of Florida, Aberystwyth University |
|          |            | How fishes use body wave interference to accelerate |
| 2:00 pm  | 96-3       | Lenz AS; University of Bristol |
|          |            | Structural Adaptations of *Nepenthes gracilis* Pitcher Lids to Capture Insects Using Drop Impacts |
| 2:15 pm  | 96-4       | Alexander SLM, Bhamla MS*; Georgia Institute of Technology |
|          |            | Ultrafast and underdamped: Slingshot spiders design conical webs for ambush predation and self-survival |
| 2:30 pm  | 96-5       | Golos MR, Bauer U; University of Bristol |
|          |            | Wettability of Pitcher Plant Trapping Surfaces |
| 2:45 pm  | 96-6       | McCaskey EN, Lehner K, Taylor I, Benfey PN, Goldman DI, Georgia Tech, Duke University |
|          |            | Rice Root Tip Circumnutation Facilitates Exploratory Behavior |
| 3:00 pm  | 96-7       | Wen KY; University of Exeter |
|          |            | Gait Rhythogenesis and Spatiotemporal Ordering in Self-propelling Unicellular Microorganisms |
| 3:15 pm  | 96-8       | Ozkan-Aydin Y, Goldman DI, Bhamla MS; Georgia Institute of Technology |
|          |            | Collective Behavior of Worm Blobs |
| 3:30 pm  | **Coffee Break** |  |
### Monday 6 January 2020

<table>
<thead>
<tr>
<th>1:30 PM – 3:15 PM</th>
<th>Session 97</th>
<th>Lone Star C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Everything Sucks</strong></td>
<td><em>Chairs: Aaron Olsen, Roi Holzman</em></td>
<td></td>
</tr>
<tr>
<td>1:30 pm 97-1</td>
<td>Hernandez LP, Olsen AM, Brainerd EL; George Washington University, Brown University</td>
<td>Convergent means of breaking constraint: How alternative means of premaxillary protrusion have allowed fishes to break functional constraints</td>
</tr>
<tr>
<td>2:00 pm 97-3</td>
<td>Olsen AM, Hernandez LP, Brainerd EL; Brown University, George Washington University</td>
<td>A 13-bar linkage model of the channel catfish skull and the degrees of freedom needed to suction feed</td>
</tr>
<tr>
<td>2:15 pm 97-4</td>
<td>Whitlow KR, Ross CF, Westneat MW; University of Chicago</td>
<td>Strike biomechanics in <em>Polypterus bichir</em> described with XROMM: implications for actinopterygian feeding evolution</td>
</tr>
<tr>
<td>2:45 pm 97-6</td>
<td>Kane EA, Higham TE; Georgia Southern University, UC Riverside</td>
<td>Apparent modulation of integration with prey type in bluegill is driven by individual differences in performance and its integration</td>
</tr>
<tr>
<td>3:00 pm 97-7</td>
<td>Holzman R, Eyal M, Malul D, Jacobs C; Tel Aviv University, Technion</td>
<td>You suck, We suck, Everyone sucks: <em>Homo sapiens</em> display poor suction feeding performance</td>
</tr>
<tr>
<td>3:15 pm</td>
<td><em>Coffee Break</em></td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

### 1:30 PM – 3:30 PM | Session 98 | Lone Star E |
| **Population Genetics** | *Chair: Christopher Martine* |            |
| 1:30 pm 98-1 | Frolova AD, Miglietta MP; Texas A&M University at Galveston | Environmental tolerance ranges and limits suggest differences in habitat preference and resilience to climate change among jellyfish (Class Scyphozoa) congeners in the Gulf of Mexico |
| 1:45 pm 98-2 | Halsey MK, Stuhler JD, Bradley RD, Stevens RD, Ray DA; Texas Tech University, Museum of Texas Tech | Temporal and Spatial Genetic Assessment of a Natural Metapopulation |
| 2:00 pm 98-3 | McDonnell AJ, Moore CL, Schuette S, Martine CT; Chicago Botanic Garden, Bucknell University, Western Pennsylvania Conservancy | A harbinger of good things to come in academic/ non-academic partnerships: Population genomics and conservation of *Erigenia bulbosa* (Apiaceae) in Pennsylvania. |
| 2:15 pm 98-4 | Hale HJ, Pokorny L, Gardner EM, Slep M, Johnson MG; Texas Tech University, Center for Biotechnology and Genomics, Case Western University | Developing a cost-effective workflow for high-throughput targeted sequencing of herbarium specimens using Angiosperms353 |
| 2:30 pm 98-5 | Whelan NV, Williams AS, Redak CA, Wright AA, Garrison NL, Halanych KM, Johnson PD, Garner JT; US Fish and Wildlife Service, Auburn University, Tuskegee University, Alabama Department of Conservation and Natural Resources | Habitat Preference and Impoundments Influence Population Genetic Patterns of Freshwater Gastropods |
| 2:45 pm 98-6 | Resh CA, Benesh KC, Mahon AR; Central Michigan University | Sourcing Invaders: A Northern Snakehead Story |
| 3:00 pm 98-7 | Orton RW, Schield DR, Nikolakis ZL, Perry BW, Demuth JP, Mackessy SP, Smith CF, Meik JM, Castoe TA; University of Texas at Arlington, University of Northern Colorado, Tarleton State University | The landscape of diversity and divergence across genomes highlights links between genome structure and evolution in the formation of genomic islands |
| 3:15 pm 98-8 | Johnson KM, Sirovka KA, Kelly MW; Louisiana State University | Variation in DNA Methylation and Gene Expression Between and Within Families of the Eastern Oyster *Crassostrea virginica* |
| 3:30 pm | *Coffee Break* | Grand Ballroom |
### Monday 6 January 2020

#### Session 99

**Pulling and Tugging: Musculo-Skeletal Architecture**  
*Chairs: Audrey Biondi, David Ryan*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>99-1</td>
<td>More evidence against a force-velocity trade-off in dynamic lever systems</td>
<td>Osgood AC, Sutton G, St. Pierre R, Cox SM*; Mount Holyoke College, University of Bristol, Carnegie Mellon University, Penn State</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>99-2</td>
<td>Mechanisms that Relate Transverse Loading of Muscle to Change in Contractile Performance</td>
<td>Ryan DS, Dominguez S, Nigam N, Wakeling JM; Simon Fraser University</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>99-3</td>
<td>Effect of the Sub-radular Fibers on Grasper Opening in <em>Aplysia californica</em></td>
<td>Kehl CE, Wu J, Lu S, Drushel RF, Smoldt RK, Chiel HJ; University of North Carolina at Chapel Hill, Case Western Reserve University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>99-5</td>
<td>Morphological Variation between Terrestrial and Semi-Aquatic Papuan Microhylid Frogs visualized through DiceCTs and Dissection</td>
<td>Fraser CJ, Hill EC, Butler MA; University of Hawaii</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>99-6</td>
<td>Functional Morphology of the Palate of <em>Varanus exanthematicus</em> and its Significance for the Evolution of Cranial Kinesis</td>
<td>Wilken AT, Middleton KM, Sellers KC, Cost IN, Holliday CM; University of Missouri</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>99-7</td>
<td>Anatomically Grounded Estimation of Limb Muscle Sizes in Archosauria</td>
<td>Cuff AR, Bishop PJ, Michel KB, Gaignet R, Hutchinson JR*; Royal Veterinary College</td>
</tr>
<tr>
<td>3:15 pm</td>
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#### Session 100

**Physiology Through the Seasons**  
*Chairs: David Swanson, Kevin Roberts*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>100-1</td>
<td>A gradual release of metabolic suppression during diapause termination in a montane insect</td>
<td>Roberts KT, Williams CM; Univ of California, Berkeley</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>100-2</td>
<td>Transcriptomic response to long-term storage under a fluctuating thermal regime in <em>Drosophila melanogaster</em></td>
<td>Melicher DM, Yocum GD, Rinehart RP; USDA ARS</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>100-3</td>
<td>Thermal Constraints on Anaerobic Exercise and Aerobic Performance are Not Major Drivers of Winter Dormancy in Cunner</td>
<td>Rowsey LE, Reeve C, Savoy T, Speers-Roesch B; University of New Brunswick</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>100-4</td>
<td>Seasonal and geographical variation in thermoregulatory performance of Cricetid rodents in the Mojave desert</td>
<td>Ramirez RW, Riddell EA, Wolf BO; University of New Mexico, University of California, Berkeley</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>100-5</td>
<td>What makes the Snow Bird fit for winter? The mechanisms underlying seasonal physiological flexibility</td>
<td>Stager M, Senner NR, Tobalske BW, Chevron ZA; University of Montana, University of South Carolina</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>100-6</td>
<td>Seasonal Changes in Body Composition and Torpor Use of Ruby-throated Hummingbirds (<em>Archilochus colubris</em>)</td>
<td>Eberts ER, Guglielmo CG, Welch KC; University of Toronto Scarborough, University of Western Ontario</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>100-7</td>
<td>Environmental Heterogeneity and Metabolic Flexibility in Horned Larks and House Sparrows: A Test of the Climatic Variability Hypothesis</td>
<td>Swanson DL, Oboikovitz P; University of South Dakota</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>100-8</td>
<td>Flux Capacity: Seasonal Changes in Body Composition and Metabolism in Migratory White-Throated Sparrows (<em>Zonotrichia albicollis</em>)</td>
<td>Elowe CR, Gerson AR; University of Massachusetts Amherst</td>
</tr>
</tbody>
</table>

#### Coffee Break

3:30 pm

#### Session 101

**Two to tango: Host-parasite interactions**  
*Chairs: Susan Balenger, Christian Cox*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>101-1</td>
<td>Fitness consequences and immunogenetic strategies against a novel parasitoid in a field cricket</td>
<td>Balenger SL, Sikkink K, Zuk M, Bailey NW; University of Mississippi, St Andrews University</td>
</tr>
</tbody>
</table>

#### Coffee Break

3:30 pm

**Lone Star F**

**Grand Ballroom**

**Lone Star G**

**Grand Ballroom**

**Rooms 301-302**
Monday 6 January 2020

1:45 pm 101-2 Conrad H, Wittman T, Pollock N, John-Alder H; Rutgers University, University of Texas, University of Virginia

Conrad H, Wittman T, Pollock N, John-Alder H; Rutgers University, University of Texas, University of Virginia

Tolerance of ectoparasitism in Eastern Fence Lizards, Sceloporus undulatus

2:00 pm 101-3 Fuess LE, Weber JN, Steinel NC, Den Haan S, Bolnick DI; University of Connecticut, University of Alaska Anchorage, University of Massachusetts Lowell, University of Texas

Fuess LE, Weber JN, Steinel NC, Den Haan S, Bolnick DI; University of Connecticut, University of Alaska Anchorage, University of Massachusetts Lowell, University of Texas

Transcriptomic analyses of Gasterosteus aculeatus parasite response reveal mechanisms of resistance

2:15 pm 101-4 Talbott KM, Soini HA, Novotny MV, Whittaker D, Higgins B, Ketterson ED; Indiana U, Michigan State U

Talbott KM, Soini HA, Novotny MV, Whittaker D, Higgins B, Ketterson ED; Indiana U, Michigan State U

Does Haemosporidian infection status influence volatile composition of avian preen oil?

2:30 pm 101-5 Cox CL, Rosso AA, Nicholson DJ, McMillan WO, Logan ML; Florida International University, Georgia Southern University, Queen Mary University London, Smithsonian Tropical Research Institute, University of Nevada-Reno

Cox CL, Rosso AA, Nicholson DJ, McMillan WO, Logan ML; Florida International University, Georgia Southern University, Queen Mary University London, Smithsonian Tropical Research Institute, University of Nevada-Reno

Sex-biased Parasitism and the Expression of a Sexual Signal in a Tropical Forest Lizard

2:45 pm 101-6 Rudzki EN, Kohl KD, Stephenson JF; University of Pittsburgh

Rudzki EN, Kohl KD, Stephenson JF; University of Pittsburgh

Skin Microbiome Significantly Predicts Susceptibility to Ectoparasite Infection in Trinidadian Guppies, Poecilia reticulata

3:00 pm 101-7 Sandmeier FC, Leonard KL, Weitzman CL, Tracy CR, Bayer B, Bauschlicher S; Colorado State University, Virginia Polytechnic Institute and State University, University of Nevada

Sandmeier FC, Leonard KL, Weitzman CL, Tracy CR, Bayer B, Bauschlicher S; Colorado State University, Virginia Polytechnic Institute and State University, University of Nevada

Indirect, facultative interaction between a commensal microbe and an opportunistic pathogen in the tortoise respiratory tract

3:15 pm 101-8 Kelly TR, Bayer A, MacDougall-Shackleton EA, MacDougall-Shackleton SA; Louisiana State University, Western University

Kelly TR, Bayer A, MacDougall-Shackleton EA, MacDougall-Shackleton SA; Louisiana State University, Western University

Experimental acute-phase immune activation in migratory sparrows has host-antigen specific effects on body mass and migratory restlessness

3:30 pm Coffee Break

1:30 PM – 3:30 PM Session 102 Rooms 303-304

Ecophysiology of Diet

Chair: Beck Wehrle

1:30 pm 102-1 Yang ZY, Easy RH, Avery TA; Acadia University

Yang ZY, Easy RH, Avery TA; Acadia University

Identification and quantification of Atlantic Salmon Salmo salar, Arctic char Salvelinus alpinus, Cod Gadus morhua, and Capelin Mallotus villosus in Striped Bass diets in Labrador

1:45 pm 102-2 Littler A, Garcia M, Teets N; University of Kentucky

Littler A, Garcia M, Teets N; University of Kentucky

Does a Well-Balanced Diet Keep You Going When the Going Gets Cold?

2:00 pm 102-3 Trevelline BK, Maier M, Martínez-Mota R, Derting T, Pasch B, Dearing MD, Kohl KD; Univ of Pittsburgh, Univ of Utah, Murray State Univ, Northern Arizona Univ

Trevelline BK, Maier M, Martínez-Mota R, Derting T, Pasch B, Dearing MD, Kohl KD; Univ of Pittsburgh, Univ of Utah, Murray State Univ, Northern Arizona Univ

Investigating the mechanisms of diet-induced metabolic depression in wild rodents

2:15 pm 102-4 Muhammad S, Dick MF, Welch KC; University of Toronto

Muhammad S, Dick MF, Welch KC; University of Toronto

Sugar Flux and Metabolism in the Ruby-Throated Hummingbird.

2:30 pm 102-5 Azzolini JA, Denardo DF; Arizona State University

Azzolini JA, Denardo DF; Arizona State University

Effect of elevated glucose intake on physiological biomarkers

2:45 pm 102-6 Sandfoss MR, Clauch NM, Stacy NI, Romagosa CM, Lillywhite HB; University of Florida

Sandfoss MR, Clauch NM, Stacy NI, Romagosa CM, Lillywhite HB; University of Florida

A tale of two islands: stress response and immune function of an insular pit viper following ecological disturbance.

3:00 pm 102-7 Frazier AJ, Jensen NR, Young SP, Cooley-Rieders CC, Todgham AE; University of California Davis, Kootenai Tribe of Idaho

Frazier AJ, Jensen NR, Young SP, Cooley-Rieders CC, Todgham AE; University of California Davis, Kootenai Tribe of Idaho

Does a Cannibal Feeding Strategy Impart Differential Metabolic Performance in Young Burbot Lota lota?

3:15 pm 102-8 Wehrle BA, Gonzalez AX, Stone J, Rankins D, Vuu E, Herrel A, Tadic Z, German D; UC Irvine, MNHN/CNRS, U Zagreb

Wehrle BA, Gonzalez AX, Stone J, Rankins D, Vuu E, Herrel A, Tadic Z, German D; UC Irvine, MNHN/CNRS, U Zagreb

Do digestive enzyme activities explain increased plant digestibility in a newly omnivorous lizard?

3:30 pm Coffee Break

The Society for Integrative and Comparative Biology

106
### Session 103
**Sensing and Navigation**

**Chairs:** Jeff Riffell, Tanvi Deora

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td><strong>103-1</strong> Sensing and Navigation</td>
<td>Johnson TL, Defino NJ, Rauscher MJ, Heckscher ES, Fox JL, Case Western Reserve University, University of Arizona, University of Chicago</td>
</tr>
<tr>
<td>1:45 pm</td>
<td><strong>103-2</strong> Sensing and Navigation</td>
<td>Sprayberry JDH, Muhlenberg College</td>
</tr>
<tr>
<td>2:00 pm</td>
<td><strong>103-3</strong> Sensing and Navigation</td>
<td>Riffell J, Chan J, Okubo R, University of Washington</td>
</tr>
<tr>
<td>2:15 pm</td>
<td><strong>103-4</strong> Sensing and Navigation</td>
<td>Bakken GS, Schraft HA, Orduño-Baez A, Clark RW, San Diego State Univ</td>
</tr>
<tr>
<td>2:30 pm</td>
<td><strong>103-5</strong> Sensing and Navigation</td>
<td>Lohmann KJ, Brothers JR, Lohmann CMF, University of North Carolina at Chapel Hill</td>
</tr>
<tr>
<td>2:45 pm</td>
<td><strong>103-6</strong> Sensing and Navigation</td>
<td>McEntire KD, Poljan M, Vela S, Thompson ML, Baum A, Trinity University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td><strong>103-7</strong> Sensing and Navigation</td>
<td>Deora T, Brunton BW, Ahmed M, Daniel TL, University of Washington</td>
</tr>
</tbody>
</table>

### Session 104
**Comparative Endocrinology**

**Chairs:** Stefanny Titon, Nick Holloway

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td><strong>104-1</strong> Comparative Endocrinology</td>
<td>Titon SCM, Titon Jr. B, Teixeira RV, Lima AS, Garcia Neto PG, Ferreira LF, Assis VR, Gomes FR, Markus RP, University of Sao Paulo, University Center Fundacao Sao Andre</td>
</tr>
<tr>
<td>1:45 pm</td>
<td><strong>104-2</strong> Comparative Endocrinology</td>
<td>Hunt KE, Buck CL, Hudson J, Fernández-Ayó A, Heide-Jærgensen MP, Ferguson SH, Matthews CJD, George Mason U, N Arizona U, U Manitoba, Greenland Inst Nat Res, Fish Oc Canada</td>
</tr>
<tr>
<td>2:00 pm</td>
<td><strong>104-3</strong> Comparative Endocrinology</td>
<td>Cox RM, Wittman T, Robinson CD, Cox CL, John-Alder HB, University of Virginia, Georgia Southern University, Rutgers University</td>
</tr>
<tr>
<td>2:15 pm</td>
<td><strong>104-4</strong> Comparative Endocrinology</td>
<td>Holloway ND, Mackenzie DS, Riley BB, Texas A&amp;M University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td><strong>104-5</strong> Comparative Endocrinology</td>
<td>Muller UK, Summers AP, CSUF, UW - Friday Harbor Labs</td>
</tr>
<tr>
<td>2:45 pm</td>
<td><strong>104-6</strong> Comparative Endocrinology</td>
<td>Summers AP, Muller UK, UW - Friday Harbor Labs, CSUF</td>
</tr>
</tbody>
</table>

### Session 105
**The Evolution of Morphology**

**Chair:** Margaret Hall

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td><strong>105-1</strong> The Evolution of Morphology</td>
<td>Hall MI, Plochocki JH, Sosa JRR, Voegele GM, Midwestern University, University of Central Florida, Dartmouth College</td>
</tr>
<tr>
<td>1:45 pm</td>
<td><strong>105-2</strong> The Evolution of Morphology</td>
<td>Webb JF, Molnar EJ, Nickles KR, Jones AE, Conway KW, McHenry MJ, University of Rhode Island, Texas A&amp;M, University of California Irvine</td>
</tr>
<tr>
<td>2:00 pm</td>
<td><strong>105-3</strong> The Evolution of Morphology</td>
<td>Simon MN, Brandt R, Kohlsdorf T, Marroig G, University of Sao Paulo</td>
</tr>
</tbody>
</table>
Monday 6 January 2020

2:15 pm 105-4 Oufiero CE, Towson U  
Morphological evolution of the praying mantis (Mantodea) raptorial foreleg in relation to body size and depth perception

2:30 pm 105-5 Roberts A, Wainwright P, University of California, Davis  
Anatomical basis of jaw protrusion directionality in ponyfishes (Leiognathiidae)

2:45 pm 105-6 Schwaha T, University of Vienna  
O anus where art thou? An investigation of ctenostome bryozoans

3:00 pm 105-7 Feltmann A, Gifford M, Field E, University of Central Arkansas  
Effect of Selection and Genetic Drift on Phenotypic Diversification in the Eastern Collared Lizard

3:15 pm 105-8 Goodman CM, Buckman KN, Hill JE, Tuckett OM, Romagosa CM, University of Florida  
Dispersal, performance, and Morphometry of a Novel Invader (Xenopus tropicalis) in Central Florida: Evidence of Spatial Sorting?

3:30 pm Coffee Break  
Grand Ballroom

1:30 PM – 3:30 PM Session 106  
Rooms 402-403  
The Evolution of Physiology  
Chair: Anthony Gilbert

1:30 pm 106-1 Saenz DE, Winemiller KO, Markham MR, Texas A&M University, University of Oklahoma  
Derived Loss of Signal Plasticity in a Genus of Weakly Electric Fish

1:45 pm 106-2 Gilbert AL, Rutschmann A, Fitchsen-Brown MS, Miles DB, Clobert J, Ohio University, University of Auckland, Theoretical and Experimental Ecology Station  
Acclimation to warmer temperatures attenuates heat-shock plasticity in high elevation populations of common lizards

2:00 pm 106-3 Faria S, Goodbody-Gringley G, Marangoni L, Pereira C, Bateman S, Zilberberg C, Mies M, Kitahara M, Bianchini A, Garland T, Navas C, Bermuda Institute of Ocean Sciences, Monaco Scientific Center, Federal University of Rio de Janeiro, University of Sao Paulo, University of California, Riverside  
Brazilian Phenotypic Plasticity under Climate Changes: an Evolutionary History Scripted in the Coral-Dinoflagellate Symbiosis

2:15 pm 106-4 Boggs TE, Friedman JS, Gross JB, University of Cincinnati  
Parallel adaptation to hypoxia in the blind Mexican cavefish, Astyanax mexicanus.

2:30 pm 106-5 Gamboa MP, Kohlruss PS, Wolf BO, Sillett TS, Funk WC, Ghalambor CK, Colorado State University, University of New Mexico, Smithsonian Conservation Biology Institute  
Climate variation facilitates morphological, not physiological, divergence in song sparrows

2:45 pm 106-6 Marshall CA, Zeller KR, Ghalambor CK; Colorado State University  
The Effects of Long- and Short-Term Salinity Acclimation on the Aerobic Scope of Trinidadian Guppies: Implications for Dispersal

3:00 pm 106-7 Zhang Y, Wong HS, University of Memphis, Buck Institute for Research on Aging  
Are mitochondria the major contributor of reactive oxygen species production? No.

3:15 pm 106-8 Wolf CJ, Cheviron ZA; University of Montana  
Seasonal Variation of Body Composition in Deer Mice (Peromyscus maniculatus)

3:30 pm Coffee Break  
Grand Ballroom
### Pollution and toxicity

<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3-1</td>
<td>Skin Coloration as a Possible Non-Invasive Marker for Skewed Sex Ratios and Gonadal Abnormalities in Immature Common Toads</td>
<td>Ujhegyi N, Bókony V, Plant Protection Institute</td>
</tr>
<tr>
<td>P3-2</td>
<td>DNA damage in the cells of lateral antennules of crayfish (Faxonius viridis) is increased following exposure to environmentally relevant concentrations of atrazine</td>
<td>Abdulaleh SA, Crile KG, Almouseli A, Awali S, Tutwiler AY, Tien EA, Manzo VJ, Hadeed MN, Belanger RM, University of Detroit Mercy</td>
</tr>
<tr>
<td>P3-3</td>
<td>The Effects of Oil and PAH Exposure on Swim Bladder Development and Function</td>
<td>Price ER, Mager EM, University of North Texas</td>
</tr>
<tr>
<td>P3-4</td>
<td>Glyphosate in a warming world: Effects on lifespan, feeding, and food conversion efficiency in a field cricket, Gryllus lineaticeps</td>
<td>Jacob JR, Vo CP, Stahlschmidt ZR, U Pacific</td>
</tr>
<tr>
<td>P3-5</td>
<td>The effects and quantitation of atrazine in crayfish tissue post-exposure</td>
<td>Almouseli A, Manzo VJ, Yacoo KE, Dayfield DJ, Torres VC, Evans KR, Roberts-Kirchhoff ES, Belanger RM, University of Detroit Mercy</td>
</tr>
<tr>
<td>P3-6</td>
<td>Interactive Effects of Heat Stress and Pesticide Co-exposure on Osmoregulation and Antioxidant System in Gill and Kidney of Goldfish</td>
<td>Lacy BD, Rahman MS, Rahman MS, University of Texas Rio Grande Valley</td>
</tr>
<tr>
<td>P3-7</td>
<td>Ecologically relevant atrazine exposures affect the cells of the hepatopancreas of crayfish (Faxonius viridis)</td>
<td>Crile KG, Abdulaleh SA, Almouseli A, Manzo VJ, Hadeed MN, Fard A, Iqbal T, Belanger RM, University of Detroit Mercy</td>
</tr>
<tr>
<td>P3-8</td>
<td>Using buccal cells to estimate DNA damage associated with urbanization</td>
<td>Smith TR, Moore IT, Hernandez J, Virginia Tech</td>
</tr>
<tr>
<td>P3-10</td>
<td>Liver lead concentration is unrelated to presence of lead shot in waterfowl gizzards</td>
<td>Wilburn PA, Maness TJ, Louisiana Tech University</td>
</tr>
<tr>
<td>P3-11</td>
<td>Quantification of BPA Retention in Planaria</td>
<td>Flood S, Depaola N, Moody T, Mass S, St. John P, SUNY New Paltz</td>
</tr>
</tbody>
</table>

### Ecotoxicology

<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3-13</td>
<td>Investigating Environmental Contamination in the Lower Laguna Madre Through CYP1A Expression in Pinfish Liver</td>
<td>Dubois S, Rahman AF, Rahman MD*, University of Texas Rio Grande</td>
</tr>
<tr>
<td>P3-14</td>
<td>Additive effects of oil exposure and hypoxia on aerobic performance in red drum, Sciaenops ocellatus</td>
<td>Ackerly KL, Esbaugh AJ, University of Texas at Austin</td>
</tr>
<tr>
<td>P3-15</td>
<td>Avian eggs externally exposed to sublethal crude oil applications have reduced heart rate and metabolic rate.</td>
<td>Goodchild CG, Durant SE, Oklahoma State University, University of Arkansas</td>
</tr>
<tr>
<td>P3-16</td>
<td>Embryonic Developmental Effects of Maternal Ingestion of Cypermethrin in Japanese Quail Coturnix japonica</td>
<td>Tellez-Gomez OM, Flores-Santin JR, Universidad Autonoma del Estado de Mexico</td>
</tr>
<tr>
<td>P3-17</td>
<td>Sublethal Doses of the Neonicotinoid Imidacloprid Alters mRNA Expression in Cellular Stress Pathways in Honey Bees</td>
<td>Llewellyn HJ, Hare-Harris A, Hranitz JM, Surnacz CA, Bloomsburg University</td>
</tr>
<tr>
<td>P3-18</td>
<td>Dioxin-induced steatosis and liver toxicity is enhanced by a ketogenic diet</td>
<td>Fritz T, Brogren D, Burley A, Holihan M, Graham M, Chrysler J, Scott J, Saginaw Valley State University</td>
</tr>
</tbody>
</table>
### Molecular Evolution

<table>
<thead>
<tr>
<th>P3-19</th>
<th>Thueson KA, Rabinowitz SA, Havird JC; University of Texas at Austin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuclear Compensation as the Dominant Form of Mitonuclear Coevolution</td>
</tr>
<tr>
<td>P3-20</td>
<td>Briseno JL, Tassia MG, Waits DS, Halanych KM; University of California Santa Cruz, Auburn University</td>
</tr>
<tr>
<td></td>
<td>TIR Domain-Containing Protein SARM1 Diversity in Deuterostomes and Lophotrochozoans</td>
</tr>
<tr>
<td>P3-21</td>
<td>Yousefelahiyeh M, Miller DR, Kim H, Parker J; California Institute of Technology</td>
</tr>
<tr>
<td></td>
<td>Dalota coriaria as a genetic model system of animal symbiosis</td>
</tr>
<tr>
<td>P3-22</td>
<td>Fitzgerald RP, Chandler C; SUNY College at Oswego</td>
</tr>
<tr>
<td></td>
<td>Determining Sex Specific Loci in the Genome of the Terrestrial Isopod Porcellio scaber</td>
</tr>
<tr>
<td>P3-23</td>
<td>Bogantes VE, Waits DS, Halanych KM; Auburn University</td>
</tr>
<tr>
<td></td>
<td>Toxin diversity across the annelid tree of life</td>
</tr>
<tr>
<td>P3-24</td>
<td>Saiz LV, Kelleher ES; University of Houston</td>
</tr>
<tr>
<td></td>
<td>Does the Drosophila melanogaster gene bruno impact transposition?</td>
</tr>
<tr>
<td>P3-25</td>
<td>Plakke MS, Blumenstiel JP, Walters JR; University of Kansas</td>
</tr>
<tr>
<td></td>
<td>Patterns of small non-coding RNA expression across dimorphic sperm</td>
</tr>
<tr>
<td>P3-26</td>
<td>Joglekar IU, Clark AC; University of Texas at Arlington</td>
</tr>
<tr>
<td></td>
<td>Evolution of Conformational Landscape in Reef-Building Coral Caspases</td>
</tr>
<tr>
<td>P3-27</td>
<td>McElroy KE, Boore J, Logsdon JM, Neiman M; Iowa State University, Providence St Joseph Health, Institute for Systems Biology, University of Iowa</td>
</tr>
<tr>
<td></td>
<td>Effects of asexuality on repetitive element evolution in a freshwater snail</td>
</tr>
</tbody>
</table>

### Hormones, Behavior, Development and Reproduction

<table>
<thead>
<tr>
<th>P3-28</th>
<th>Cheung JA, Rose CS; James Madison University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The hormonal control of anuran ossification sequences</td>
</tr>
<tr>
<td>P3-29</td>
<td>Heppner JJ, Ouyang JQ; University of Nevada, Reno</td>
</tr>
<tr>
<td></td>
<td>Urbanization and parental investment in a free-living songbird</td>
</tr>
<tr>
<td>P3-30</td>
<td>Closs LE, Baker DM, Fontaine R, Weltzien FA; University of Mary Washington, Norwegian University of Life Sciences</td>
</tr>
<tr>
<td></td>
<td>Investigating Reproductive Success and Endocrine Regulation of Mating Strategies in Male Medaka</td>
</tr>
<tr>
<td>P3-32</td>
<td>Cooper D, Kovacs J; Spelman College</td>
</tr>
<tr>
<td></td>
<td>Evidence of Horizontal Gene Transfer in the Pea Aphid Acyrhopisphon pismi</td>
</tr>
<tr>
<td>P3-33</td>
<td>Thomas P, Pang YF, Tan W; University of Texas at Austin</td>
</tr>
<tr>
<td></td>
<td>Rapid Progestin Induction of Sperm Hypermotility in Marine Fish through Membrane Progestin Receptor Alpha</td>
</tr>
<tr>
<td>P3-34</td>
<td>Clapp N, Reichert M; Oklahoma State University</td>
</tr>
<tr>
<td></td>
<td>The Effect of Arginine Vasotocin on Competitive Behavior in Hyla chrysoscelis</td>
</tr>
<tr>
<td>P3-35</td>
<td>Lusk EP, Witek TAR, Casto JM; Illinois State University</td>
</tr>
<tr>
<td></td>
<td>Effects of in ovo treatment with etiocholanolone on nestling development</td>
</tr>
<tr>
<td>P3-36</td>
<td>Ziauddin LS, Sarathy J, Hall IC*; Benedictine University</td>
</tr>
<tr>
<td></td>
<td>Prolactin influences osmoregulation in adult African clawed frogs, Xenopus laevis.</td>
</tr>
<tr>
<td>P3-37</td>
<td>Kratochvil LB, Small TW, Thompson RR; Bowdoin College, Oxford College of Emory University</td>
</tr>
<tr>
<td></td>
<td>Rapid effects of androgens on olfaction in the zebrafish, Danio rerio</td>
</tr>
<tr>
<td>P3-38</td>
<td>Eshleman MA, Klug PE, Wissel B, Greives TJ; NDSU, USDA-APHIS-WS, University of Regina</td>
</tr>
<tr>
<td></td>
<td>Migration and Reproduction: Is There a Reproductive Advantage to a Shorter Migration?</td>
</tr>
<tr>
<td>P3-39</td>
<td>Tait C, Ramirez MD, Olson M, Katz PS; Univ of Massachusetts Amherst</td>
</tr>
<tr>
<td></td>
<td>Molecular and behavioral characterization of two reproductive hormones in the nudibranch Berghia stephanieae</td>
</tr>
<tr>
<td>P3-40</td>
<td>Comito D, Bentley GE; University of California Berkeley</td>
</tr>
<tr>
<td></td>
<td>Gonadotropin-Inhibitory Hormone and its Receptor in Zebra Finch Spinal Cord: A Novel Pathway for Neuropeptide Action?</td>
</tr>
</tbody>
</table>

### Immunity: in defense of an organism

<table>
<thead>
<tr>
<th>P3-41</th>
<th>Cornelius Ruhs E, Martin LB, Downs CJ; University of South Florida, SUNY-ESF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The impacts of body mass on immune cell concentrations in birds</td>
</tr>
<tr>
<td>P3-42</td>
<td>Dallas JW, Deutsch M, Warne RW; Southern Illinois University</td>
</tr>
<tr>
<td></td>
<td>Thermal Performance of an Exotic Gekkonid and the Effects of n-3 PUFAs on Immunity</td>
</tr>
<tr>
<td>P3-43</td>
<td>Martin MN, Zimmerman LM; Millikin University</td>
</tr>
<tr>
<td></td>
<td>In vitro synergistic activity of antibiotics and red-eared slider plasma on bacterial growth</td>
</tr>
<tr>
<td>P3-44</td>
<td>Barsotti AMG, Madalere CB*, Wagener C, Titon Jr. B, Gomes FR, Measey J; University of São Paulo, Northern Arizona University, Stellenbosch University</td>
</tr>
<tr>
<td></td>
<td>Challenges of the invasion front: water balance, stress and immunity in the Guttural toad</td>
</tr>
</tbody>
</table>
Monday 6 January 2020

**Immune-based tradeoffs**

**P3-45**  
Weier D, Ranchod P, Steffenson M; St Edward's University  
The Effect of Colony Relocation Stress on Honeybee Immunity

**P3-46**  
Smith JJ, Balenger SL; University of Mississippi  
Costs of Immunity vs. Costs of Infection: Is the Relationship Between Humoral Immunity and Corticosterone Context Dependent?

**P3-47**  
Kenny E, Howey CAF; University of Scranton  
Ambient Light at Night and Effects on the Immune Response of Anoles

**P3-48**  
Rowley AA, Adelman JS, Dailou RA, Vinkler M, Henschen AE, Hawley DM; Virginia Tech, University of Memphis, Charles University  
Are There Broader Immunological Effects of Evolved Disease Tolerance in House Finches?

**P3-49**  
Baeza K, Ranchod P, Steffenson M; St Edward's University  
The Introduction of Commonly Used Pesticides and Their Effect on the Immunological Function of Honeybees

**P3-50**  
Virgin EE, Kepas ME, Hudson SB, French SS; Utah State University  
Comparisons of egg yolk physiology and hatching quality between urban and rural Side-blotched lizards (*Uta stansburiana*)

**Reproductive Biology**

**P3-51**  
Davis AC, Ryan MJ; University of Texas Austin  
Mirror mirror on the wall: Using mirror image scrutiny to probe phenotypic variation in an asexual-sexual fish system

**P3-52**  
Angelis E, Greenway G, Miller CW; University of Florida  
How does weapon loss influence mating behavior in the coreid *Narnia femorata*?

**P3-53**  
Lane ZM, Darnell MZ; University of Southern Mississippi  
A Home Worth Fighting For: Burrows as a Thermoregulatory Resource in the Fiddler Crab *Uca pugilator*

**P3-54**  
Dennis AJ, Taylor LA, Pertuit OR, Carson IR, Sanger TJ, Johnson MA; Trinity University, Loyola University  
Oviposition site choice in the brown anole lizard, *Anolis sagrei*

**P3-55**  
Brewer VN, Lane SJ, Sewell KB, Mabry KE; New Mexico State University, Virginia Polytechnic Institute and State University  
Effects of Urbanization on Extra-pair Paternity in the Song Sparrow

**P3-56**  
Hain TJA, Churchman EKL, Knapp R, Neff BD; University of Western Ontario, University of Oklahoma  
Nest size and 11-ketotestosterone in bluegill sunfish (*Lepomis macrochirus*)

**P3-57**  
Collum A, Whitman S, Hodges A; State University of New York  
Does Mating with a Novel Male Affect Female Fecundity in Bean Beetles?

**P3-58**  
Xavier C, Bergey L, Ritchie L, Jean-Paul J; Centenary University  
Differences in reproductive efforts in the invasive grass shrimp, *Palaemon macrodactylus* over gravid native *Palaemon* shrimp.

**P3-59**  
Strom MK, Mabry KE; New Mexico State University  
The Influence of Habitat Type on the Reproductive Success of Brush Mice (*Peromyscus boylii*)

**P3-60**  
L’Ecuyer Z, Sharp S, Todd K; Westminster College  
Hormonal circuits responsible for reproductive behavior

**P3-61**  
Solis GM, Husak JF; University of St Thomas  
The Role of Aromatization in Male Brown Anole Sexual Behavior

**P3-62**  
Afkhami M, Masly JP; University of Oklahoma  
The genetics of co-evolved reproductive traits in *Drosophila*

**P3-63**  
Keck CMT, Earley RL, Gresham JD; University of Alabama  
How Do Males Reproduce When Prospective Partners Prefer to Mate with Themselves?

**P3-64**  
Choudhry A, Lo B, Freeman A, Ophir A; Thomas Jefferson High School for Science and Technology, Cornell University  
Female African giant pouchcd rats scent mark at similar rates despite reproductive differences

**P3-65**  
Tweeten KA, Scollick JA; St Catherine University  
Tracking of Labeled Sperm Suggests that Diploid Populations of Sexually Reproducing *Lumbriculus* Cross Fertilize

**Predator-Prey Interactions**

**P3-66**  
Stewart KA, Mutsuddy A, Seroy SK; Heritage University, Wheaton College, University of Washington  
Effects of Warming Ocean Temperatures on Predation Rates on the Marine Snail *Lacuna vincta*

**P3-67**  
Folias E, Cox C, McMillan WQ, Logan ML; Univ of Toronto, Georgia Southern Univ, Smithsonian, Univ of Nevada  
Changes in escape behavior in a terrestrial vertebrate after experimental transplantation to a novel environment

**P3-68**  
Schneider NG, McKamy AJ, Diamond KM, Blob RW; Clemson Univ  
Do predators take advantage of prey blind spots? In-stream analysis of predator-prey interactions in Hawaiian stream fishes.

**P3-69**  
Chamberlain JD; Southern Arkansas University  
The Role of a Thiamine-degrading Enzyme in Shaping Trophic Ecology of Watersnakes
P3-70  Fabian ST, Lin HT; Imperial College London
Dissecting the Implementation of Dragonfly Guidance Behaviours

P3-71  Gutierrez-Andrade D, Middlebrooks ML; University of Tampa
Effectiveness of ceratal autotomy as a defense mechanism for the sacoglossan sea slug Plicidaria kingstoni

P3-72  Luebbert KM, Martin AL; Saginaw Valley State University
How Predators and Conspecifics Influence Crayfish Shelter Preference?

P3-73  Chandler KL, Davis J, Wolford D; Radford University
Arthropod Thunderdome: Antipredator responses of Gromphadorhina portentosa in relation to predator species and relative size differential

P3-74  Baker NJ, Garcia L; Austin College
Transgenerational Effects of Predatory Stress in Pea Aphids

P3-75  Jean-Paul J, Bergey L, Ritchie L, Xavier C; Centenary University
Effects of Light Conditions and Morphological Size on Predation of the Invasive Grass Shrimp, Palaemon Macroductylus, and a Native Species, Palaemonetes Pugio.

P3-76  Howerin HM, Foltz SL; Radford University
The Perfect Home: What Nestbox Features and Environmental Conditions Do Eastern Bluebirds and Tree Swallows Prefer?

P3-77  Jara RF, Crego RD, Samuel MD, Rozzi R, Jiménez JE; University of North Texas, University of Wisconsin-Madison
Nest-Site Selection and Breeding Success of Passerines in the Southernmost Forest of the World

Complementary to S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models

P3-78  Ferreira LF, Garcia Neto PG, Titon SCM, Titon Jr. B, Gomes FR, Assis VR*; Santo Andre Foundation University Center, University of Sao Paulo
Exploring toads immune response with molecular techniques

P3-79  Durica DS, Wolfard F, Shyamal S, Das S, Mykles DL; University of Oklahoma, Colorado State University
Examination of Ecdysteroid Hormone Biosynthetic Enzyme Genes in the Y-Organ Transcriptome and Developing Limb Bud Transcriptome During the Crab Molt Cycle

P3-80  Bentley VL, Mykles DL; Colorado State University
Investigating the function of Krüppel homolog 1 (Kr-h1) on molt regulation in Gecarcinus lateralis

P3-81  Rocereto SK, Whitall JB, Wheat CW, Rank NE, Dahiloff EP; Santa Clara Univ, Univ Stockholm, Sonoma State Univ
Non-synonymous variation at a metabolic enzyme locus (Pgi) under purifying selection

P3-82  Valle PF, Rocereto SK, Rank NE, Dahiloff EP; Santa Clara Univ, Sonoma State Univ
Star-crossed lovers: Mitonuclear interactions may affect reproductive activity and offspring performance in a montane leaf beetle

Comparative Genomics and Proteomics

P3-83  Barreira SN, Baxevanis AD; NIH
Exploring the Role of Ribosomal Biogenesis in the Context of Regeneration

P3-84  Chang ES, Travert M, Sanders SM, Klopchen AML, Gonzalez P, Barreira S, Mullikin J, Cartwright P, Baxevanis AD; NHGRI/NIH, U Kansas, U Pittsburgh
The genome of the hydrozoan Podocoryna carnea: An emerging resource for comparative biology

P3-85  Gonzalez P, Seaver EC, Baxevanis AD; NHGRI/NIH, University of Florida
Haplotype-Phased de novo Genome Assembly of the Marine Annelid Capitella teleta Using a Three-Generation Long-Read Binning Approach

P3-86  Preising GA, Faber-Hammond JJ, Renn SCP; Reed College
aCGH Detects Copy Number Variation with Similar Resolution to PacBio Sequencing Approaches

P3-87  Anderson AP, Renn SCP, Reed College
A genus of gouramis, Sphaerichthys, as a novel system for investigating evolution of transitions of sex-roles in brood care and sexual selection.

P3-88  Firmino Tj, Emery AH, Roelke CE, Fujita MK; University of Texas at Arlington
Investigating Toxin Evolution in the Bufonid Parotoid Gland

P3-89  Krantz J, Daly M, Macrander J; Florida Southern College, Ohio State University
Identifying Convergence of ShK Toxins in Sea Anemones

P3-90  Ortiz J, Debiassoe MB, Ryan JF; University of Florida, Iowa State University
Evolutionary history of an ancient innexin gene cluster in ctenophores

P3-91  McKinley CN, Lower SE; Bucknell University
Using transcriptionomics to identify candidate genes involved in predatory behavior of female fatale fireflies
Monday 6 January 2020

Posters

P3-92
Zhang P, Xu S, Heath-Heckman E, Jacobs D; University of California Los Angeles
Historical DNA Methylation Using Computational Methods

P3-93
Waits DS, Ribeiro R, Kocot KM, Bullard SA, Halanych KM; Auburn University, University of Alabama
You Aren’t What You Eat: The Impact of Sequence Contamination on Phylogenomics of Blood Flukes (Platyhelminthes; Schistosomatidea)

P3-94
Paulat NS, Manthey JD, Platt II RN, Ray DA, Texas Tech University, Texas Biomedical Research Institute
Transposon Activity and Mutational Impacts in Myotis

P3-96
Doerr H, Palmisciano M, Flannery C, Hamilton S, Logan C; California State University, Moss Landing Marine Labs, Humboldt State University
Effects of fluctuating vs. static exposure to hypoxia and high pCO₂ on gill transcriptomes in three rockfish species

Integrative Biology of Reproduction

P3-97
Morningstar S, Maslikova V*, Reams B, Short C, Mashanov V, Jahan-Mihan A, Hahn DA, Hatle JD; Univ of North Florida
Dietary and storage protein thresholds for reproduction in grasshoppers

P3-98
Mark D, Nasari A, Triano N, Bauer C; Adelphi University, Hicksville High School
Early identification of pregnancy in a precocial rodent (Octodon degus)

P3-99
Bentz EJ, Mason RT; Oregon State University
Characterizing the Function of the Harderian Gland and its Interactions with the Vomeronasal Organ in the Red-sided Garter Snake

P3-100
Ochs RA, Chamberlain JD; Southern Arkansas University
The Reproductive Effects of Supplemental Nutrition in an Income-breeding Snake

P3-101
Bleke CA, French SS, Roberts SB, Gese EM; Utah State University, Idaho Department of Fish and Game, USDA-National Wildlife Research Center
Natural variations in fecal steroid hormones across pregnancy and population

P3-102
Weber WD, Fisher HS; University of Maryland
Mating system drives the evolution of male and female reproductive traits in Peromyscus mice

P3-103
Rennolds CW, Bely AE; University of Maryland
Reproductive investment is enhanced by food but independent of injury history in an asexual annelid

P3-104
Stephens ER, Harris BN, Prater CM, Soto PL, Carr JA; Texas Tech University, Louisiana State University
Testicular histopathology in an Alzheimer’s disease model

P3-105
Baloun DE, Lane JE, McAdam AG, Dantzer BJ, Boutin S; University of Saskatchewan, University of Guelph, University of Michigan Ann Arbor, University of Alberta Edmonton
Does the ability to dissipate endogenous heat to their environment constrain reproductive investment for wild endotherms?

Muscle and cardiovascular physiology

P3-106
Merges CR, Craig K, Pirtle T; College of Idaho
Exposure to cAMP and cGMP Inhibits Heart Rate in Daphnia Magna

P3-107
Gardner S, Appel A, Mendonça MT; Auburn University
Chasing cane toads: locomotive and behavioral changes from northward dispersal

P3-108
Weiss A, Lau B, Spaniac M, Monroy JA; Claremont Colleges
The Effects of Eccentric Resistance Training on History-Dependent and Elastic Properties of Skeletal Muscles from Mice

P3-109
Farmer L, Krajniak K; Southern Illinois University Edwardsville
The effects of FMRFamide and APKQYVRFamide on the same isolated crop-gizzards of earthworm, Lumbricus terrestris

P3-110
Larson AM, Kanatous SB; Colorado State University
Temporal Examination of Myoglobin and Myosin Heavy Chain Expression Patterns in Skeletal Muscle Cells

P3-111
Goodreau JL, Krans JL; Western New England University
Using STED to measure RNAi induced changes in isoform structure of the titin ortholog, sallimus.

P3-112
Hefele KR, Jorgensen DD; Roanoke College
Ventricular function in American lobsters and Atlantic blue crabs: does contractility change with increasing metabolic demand?

P3-113
Fletcher ML, Barrett LM, Dearoff JL, Thometz NM, Bryan A, Reichmuth C; Hendrix College, Univ of San Francisco, Alaska Department of Fish and Game, Univ of California Santa Cruz
Fiber-type profile of bearded seal (Erignathus barbatus) longissimus dorsi muscle

P3-114
Flores JP, Gad M, Bushong E, Schulz JR; Occidental College
From Sequence to Activity: Synthetic Neuroexcitatory Peptides from Fish-Hunting Cone Snails
<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3-115</td>
<td>Fiber-type profile of the locomotor muscle of spotted seals</td>
<td>Nazar S, Dearolf JL, Thometz NM, Bryan A, Reichmuth C; Hendrix College, Univ of San Francisco, Alaska Department of Fish and Game, Univ of California Santa Cruz</td>
</tr>
<tr>
<td>P3-116</td>
<td>Fiber-type profile of the <em>latissimus dorsi</em> muscle of the ringed seal</td>
<td>Mukhtar V, Dearolf JL, Thometz NM, Bryan A, Reichmuth C; Hendrix College, Univ of San Francisco, Alaska Department of Fish and Game, Univ of California Santa Cruz</td>
</tr>
<tr>
<td>P3-117</td>
<td>Muscle growth patterns and implications for energy costs in diamondback water snakes (<em>Nerodia rhombifer</em>)</td>
<td>Kinsey ST, Cook JG, Laite C, Secor SM; University of North Carolina Wilmington, University of Alabama</td>
</tr>
<tr>
<td>P3-118</td>
<td>Exposing <em>Daphnia magna</em> to Ethanol Results in a Decline in Heart Rate by Increasing Nitric Oxide Production</td>
<td>Craig KJ, Merges C, Pirtle TJ; College of Idaho</td>
</tr>
<tr>
<td>P3-119</td>
<td>The Metabolic and Cardiovascular Response of Central Texas Pulmonate Snails to Acute and Chronic Warming Events</td>
<td>Porras ND, Culverhouse EK, Tate KB; Texas Lutheran University</td>
</tr>
<tr>
<td><strong>Locomotion - Swimming</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3-120</td>
<td>The Upper Jaw of Rorquals Can Act as a Delta Wing for Stability during Lunge Feeding</td>
<td>Fish FE, Segre PS, Potvin J, Goldbogen JA; West Chester University, Stanford University, St Louis University</td>
</tr>
<tr>
<td>P3-121</td>
<td>Predator-Prey Swimming Kinematics of <em>Sphyrna mokarran</em> and <em>Carcharhinus limbatus</em></td>
<td>Kirwan DJ, Ruddy BT, Porter ME; Florida Atlantic University</td>
</tr>
<tr>
<td>P3-122</td>
<td>The Physics of Whale Movement: Drag and Thrust Production to Measure Whale Propulsive Efficiency</td>
<td>Smith HJ, Gough WT*, Savoca MS, Czapanskiy MF, Fish FE, Potvin J, Cade DE, Bierlich KC, Kennedy J, Goldbogen JA; Southwestern University, Stanford University, West Chester University, Saint Louis University, University of California Santa Cruz, Duke University</td>
</tr>
<tr>
<td>P3-123</td>
<td>Scaling of preferred swimming kinematics in bluegill sunfish (<em>Lepomis macrochirus</em>)</td>
<td>De La Cruz D, Pergola D, Svensson K, Gellman E, Ellerby DJ*; Wellesley College</td>
</tr>
<tr>
<td>P3-124</td>
<td>Achieving cohesive and mobile groups using simple sensory feedback</td>
<td>Akanyeti O, Strong JB; Aberystwyth University</td>
</tr>
<tr>
<td>P3-125</td>
<td>Intermittent Propulsion in Largemouth Bass</td>
<td>Coughlin DJ, Chrostek JD, Ellerby DJ; Widener University, Wellesley College</td>
</tr>
<tr>
<td>P3-126</td>
<td>Function of the Erector Muscles of the Spiny Dorsal Fin in Bluegill exposed to Turbulence</td>
<td>Chamaral A, Sayegh N, Martinez D, Maia A; Rhode Island College</td>
</tr>
<tr>
<td>P3-127</td>
<td>Metachronal, synchronous, and hybrid stroke patterns in aquatic paddling locomotion</td>
<td>Blackshare TW, Ford MP, Garayev K, Murphy DW, Santhanakrishnan A; Oklahoma State University, University of South Florida</td>
</tr>
<tr>
<td>P3-128</td>
<td>Armor and Maneuverability of Poachers</td>
<td>Rosado KA, Kruppert S, Summers AP; Monmouth University, University of Washington</td>
</tr>
<tr>
<td>P3-129</td>
<td>LiEFi (Light-Energy Fish): Using Simple Bio-Mechanical Models to Simulate Climatic Changes in Fish Communities</td>
<td>Logsdon M; University of Washington</td>
</tr>
<tr>
<td>P3-130</td>
<td>Assessing the Mosasaur Pectoral Girdle and its Controls on Chest Width: Implications for Mosasaur Swimming Function</td>
<td>Formoso KK, Habib MB, Bottjer DJ; University of Southern California</td>
</tr>
<tr>
<td><strong>Locomotion - Tricky substrates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3-131</td>
<td>Running on Land and Water: Three-dimensional Limb Kinematics and Locomotor Performance of Anolis sagrei</td>
<td>Mann SD, Reed SA, Bergmann PJ; Clark University</td>
</tr>
<tr>
<td>P3-132</td>
<td>A twisted tail of intrigue: Does fish vertebral morphology constrain locomotor mode?</td>
<td>Ashley-Ross MA, Bressman NR; Wake Forest University</td>
</tr>
<tr>
<td>P3-133</td>
<td>Predatory selection across stages of limb and tail development in Xenopus tadpoles</td>
<td>Kinsey CT, Blob RW; Clemson University</td>
</tr>
<tr>
<td>P3-134</td>
<td>Mechanisms That Determine Success At Running On Water In The Quadrupedal Lizard <em>Anolis sagrei</em></td>
<td>Reed SE, Mann SDW, Bergmann PJ; Clark University</td>
</tr>
<tr>
<td>P3-135</td>
<td>SBOR: A Self-Burrowing-Out Robot Inspired by Razor Clam</td>
<td>Huang S, Tang Y, Tao J; Arizona State University</td>
</tr>
<tr>
<td>P3-136</td>
<td>The Effect of Shell Shape on Burrowing Dynamics in Granular Media</td>
<td>Treers LK, Stuart H; University of California Berkeley</td>
</tr>
<tr>
<td>P3-137</td>
<td>The Effect of Substrate on Terrestrial Locomotion in <em>Lepidosiren paradoxa</em>, the South American Lungfish, Informs the Water-to-Land Transition</td>
<td>Redmann E, Ward AB; Adelphi University</td>
</tr>
</tbody>
</table>
### Posters

**Monday 6 January 2020**

**P3-138** Yohannan K, Narici V, Mass S; SUNY New Paltz  
Further studies of axolotl and tiger salamander kinematics

**P3-139** Gamel KM, Astley HC; University of Akron  
Design and Fabrication of an Underwater Force plate

### Biomaterials - Fluids

**P3-140** Reid HE, Zhou H, Deng J, Jankauski M; Montana State University, Binghamton University  
Towards the Design of Dynamically Similar Isospectral Isomodal Artificial Insect Wings

**P3-141** Hagood ME, Porter ME; Florida Atlantic University  
Anisotropic Mechanical Properties of Shark Skin

**P3-142** West J, Farina S, Gibb A; Howard University, Northern Arizona University  
Preference and Performance in Flatfish Burial

**P3-143** Wong JCM, Joshi V, Jaiman RK, Altshuler DL; University of British Columbia  
Wing Morphing During Avian Flight Induces Changes in Local Wing Stiffness Which Affect Aeroelastic Response

**P3-144** McCarter MG, Loudon C; University of California Irvine  
Mechanical damping of cricket antennae

**P3-146** Prakash VN, Bull MS, Prakash M; Stanford University  
Tissue fracture dynamics govern plastic shape changes in a simple animal

**P3-147** Zeng Y, Nieders K, Petrichko S, Fudge D; Chapman University  
Epidermal Threads in Pacific Hagfish (Eptatretus stoutii)

**P3-148** Elcock JN, Summers AP, Hall KC; Howard University, University of Washington  
Skiing on Egg Shells: Microstructure of Skate Egg Cases and Attachment to Substrate

**P3-149** Metimbo-Tambo KLO, Taft BN, Taft NK; University of Wisconsin Parkside, Landmark Acoustics LLC  
Comparative Fin Ray Stiffness in Coho Salmon

**P3-150** Eng CM, Yawar A, Venkadesan M; Yale University  
Functional Curvature and the Stiffness of Rayed Fins

**P3-151** Mohammadi S, Waltrip LD, Hassanalian M; Chapman University, New Mexico Tech  
Investigation on aquatic animal colors and skin temperature on skin friction drag reduction

### Ventilation and sensing

**P3-152** Anacker KY, Farina SC; Howard University  
Asymmetrical Breathing in Flatfishes

**P3-153** Clark AE, Meredith TL, Porter ME; Florida Atlantic University  
Comparing Olfactory Rosette Morphology Among Elasmobranchs

**P3-154** Handy SD, Farina SC; California State University San Bernadino, Howard University  
Gill Position Affects Ventilatory Pressure Amplitudes in Pacific Spiny Dogfish

**P3-155** Jones AE, Webb JF; University of Rhode Island  
Implications of the Relatively Long Larval Phase of a Salmonid (Brook Trout, Salvelinus fontinalis) for Mechanosensory Lateral Line System Morphology

**P3-156** Carter D, Lee-Robinson B, Williams T, Farina S; Howard University  
Evolutionary Morphological and Behavioral Specializations for Jet Propulsion in Frogfishes

**P3-157** Hardy DJ, Salcedo MK, Kenny MC, Pulliam JN, Pendar H, Socha JJ; Morehouse College, Virginia Tech, Wake Forest University  
Shot through the heart: a non-invasive IR technique to measure dorsal heart pumping in insects

**P3-158** Gabriel AN, Bramer EL, Olsen A, Hernandez LP, Camp A, Farina SC, Howard University, Brown University, George Washington University, University of Liverpool  
Influence of mechanical linkages between the buccal and gill chambers on ventilatory kinematics

**P3-159** Young BA, Adams J, Knoche L, Cramberg M, Klassen M; Kirksville College of Osteopathic Medicine  
Regulation of Narial Patency in Alligator mississippiensis

### Locomotion - Gliding and Flying

**P3-160** Ribak G, Urca T, Debnath AK, Stefanini J, Gurka R, Tel Aviv University, Coastal Carolina University, TSI France  
The Aerodynamics and Energetics of a Long-Distance Flying Beetle Studied Using PIV

**P3-161** Swinsky CM, Jackson BE; Longwood University  
(Don’t) Shake a Tail Feather: Function of American Goldfinch Tails During Slow Flight

**P3-162** Sathe EA, Dudley R; University of California Berkeley  
Forelimb Kinematic Variation Alters Body Velocity in Flat-tailed House Geckos (Hemidactylus platyurus) During Directed Aerial Descent

**P3-163** Senthivasan S, Altshuler DL; University of British Columbia  
Automated kinematic tracking using inertial sensor arrays

**P3-164** Fan X, Swartz SM, Breuer KS; Brown University  
A reduced order computational model to simulate the dynamics of maneuvering flight
### Monday 6 January 2020

#### Posters

<table>
<thead>
<tr>
<th>Presentation ID</th>
<th>Title</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3-165</td>
<td>Membrane shape changes during gliding in flying squirrels</td>
<td>Byrnes G, Lim NTL; Siena College, National Institute of Education, Nanyang Technological University</td>
</tr>
<tr>
<td>P3-166</td>
<td>How Bats Don’t Crash and Burn: Bilateral Muscle Recruitment for Recovery Maneuvers in Egyptian Fruit Bats</td>
<td>Bortoni A, Morris AT*, Young IR, Breuer KS, Swartz SM; Brown University</td>
</tr>
<tr>
<td>P3-167</td>
<td>Predicting muscle length changes from EMG activation in Manduca sexta</td>
<td>Von Hagel AA, Malingen SA, Daniel TL; University of Washington</td>
</tr>
<tr>
<td>P3-168</td>
<td>Development of a multi-camera array to study gliding in flying snakes</td>
<td>Worrell TA, Weiss TM, Gonzalez MG, Whitehead JG, Salcedo MK, Pulliam JN, Graham M, Socha JJ; Virginia Tech</td>
</tr>
<tr>
<td><strong>Biological Rhythms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3-169</td>
<td>Effects of short photoperiod on sleep and carbohydrate consumption in diurnal grass rats</td>
<td>McCahon SL, Shankar A, Williams C; University of Alaska Fairbanks</td>
</tr>
<tr>
<td>P3-170</td>
<td>Effects of Short Photoperiod and Carbohydrate Consumption on the Gut Microbiome of Diurnal Grass Rats</td>
<td>Callegari K, Shankar A, Seitz T, Drown D, Williams C; University of Alaska Fairbanks</td>
</tr>
<tr>
<td>P3-171</td>
<td>Artificial Light At Night (ALAN): An Anthropogenic Challenge for Urban Lizard Behavior and Physiology</td>
<td>Taylor LA, Pertuit OR, Carson IR, Tang C, Dennis AJ, Thawley CJ, Johnson MA; Trinity University, United International College, Davidson College</td>
</tr>
<tr>
<td>P3-172</td>
<td>Can the cnidarian circadian clock entrain to temperature cycles?</td>
<td>Berger CA, Tarrant AM, Woods Hole Oceanographic Institution</td>
</tr>
<tr>
<td>P3-173</td>
<td>Self-Compatibility in a Self-Fertilizing Fish</td>
<td>Longmire AE, Clark AE, Earley RL, Gresham JD; University of Alabama</td>
</tr>
<tr>
<td><strong>Social Behaviours</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3-174</td>
<td>Feeding Facilitation and its Impacts on Mouthpart Development in the Leaf-Footed Bug, Namia femorata</td>
<td>Sieber KR, Zlotnik S, Miller CW; University of Florida</td>
</tr>
<tr>
<td>P3-175</td>
<td>Behavioural differences between unstudied male and female morphs in the kribensis cichlid</td>
<td>Hurd PL, Dittmann N, Kruschke Z, Vandenberg P; University of Alberta</td>
</tr>
<tr>
<td>P3-176</td>
<td>Western Mosquitofish Social Behavior Varies with Levels of Land Use Conversion</td>
<td>Molina R, Kolonin A, Aspbury AS, Gabor CR; Texas State University</td>
</tr>
<tr>
<td>P3-177</td>
<td>Effects of Social Stress on Telomere Length and Telomerase Activity in Astatotilapia burtoni</td>
<td>Guo Y, Shampay J, Renn SCP; Reed College</td>
</tr>
<tr>
<td>P3-178</td>
<td>Seasonal changes in male Oyster Toadfish’s response to boatwhistle playbacks</td>
<td>Curtis NJ, Mackiewicz AG, Putland RL, Mensinger AF; University of Minnesota Duluth</td>
</tr>
<tr>
<td>P3-179</td>
<td>Neural Transcriptomic Responses to Social Opportunity</td>
<td>Wang JY, Paggeot LX, Friesen CN, Solomon-Lane TK, Hofmann HA, Young RL; University of Texas at Austin</td>
</tr>
<tr>
<td>P3-180</td>
<td>Neuroendocrine basis of cognition and behavior in a highly social cichlid fish</td>
<td>Wallace KJ, Hofmann HA; University of Texas at Austin</td>
</tr>
<tr>
<td>P3-181</td>
<td>Transcriptomic signatures of “choosy” vs “indecisive” social preferences in a salmin molly (Poecilia latipinna)</td>
<td>Price S, Schumer M, Wang S, Cummings M; University of Texas at Austin, University of British Columbia</td>
</tr>
<tr>
<td>P3-182</td>
<td>Individual changes in conspecific aggression across breeding stages: an exploration into adaptive plasticity</td>
<td>Weber AM, George EM, Rosvall KA; Indiana University, Bloomington</td>
</tr>
<tr>
<td>P3-183</td>
<td>Effects of Population Structure on Crayfish Behavior</td>
<td>Zona JO, Macomber GE, Martin AL, Moore PA; Saginaw Valley State University, Bowling Green State University</td>
</tr>
<tr>
<td>P3-184</td>
<td>Effects of Mycoplasma gallisepticum infection on juvenile sociality in house finches (Haemorhous mexicanus)</td>
<td>Langager MM, Hawley DM; Virginia Tech</td>
</tr>
<tr>
<td>P3-185</td>
<td>Modeling private versus social information in the assessment of environments</td>
<td>Aguiñaga J, Gomulkiewicz R, Watts HE; Washington State University</td>
</tr>
<tr>
<td>P3-187</td>
<td>Observation learning of the cap pushing response in honey bees (Apis mellifera)</td>
<td>Rodriguez SD, De Jesus-Soto MG, Fletcher SJ, Pretends Eagle TJ, Pentanidou T, Tschelin T, Barthell J, Giray T, Abramson CI, St Philip’s College, University Puerto Rico, Oklahoma State University, North Dakota State University, University of the Aegean, University Central Oklahoma, Oklahoma State University</td>
</tr>
<tr>
<td>P3-188</td>
<td>Testing for differences in temperature-dependent activity between introduced Anolis sagrei and native Anolis carolinensis in the U.S.</td>
<td>Ryan LM, Gunderson A; Tulane University</td>
</tr>
<tr>
<td>P3-190</td>
<td>Sex Differences in Offensive and Defensive Investment in Crayfish Claws</td>
<td>Vargas C, Graham ZA, Palaoro AV, Angilletta MJ; Arizona State University, Universidade Federal de São Paulo</td>
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<tr>
<td>Poster ID</td>
<td>Authors and Affiliations</td>
<td>Title</td>
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<tr>
<td>P3-191</td>
<td>Greene MJ, Renner K, Swallow JG; University of Colorado Denver, University of South Dakota</td>
<td>Mechanisms of Pavement Ant Aggression.</td>
</tr>
<tr>
<td>P3-192</td>
<td>Johnson ZV, Long L, Li J, Alapur V, Arroywala M, Hegarty BE; Lee T, Gu K, Lecesne RL, Moorman JM, Steeelman JT, McGrath PT; Georgia Institute of Technology PT</td>
<td>Depth sensing and deep learning: new insights into social bower building behaviors in Lake Malawi cichlids</td>
</tr>
<tr>
<td>P3-193</td>
<td>Bilbrey CM, Olenksi M, Dirienzo N, Dormha A; University of Arizona Tucson</td>
<td>Serotonin Reduces Aggression in Black Widow Spiders</td>
</tr>
<tr>
<td>P3-194</td>
<td>Hastings BT, Jackson BE; Longwood University</td>
<td>Analyzing the Flight Patterns and Behavior of Dragonflies Engaged in Aerial Territory Battles</td>
</tr>
<tr>
<td>P3-195</td>
<td>Young RL, Weitekamp CA, Tiri Z, Bhshary R, Hofmann HA; University of Texas at Austin, University of Neuchatel</td>
<td>Comparative Transcriptomics of Cooperative Behavior in Cleaner Wrasses</td>
</tr>
<tr>
<td>P3-196</td>
<td>Ismail A, Goldina A; Elizabethtown College</td>
<td>Assessing the effect of antidepressant sertraline on agonistic behavior of the subordinate crayfish Orconectes rusticus</td>
</tr>
<tr>
<td>P3-197</td>
<td>Ellison M, Bush J; University of Tennessee Knoxville</td>
<td>Hierarchical shifts in green anole social networks following brown anole invasion</td>
</tr>
<tr>
<td>P3-198</td>
<td>White KJ, Starkey JM, Sah S, Pradhan DS; Idaho State University</td>
<td>Different Aggressive Intensities Within Two Social Contexts in a Hermaphroditic Fish</td>
</tr>
<tr>
<td><strong>Development in an ecological context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3-200</td>
<td>Shrestha S, Tung J, Grinshpon RD, Swartz P, Hamilton PT, Mydlarz L, Clark AC; University of Texas at Arlington, North Carolina State University</td>
<td>Caspases from Scleractinian Coral Show Unique Regulatory Features</td>
</tr>
<tr>
<td>P3-201</td>
<td>Marshall AS, Mullins H, Urina CY, Davis JE, Radford University</td>
<td>Neutrophil/Lymphocyte Ratio as a Measure of Immune Response in Humans Exposed to Novel Microbiomes</td>
</tr>
<tr>
<td>P3-202</td>
<td>Bae J, Bertucci EM, Moore JA, Bock SL, Rainwater TR, Hale MD, Parrott BB, Augusta Univ, Univ of Georgia, Benedict College, Tom Yawkey Wildlife Center, Univ of Virginia</td>
<td>“The effects of the developmental environment on telomere length in Alligator mississippiensis hatchlings”</td>
</tr>
<tr>
<td>P3-203</td>
<td>Salazar-Nicholls MJ, Macias H*, Warkentin KM; Boston University, Smithsonian Tropical Research Institute, Pontifical Catholic University</td>
<td>Ontogeny and extent of hatching enzyme accumulation in red-eyed treefrog embryos</td>
</tr>
<tr>
<td>P3-204</td>
<td>Mutshady A, Stewart K, Seroy SK, Wheaton College, Heritage University, University of Washington</td>
<td>Effects of temperature and habitat on egg hatching time in the marine snail Lacuna vincta</td>
</tr>
<tr>
<td>P3-205</td>
<td>Lau E, Oakley TH; University of California Santa Barbara</td>
<td>A light meal: dietary acquisition and metabolism of bioluminescent compounds in the midshipman fishes</td>
</tr>
<tr>
<td>P3-206</td>
<td>Lewis JA, Secor SM; University of Alabama</td>
<td>Postprandial Remodeling of Organs and Intestinal Tissues by the Boa Constrictor</td>
</tr>
<tr>
<td>P3-207</td>
<td>Camilliere M, McPherson DR; SUNY Geneseo</td>
<td>Bimodal Effects of Serotonin on Cardiac Development in Japanese Quail Embryos</td>
</tr>
<tr>
<td>P3-208</td>
<td>Finkler MS, Rhoda MA; Indiana University Kokomo</td>
<td>Separating the effects of temperature on embryonic growth and development in Chelydra serpentina.</td>
</tr>
<tr>
<td>P3-209</td>
<td>Pyatt JE, Li CY, Waits A, Earley RL; University of Alabama</td>
<td>Mechanisms underlying temperature-dependent sex change</td>
</tr>
<tr>
<td>P3-210</td>
<td>Reynolds JA; Ohio State University</td>
<td>Coordinated microRNA and Endocrine Regulation of Insect Diapause</td>
</tr>
<tr>
<td>P3-211</td>
<td>Hawkins TM, Short RA, Davis JE; Radford University</td>
<td>Exploring the Impacts of Royal Jelly, Juvenile Hormone, and Nutritional State on Immune Response of Gromphadorhina portentosa</td>
</tr>
<tr>
<td>P3-212</td>
<td>Zeller KR, Marshall CA, Ghalambor CK; Colorado State University</td>
<td>The effects of local adaptation and rearing salinity on sustained swimming performance in freshwater estuary dwelling Trinidadian guppies</td>
</tr>
<tr>
<td>P3-213</td>
<td>Martinez J, Kopyay C, Misamore M*; Texas Christian University</td>
<td>Environmental factors effecting the survival and reproductive success of the invasive zebra mussel Dreissena polymorpha</td>
</tr>
<tr>
<td>P3-214</td>
<td>Rashid S, Halanych K, Moss A; Auburn University</td>
<td>Differential Gene Expression of Wound Repair in Mnemiopsis leidyi</td>
</tr>
<tr>
<td>P3-215</td>
<td>Hagen OL, Cerveny KL; Reed College</td>
<td>How does cell proliferation in the optic tectum change when fish see?</td>
</tr>
<tr>
<td>Posters</td>
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<td><strong>Character Development and Evolution</strong></td>
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<td></td>
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<tr>
<td><strong>P3-216</strong></td>
<td>Rajaratnam G, Supeinthiran A, Su KFY, Meier R; National University of Singapore, University of Toronto Scarborough, Lee Kong Chian Natural History Museum</td>
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<tr>
<td><strong>P3-216</strong></td>
<td>Character Development and Evolution</td>
<td></td>
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<tr>
<td><strong>P3-217</strong></td>
<td>Zaloga AR, Neal S, Koenig KM; Harvard University</td>
<td></td>
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<tr>
<td><strong>P3-217</strong></td>
<td>Sex brushes and dirty flies: The development and evolution of a novel abdominal appendage in male sepsid flies</td>
<td></td>
</tr>
<tr>
<td><strong>P3-218</strong></td>
<td>Goodheart JA, Minsky G, Brynjegard-Bialik MN, Drummond MS, Munoz JD, Fallon TR, Schultz DT, Weng J, Torres E, Oakley TH; UC Santa Barbara, California State Univ Los Angeles, Massachusetts Institute of Technology, Monterey Bay Aquarium Research Institute</td>
<td></td>
</tr>
<tr>
<td><strong>P3-218</strong></td>
<td>Laboratory culture of the California Sea Firefly Vargula tsuji: Developing a model system for the evolution of marine bioluminescence</td>
<td></td>
</tr>
<tr>
<td><strong>P3-219</strong></td>
<td>Kudla AM, Nijhout HF; Duke University</td>
<td></td>
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<tr>
<td><strong>P3-219</strong></td>
<td>Sources of Treehopper Pronotal Variability: An Exploration of Evolutionary Potential in Entylia carinata</td>
<td></td>
</tr>
<tr>
<td><strong>P3-220</strong></td>
<td>Hammond TA, Kovacs J, Weiner J; Spelman College, University of Rochester</td>
<td></td>
</tr>
<tr>
<td><strong>P3-220</strong></td>
<td>Evidence of Horizontal Gene Transfer in the Kissing Bug, Rhodnius prolixus</td>
<td></td>
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<tr>
<td><strong>Undergraduate education</strong></td>
<td></td>
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<tr>
<td><strong>P3-221</strong></td>
<td>McCue MD, Arbithina L, Lighton JRB; Sable Systems International</td>
<td></td>
</tr>
<tr>
<td><strong>P3-221</strong></td>
<td>A new model for introducing undergraduate biology students to energy budgets</td>
<td></td>
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<tr>
<td><strong>P3-222</strong></td>
<td>Whitenack LB; Allegheny College</td>
<td></td>
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<tr>
<td><strong>P3-222</strong></td>
<td>Insights from a five-year partnership between Allegheny College and local STEM teachers</td>
<td></td>
</tr>
<tr>
<td><strong>P3-223</strong></td>
<td>Price SA, Larouche O, Friedman ST, Corn KA, Wainwright PC, Martinez CM; Clemson University, University of California Davis</td>
<td></td>
</tr>
<tr>
<td><strong>P3-223</strong></td>
<td>A practical guide to implementing a quantitative specimen-based classroom undergraduate research experience</td>
<td></td>
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<tr>
<td><strong>P3-224</strong></td>
<td>Kane EA; Georgia Southern University</td>
<td></td>
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<tr>
<td><strong>P3-224</strong></td>
<td>On designing and implementing a new course as a new professor</td>
<td></td>
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<tr>
<td><strong>P3-225</strong></td>
<td>Garner AM, Ramey AL, Niewiarowski PH; University of Akron</td>
<td></td>
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<tr>
<td><strong>P3-225</strong></td>
<td>A Sticky Situation: Anole Adhesive Performance as an Inquiry-based Learning Exercise in an Introductory Biology Course</td>
<td></td>
</tr>
<tr>
<td><strong>P3-226</strong></td>
<td>Silvertboom DJ; University of Texas at Austin</td>
<td></td>
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<tr>
<td><strong>P3-226</strong></td>
<td>Teaching Epithelial Transport as a Core Concept in Physiology</td>
<td></td>
</tr>
<tr>
<td><strong>P3-227</strong></td>
<td>Chang ML, Abalusi D, McFarlane DA, Schmitz L; Claremont McKenna, Scripps, and Pitzer Colleges</td>
<td></td>
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<tr>
<td><strong>P3-227</strong></td>
<td>Exploring the Tempo of Eye Evolution through a Web Interface Application</td>
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<tr>
<td><strong>P3-228</strong></td>
<td>McAlister JS, Prestwich KN; College of the Holy Cross</td>
<td></td>
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<tr>
<td><strong>P3-228</strong></td>
<td>A liberal arts approach to introductory biology: Introductory sequence that gives full time to modern organisal biology</td>
<td></td>
</tr>
<tr>
<td><strong>P3-229</strong></td>
<td>Call E, Schenker E, Duprez D, Myers M, Lee V, Gilchrist SL; New College of Florida</td>
<td></td>
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<tr>
<td><strong>P3-229</strong></td>
<td>Adding STREAM to a Study Abroad Program in Honduras</td>
<td></td>
</tr>
<tr>
<td><strong>P3-230</strong></td>
<td>Hoese WJ, Burnaford JL; Cal State Univ Fullerton</td>
<td></td>
</tr>
<tr>
<td><strong>P3-230</strong></td>
<td>Southern California Ecosystems Research Program: A Year-round Program Fostering Undergraduate Ecology Research</td>
<td></td>
</tr>
<tr>
<td><strong>P3-231</strong></td>
<td>Krumm JL, Shea EK, Woods JL; Widener University, Delaware Museum of Natural History</td>
<td></td>
</tr>
<tr>
<td><strong>P3-231</strong></td>
<td>Integrating Digitized Natural History Collections into Course-based Undergraduate Research Experiences</td>
<td></td>
</tr>
<tr>
<td><strong>P3-232</strong></td>
<td>Hember AK, Mineo PM, Bennett KF, Ksiazek-Mikenas K, Marsch TM, Millgren EM, Raimondi SL; Elmhurst College</td>
<td></td>
</tr>
<tr>
<td><strong>P3-232</strong></td>
<td>Incorporating Vision and Change at Elmhurst College: a Departmental Approach</td>
<td></td>
</tr>
<tr>
<td><strong>P3-233</strong></td>
<td>Arrez SA, Arango K, Ferrigno A, Gibshand NJ; Knox College</td>
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</tr>
<tr>
<td><strong>P3-233</strong></td>
<td>Impacts of a fin whale skeleton in teaching Art and Biology courses at an undergraduate-only college</td>
<td></td>
</tr>
<tr>
<td><strong>Rising temperatures and climate change</strong></td>
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<tr>
<td><strong>P3-234</strong></td>
<td>Johnstone JB, Rahman MS; University of Texas Rio Grande Valley</td>
<td></td>
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<tr>
<td><strong>P3-234</strong></td>
<td>Impacts of rising temperature on gonadal functions, heat shock protein expression, cellular apoptosis, and body fluid conditions in Atlantic sea urchin</td>
<td></td>
</tr>
<tr>
<td><strong>P3-235</strong></td>
<td>Shlik NJ, Powers DR; George Fox University</td>
<td></td>
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<tr>
<td><strong>P3-235</strong></td>
<td>Do Hummingbirds Select Perch Microclimates to Maximize Their Ability to Dissipate Heat?</td>
<td></td>
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<tr>
<td><strong>P3-236</strong></td>
<td>Manzi S, Macrander J, Frias A, Krantz J; Florida Southern College</td>
<td></td>
</tr>
<tr>
<td><strong>P3-236</strong></td>
<td>A Comparative Analysis of Differentially Expressed genes from a stress response to increased water temperatures between sea anemones Exaipatia pallida, Diadumene lineata</td>
<td></td>
</tr>
<tr>
<td><strong>P3-237</strong></td>
<td>Ayala AN, Chamberlain C, Holbrook NM; University of Texas at Austin, Harvard University</td>
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<tr>
<td><strong>P3-237</strong></td>
<td>Temperate forests! How climate change affects growth and phenology</td>
<td></td>
</tr>
</tbody>
</table>
Monday 6 January 2020

Posters

P3-238  Bonfoey AM, Padda SS, Stahlschmidt ZR; U Pacific
Effects of Spatiotemporal Variation in Temperature and Water Availability on a Riparian Insect Community

P3-240  Cahill AE, Breen C, Stander R, Jost S, Hernandez R; Albion College
Seasonal differences dominate spatial ones in an inland salt marsh community

P3-241  Zinn D, Connor C, Watson CM; Midwestern State University
Indications of stress in Anolis oculatus and Anolis cristatellus populations two years after Hurricane Maria

P3-242  Clardy TR, Thomas BK, Das PB, Al-Nuwairah MA, Heinle MJ, Hikmawan TI, Prihartato PK, Abdulkader KA, Qurban MA; King Fahd University of Petroleum and Minerals, Environmental Protection Department
Optimal temperatures for common copepods in the Western Arabian Gulf

P3-243  Alba JC, Onthank KL; Walla Walla University
Predatory Behavior of Octopus rubescens in Response to Elevated Carbon Dioxide and Temperature

Complementary to S10: Melding Modeling and Morphology: integrating approaches to understand the evolution of form and function

P3-244  Howell BK, Hagey TJ, Winchell KM; Mississippi University for Women, Washington University in St Louis
Adapting to Urban Habitats: How Toe Pad Shape Varies in Puerto Rican Anoles

P3-245  Upadhyay A, Stayton TC, Hagey TJ; Mississippi University for Women, Bucknell University
Convergent Evolution in Toe Pad Shape Across Pad Bearing Lizards

P3-246  Hennessey PJ, Streicher JW, Cox CL; Georgia Southern University, Natural History Museum London, Florida International University
Evolution of skull morphology during diversification in specialist snakes

P3-247  Donatelli CM, Sanders E, Polavaram T, Toner M, Pfeiffenberger J, Tytell JD; University of Ottawa, Tufts University
A Thousand Fibers: The Functional Morphology of Fish Skin Collagen Fibers

P3-248  Turner M, Clardy T, Donatelli CM; University of Washington, King Fahd University of Petroleum, University of Ottawa
Bits and Pieces: Using Fractals to Understand Complex Morphology

P3-249  Rolfe S, Winchester J, Pieper S, Boyer D, Summers A, Maga M*; University of Washington, Duke University, Isomics Inc
SlicerMorph: Retrieve, Visualize and Analyze 3D Morphology with Open-Source

P3-250  Sajdah-Bey N, Wyman J, Srinivas A, Sallan L; University of Pennsylvania
The Hydrodynamic Effects of Pectoral Fins Attached to Back of the Skull in Extinct Cartilaginous Fishes (Iniopterygians)

P3-251  Turner M, Clardy T, Donatelli CM; University of Washington, King Fahd University of Petroleum, University of Ottawa
Bits and Pieces: Using Fractals to Understand Complex Morphology

P3-252  Levy MG; University of California Berkeley
Modeling the Developmental Shape Transition in the Morphogenesis of Cowrie Shells

P3-253  Storch JD, Hernandez LP; George Washington University
Calibrating Empirical Estimates of Theoretical Morphospace: A Phylometricmorphospace Approach
# Tuesday Schedule of Events

Events take place in the JW Marriott Austin, unless otherwise noted

<table>
<thead>
<tr>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker Ready Room</td>
<td>7:00 AM – 10:00 AM</td>
<td>Room 405</td>
</tr>
<tr>
<td>Registration</td>
<td>7:30 AM – 2:30 PM</td>
<td>Grand Ballroom Foyer</td>
</tr>
<tr>
<td>Coffee Break AM</td>
<td>9:30 AM – 10:30 AM</td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

## SPECIAL LECTURE

Moore Lecture: Emily Graslie  
Prehistoric Road Trip: Crafting a Story 2 Billion Years in the Making  
3:45 PM – 4:45 PM | Salon 5

## SYMPOSIUM ORAL PRESENTATIONS

**S10: Melding Modeling and Morphology: integrating approaches to understand the evolution of form and function**  
Chairs: Lindsay Waldrop, Jonathan Rader  
7:45 AM – 3:30 PM | Lone Star D

**S11: Integrative comparative cognition: can neurobiology and neurogenomics inform comparative analyses of cognitive phenotype?**  
Chairs: Yuxiang Liu, Sabrina Burmeister  
8:00 AM – 3:00 PM | Rooms 301-302

## CONTRIBUTED PAPER ORAL PRESENTATIONS

**MORNING**

**Session 107: Complementary to S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models, Part I**  
8:00 AM – 9:45 AM | Lone Star A

**Session 108: Twist and Turn**  
8:00 AM – 9:45 AM | Lone Star B

**Session 109: Molecular Mechanisms Underlying Physiology, Performance and Life History**  
8:00 AM – 10:15 AM | Lone Star C

**Session 110: Mechanics of Leftovers: Bone, Gristle and Sinew**  
8:00 AM – 9:45 AM | Lone Star F

**Session 111: Dealing with Damage**  
8:00 AM – 9:30 AM | Lone Star G

**Session 112: Bitchin Bioindicators**  
8:00 AM – 10:00 AM | Lone Star H

**Session 113: Sensory Biology - Navigation and Sensing**  
8:00 AM – 9:45 AM | Rooms 303-304

**Session 114: Complementary to S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models, Part II**  
8:00 AM – 9:30 AM | Room 205

**Session 115: Animal Movement**  
8:00 AM – 9:30 AM | Rooms 201-202

**Session 116: Reproduction & Development - Hormonally Speaking**  
8:00 AM – 9:45 AM | Rooms 203-204

**Session 117: Reproduction and Sensory Biology**  
8:00 AM – 9:45 AM | Brazos

**Session 118: Evolutionary Morphology and Modularity**  
8:00 AM – 9:30 AM | Rooms 402-403

**Session 119: Complementary to S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models, Part II**  
10:15 AM – 12:00 PM | Lone Star A

**Session 120: Robot Chicken of the Sea**  
10:15 AM – 12:00 PM | Lone Star B

**Session 121: Ionic and Osmotic Regulation: From Molecules to Organisms**  
10:30 AM – 12:00 PM | Lone Star C

**Session 122: Into the Interstitial Matrix**  
10:15 AM – 12:00 PM | Lone Star F

**Session 123: Growing Pains**  
10:00 AM – 12:00 PM | Lone Star G

**Session 124: Huevos to Ninos-Larvae, Yolks and Hatching**  
10:30 AM – 11:45 AM | Lone Star H

**Session 125: How Hormones Make Animals do What They do**  
10:15 AM – 11:45 AM | Rooms 303-304

**Session 126: Social Communication and Competition**  
10:15 AM – 12:00 PM | Room 205

**Session 127: “One Ant, One Bird, One Tree”, Biodiversity**  
10:30 AM – 11:45 AM | Rooms 201-202

**Session 128: Behavioural Phenotypes**  
10:15 AM – 11:45 AM | Rooms 203-204

**Session 129: Shedding Light on Adaptation and Co-evolution**  
10:15 AM – 12:00 PM | Brazos

**Session 130: Take a Bow for the New "Evolution"-Evolutionary and Population Biology**  
10:30 AM – 12:00 PM | Rooms 402-403
AFTERNOON
Session 131: Find Food, Eat or be Eaten 1:30 PM – 3:15 PM Lone Star A
Session 132: Paddles, Fins and Schools: Variety in Swimming Tools 1:30 PM – 3:15 PM Lone Star B
Session 133: Muscle Physiology and Function 1:30 PM – 3:15 PM Lone Star C
Session 134: Biological Velcro 1:30 PM – 3:15 PM Lone Star F
Session 135: Playing with Shape: Plasticity 1:30 PM – 3:15 PM Lone Star G
Session 136: Mechanisms of Development 1:30 PM – 3:15 PM Lone Star H
Session 138: Courtship Communication 1:30 PM – 3:30 PM Rooms 201-202
Session 139: On Not-So-Solid Ground 1:30 PM – 3:15 PM Rooms 203-204
Session 140: Comparative Genomics, Proteomics, Cell Type Evolution 1:30 PM – 3:30 PM Brazos

COMMITTEE AND BOARD MEETINGS
Executive Committee with 2020 Symposium organizers and ICB Editors/Associate Editors 7:00 AM – 9:00 AM Room 401
Executive Committee Meeting 7:45 AM – 9:00 AM Room 409
Public Affairs Committee 12:00 PM – 1:30 PM Room 408
/IOB Editorial Board Meeting 12:00 PM – 1:30 PM Room 406

WORKSHOPS AND PROGRAMS
Student Postdoctoral Affairs Committee Workshop: Transitions in Science Careers 12:00 PM – 1:30 PM Lone Star E
Workshop: Building Bridges from Genome to Phenome: Molecules, Methods and Models 12:00 PM – 1:30 PM Room 401
Workshop: 3D Visualization and Morphometrics with SlicerMorph 12:00 PM – 3:30 PM Rooms 502-503

SOCIAL EVENTS
Morning Run 6:00 AM JW Marriott Lobby
Society-wide social in honor of students and post-docs 5:00 PM – 7:00 PM Griffin Hall
## Tuesday Program Symposia

**Tuesday 7 January 2020**

### Symposium S10

**Melding Modeling and Morphology: integrating approaches to understand the evolution of form and function**

*Chairs: Lindsay Waldrop, Jonathan Rader*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45 am</td>
<td>S10-0</td>
<td><strong>Waldrop LD, Rader JA; Chapman University, UNC Chapel Hill</strong></td>
</tr>
<tr>
<td>8:00 am</td>
<td>S10-1</td>
<td><strong>Hebdon N, Ritterbush KA; University of Utah</strong></td>
</tr>
<tr>
<td>8:30 am</td>
<td>S10-2</td>
<td><strong>Anderson PSL; University of Illinois Urbana-Champaign</strong></td>
</tr>
<tr>
<td>9:00 am</td>
<td>S10-3</td>
<td><strong>Battista NA; College of New Jersey</strong></td>
</tr>
<tr>
<td>9:30 am</td>
<td></td>
<td><strong>Coffee Break</strong></td>
</tr>
<tr>
<td>10:00 am</td>
<td>S10-4</td>
<td><strong>Dakin R, Segre PS, Berberi I, Altschuler DL; Carleton University, Stanford University, University of British Columbia</strong></td>
</tr>
<tr>
<td>10:30 am</td>
<td>S10-5</td>
<td><strong>Holzman R, Olsson K, Tel Aviv University</strong></td>
</tr>
<tr>
<td>11:00 am</td>
<td>S10-6</td>
<td><strong>Muñoz MM, Anderson PSL, Hu Y, Patek SN, Camarillo H, Yale University, University of Illinois, Urbana-Champaign, Brown, Duke University</strong></td>
</tr>
</tbody>
</table>

### Symposium S11

**Integrative comparative cognition: can neurobiology and neurogenomics inform comparative analyses of cognitive phenotype?**

*Chairs: Yuxiang Liu, Sabrina Burmeister*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>S11-1</td>
<td><strong>Burmeister SS, Liu Y; University of North Carolina, University of Texas Southwestern Medical Center</strong></td>
</tr>
<tr>
<td>8:30 am</td>
<td>S11-2</td>
<td><strong>MacLean E, Gnanadesikan G, Bray E, Snyder-Mackler N; University of Arizona, Arizona State University</strong></td>
</tr>
<tr>
<td>9:00 am</td>
<td>S11-3</td>
<td><strong>Ladage LD; Penn State Altoona</strong></td>
</tr>
<tr>
<td>9:30 am</td>
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<td><strong>Coffee Break</strong></td>
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</tbody>
</table>
# Tuesday Program Morning Sessions

**Note:** Presenter is first author unless noted by an asterisk (*).

## Tuesday 7 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presentation Details</th>
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<tbody>
<tr>
<td>10:00 am</td>
<td>S11-4</td>
<td>Chittka L; Queen Mary University of London</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S11-5</td>
<td>Audet JN; Rockefeller University Field Research Center</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S11-6</td>
<td>Leal M, Powell JB; University of Missouri</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S11-7</td>
<td>Healy SD; University of St Andrews</td>
</tr>
<tr>
<td>12:00 pm</td>
<td></td>
<td><strong>Lunch Break</strong></td>
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<tr>
<td>1:30 pm</td>
<td>S11-8</td>
<td>Liu Y; University of Texas Southwestern Medical Center</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S11-10</td>
<td>Burmeister SS; University of North Carolina</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S11-11</td>
<td>Bingman VP; Bowling Green State University</td>
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</table>

## Complementary to S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models, Part I

**Session 107**

**Lone Star A**

**8:00 AM – 9:45 AM**

**Chairs:** Richelle Tanner, Nicholas Teets

<table>
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<tr>
<th>Time</th>
<th>Presentation Details</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>107-1</td>
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<tr>
<td>8:15 am</td>
<td>107-2</td>
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<tr>
<td>8:30 am</td>
<td>107-3</td>
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<td>8:45 am</td>
<td>107-4</td>
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<tr>
<td>9:00 am</td>
<td>107-5</td>
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<td>9:15 am</td>
<td>107-6</td>
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<tr>
<td>9:30 am</td>
<td>107-7</td>
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## Twist and Turn

**Session 108**

**Lone Star B**

**Chair:** Frank Fish

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation Details</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>108-1</td>
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### Tuesday 7 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Name and Affiliation</th>
<th>Presentation Title</th>
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<tbody>
<tr>
<td>8:15 am</td>
<td>108-2</td>
<td>Akanyeti O, Fetherstonhaugh S, Aberystwyth University</td>
<td>A kinematic chain model to quantify undulatory locomotion in animals and robots</td>
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<tr>
<td>8:30 am</td>
<td>108-3</td>
<td>Thandiackal R, Lauder GV, Harvard University</td>
<td>Turning in Zebrafish: Measuring Body Pressure, Torque, and Work During Spontaneous Turns</td>
</tr>
<tr>
<td>8:45 am</td>
<td>108-4</td>
<td>Downs AM, Kolpas A, Block BA, Fish FE, West Chester University, Stanford University</td>
<td>Turning Performance by Bluefin Tuna: Novel Mechanism for Rapid Maneuvers with a Rigid Body</td>
</tr>
<tr>
<td>9:00 am</td>
<td>108-5</td>
<td>Segre PS, Goldbogen JA, Stanford University</td>
<td>A computational framework for quantifying the maneuvering performance of free-swimming rorqual whales</td>
</tr>
<tr>
<td>9:15 am</td>
<td>108-6</td>
<td>Leahy AL, Fish FE, Kerr SJ, Leftwich MC, West Chester University, George Washington University</td>
<td>Value of the California Sea Lion (<em>Zalophus californianus</em>) Hindflippers during Porpoising and Turning Maneuvers</td>
</tr>
<tr>
<td>9:30 am</td>
<td>108-7</td>
<td>Fish FE, Leahy AM, Kulkarni AA, Leftwich MC, West Chester University, George Washington University</td>
<td>Hydrodynamics of a Crenelated Delta Wing Design of the Hindflippers of the California Sea Lion</td>
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<tr>
<td>9:45 am</td>
<td>✪</td>
<td>Coffee Break</td>
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#### Molecular Mechanisms Underlying Physiology, Performance and Life History

**Session 110**

**Molecular Mechanisms Underlying Physiology, Performance and Life History**

*Chairs: Rachel Davis, Kent Edmonds*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Name and Affiliation</th>
<th>Presentation Title</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>109-1</td>
<td>Bertucci EM, Parrott BB, University of Georgia</td>
<td>Characterization of the Age-Related DNA Methyelome and Development of an Epigenetic Age Predictor in Medaka (<em>Oryzias latipes</em>)</td>
</tr>
<tr>
<td>8:15 am</td>
<td>109-2</td>
<td>Zikeli S, Yamada K, Yap K, Zhang Y, Kiaris H, Hood W, Auburn University, University of South Carolina</td>
<td>Shy and Stressed? Correlations Between Corticosterone Level, Unfolded Protein Response, and Animal Personality</td>
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<td>8:30 am</td>
<td>109-3</td>
<td>Davis RL, Cristol DA, Heidinger BJ, Kittlison J, Swaddle JP, William &amp; Mary, North Dakota State University</td>
<td>Does lifetime methylmercury exposure impact telomere length in various organs within the zebra finch?</td>
</tr>
<tr>
<td>8:45 am</td>
<td>109-4</td>
<td>Heine KB, Justyn NM, Hill GE, Tucker VL, Jung D, Pollock B, Hood WR, Auburn University</td>
<td>Modeling Mitochondrial Behavior and Morphology from TEM Micrographs of Copepod Myocytes Following Ultraviolet Irradiation</td>
</tr>
<tr>
<td>9:00 am</td>
<td>109-5</td>
<td>Mackessy SP, University of Northern Colorado</td>
<td>A little variety goes a long way: Diversification of three-finger toxins in rear-fanged snake venoms</td>
</tr>
<tr>
<td>9:15 am</td>
<td>109-6</td>
<td>Edmonds KE, Gibson L, Roederer L; Indiana University Southeast</td>
<td>Corticosterone and Estradiol Regulation of Gastrointestinal (GI) Development and Reproduction in the Marsh Rice Rat (<em>Oryzomys palustris</em>)</td>
</tr>
<tr>
<td>9:30 am</td>
<td>109-7</td>
<td>Titon Jr. B, Titon SCM, Assis VR, Barsotti AMG, Teixeira RV, Gomes FR, University of São Paulo</td>
<td>Time-Related Inflammatory Response in <em>Rhinella diptycha</em> Toads</td>
</tr>
<tr>
<td>10:00 am</td>
<td>109-9</td>
<td>Klompen AML, Sanders SM, Cartwright P, University of Kansas Lawrence, University of Pittsburgh School of Medicine</td>
<td>Hazardous Hydroids of Hydractinia: Variation in venom expression and nematocyte distribution in functionally distinct tissues of a hydractiniid hydrozoan</td>
</tr>
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<th>Time</th>
<th>Session</th>
<th>Name and Affiliation</th>
<th>Presentation Title</th>
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<td>10:15 am</td>
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<td>Coffee Break</td>
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#### Mechanics of Leftovers: Bone, Gristle and Sinew

**Session 110**

**Mechanics of Leftovers: Bone, Gristle and Sinew**

*Chairs: Hila Tzipora, Mason Dean*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<th>Presentation Title</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>110-1</td>
<td>Williams KL, Evans KM, Simons AM; University of Minnesota, Brown University</td>
<td>The morphology of tooth replacement in Saliarii Combttooth Blennies (<em>Blenniformes: Blenniidae: Salarini</em>)</td>
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<tr>
<td>8:15 am</td>
<td>110-2</td>
<td>Zack EH, Smith SM, Angielczyk KD; University of Chicago, Field Museum of Natural History</td>
<td>Zoo Versus Wild: Trabecular Bone Architecture in Captive and Wild Xenarthra</td>
</tr>
</tbody>
</table>
Tuesday 7 January 2020

8:30 am 110-3 Ingle DN, Porter ME; Florida Atlantic University
Cetacean vertebral trabecular bone mechanical properties and structure vary among swimming modes and diving behaviors

8:45 am 110-4 Chase HT, Tobalske BW; University of Montana
Bird to the Bone: Functional Adaptation in the Avian Wing

9:00 am 110-5 Dean MN, Blumer M, Gualda E, Chaumel J, Seidel R, Marsal M, Omelon S; MPIKG
Cartilage canals in ray skeletons: Morphology, homology and putative role in mineralization

9:15 am 110-6 Chaumel J, Schotte M, Bizzarro J, Zaslansky P, Fratzl P, Baum D, Dean M; MPIKG, ZUSE, UCSC, Charité Hospital
Are the cells in stingray mineralized cartilage performing the roles of bone cells? Quantitative analysis of the lacuno-canalicular network in stingray tesserae

9:30 am 110-7 Mossor AM, Austin BL, Avey Arroyo JA, Butcher MT; Youngstown State University, Sloth Sanctuary of Costa Rica
Are sloths horses hanging upside down?: Suspensory adaptations of sloth flexor tendons

9:45 am  Coffee Break  Grand Ballroom Foyer

8:00 AM – 9:30 AM  Session 111  Lone Star G
Dealing with Damage
Chairs: Andrew Mountcastle, Vivek Prakash

8:00 am 111-1 Gawne R, Levin M; Tufts University
Planarian Head Shape Control: Regeneration Recapitulates Phylogeny

8:15 am 111-2 Prakash VN, Bull MS, Prakash M; Stanford University
Motility induced fractures reveal a ductile to brittle crossover in the epithelial tissues of Trichoplax adhaerens

8:30 am 111-3 Mountcastle AM, Ahlholm PD, Stone I, Federico P, Nixon E, Johnson N; Bates College
Effects of wing size and wingbeat frequency on wing wear in bumblebees

8:45 am 111-4 Combes SA, Gagliardi SF, Wargin AH; UC Davis
Wing damage isn’t all bad for bumblebees: Asymmetric damage impairs maneuverability, but symmetric damage improves stability

9:00 am 111-5 Kruppert S, Chu F, Stewart MC, Schmitz L, Summers AP; Friday Harbor Laboratories, University of Washington, Scripps College
En Garde! The poachers’ body armor is no show-off but a heavy defensive trait.

9:15 am 111-6 Van Wassenbergh S, Böhmer C, Abourachid A; Université Antwerpen, Muséum National D’Histoire Naturelle
Analysis of the Shock Absorption Paradox in Woodpeckers

9:30 am  Coffee Break  Grand Ballroom Foyer

8:00 AM – 10:00 AM  Session 112  Lone Star H
Bitchin Bioindicators
Chair: Travis Wilcoxen

8:00 am 112-1 Wilcoxen TE, Spence JM*; Millikin University
Effects of cypermethrin on neurophysiology, development, and behavior of Cuban treefrog (Osteopilus septentrionalis) and American bullfrog (Lithobates catesbeiana) tadpoles.

8:15 am 112-2 Marbach S, Xu W; Texas A&M University Corpus Christi
The Toxic Effects of Nanoplastic Particles on Fish Embryonic Development

8:30 am 112-3 Bain SR, Lower SE; Bucknell University, Bucknell University
Using Environmental Factors to Predict the Emergence Patterns of Firefly Species in Pennsylvania

8:45 am 112-4 Jones CLC, Huber RJ, Kim W, Prater C, Shafer ABA, Wagner ND, Frost PC; Trent University, Loughborough University, Baylor University
Animal co-limitation by calcium and phosphorus revealed through experimental nutrigenomics

9:00 am 112-5 Fetke JK, Flick RW, Martinson JW, See MJ, Pilgrim EM, Biales AD; University of Cincinnati, US EPA
Investigating the effects of DNA methylation on EE2 induction of Estrogen Receptor alpha gene expression in fathead minnows (Pimephales promelas)

9:15 am 112-6 Steele AN, Moore PA; Bowling Green St Univ, Univ of Michigan Biological Station
Behavioral consequences of per- and poly-fluorinated alkyl substances (PFAS) exposure on Northern Michigan crayfish species
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
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<tbody>
<tr>
<td>09:30</td>
<td>112-7</td>
<td>Bioaccumulation of lead (Pb) in songbirds following the Flint, Michigan drinking water crisis</td>
<td>Zahor DL, Glynn KJ, Chiparus S, Cornelius JM; Eastern Michigan University, Oregon State University</td>
</tr>
<tr>
<td>09:45</td>
<td>112-8</td>
<td>The catch of the day is...plastic? The ingestion of microplastics by zooplankton in southern California</td>
<td>Leigh SC, Paig-Train M; California State University Fullerton</td>
</tr>
<tr>
<td>10:00</td>
<td></td>
<td>Coffee Break</td>
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<tr>
<td>08:00</td>
<td>113-1</td>
<td>Time-dependent Characterization of Candidate Magnetoreception Genes in the Brain of Chinook Salmon</td>
<td>Fitak RR, Wheeler BR, Naisbett-Jones LC, Scanlan MM, Noakes DLG, Johnsen S; University of Central Florida, Duke University, University of North Carolina, Oregon State University</td>
</tr>
<tr>
<td>08:15</td>
<td>113-2</td>
<td>Why (and how) did the catfish cross the road? Chemoreceptive terrestrial orientation and amphibious natural history of the invasive walking catfish (Clarias batrachus)</td>
<td>Bressman NR, Hill JE, Ashley-Ross MA; Wake Forest University, University of Florida</td>
</tr>
<tr>
<td>08:30</td>
<td>113-3</td>
<td>Gray Whales Strand More Often on Days With Increased Levels of Atmospheric Radio Frequency Noise</td>
<td>Granger J, Walkowicz L, Fitak RR, Johnsen S; Duke University, Adler Planetarium</td>
</tr>
<tr>
<td>08:45</td>
<td>113-4</td>
<td>The role of vision and flow sensing in schooling behavior</td>
<td>McKee AA, Soto AP, Chen P, McHenry MJ; University of California Irvine</td>
</tr>
<tr>
<td>09:00</td>
<td>113-5</td>
<td>Active amplification in tree cricket hearing</td>
<td>Mhatre N; Western University</td>
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<tr>
<td>09:15</td>
<td>113-6</td>
<td>A Natural Occurring Shark Repellent: Ink has a Negative Effect on Shark Swimming Behavior</td>
<td>Simonitis LE, Marshall CD; Texas A&amp;M University at Galveston</td>
</tr>
<tr>
<td>09:30</td>
<td>113-7</td>
<td>Agent-based Models of Insect Odor Tracking Based on Behavior Experiments</td>
<td>LocPort JK, Daniel TL, Willis MA; University of Washington, Case Western Reserve University</td>
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<tr>
<td>09:45</td>
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<td>Coffee Break</td>
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<tr>
<td>08:00</td>
<td>114-1</td>
<td>Propulsion via vertical undulation in snakes</td>
<td>Jurestovsky DJ, Usher L, Astley HC; University of Akron</td>
</tr>
<tr>
<td>08:15</td>
<td>114-2</td>
<td>Amplitude Modulation in Sidewinding Locomotion Driven by Contact Sensing Facilities Movement in Heterogeneous Environments</td>
<td>Kaba AK, Rieser JM, Peez VM, Astley HC, Goldman DI, Georgia Tech, Akron University</td>
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<td>08:30</td>
<td>114-3</td>
<td>Evolutionary convergence in nanostructural adaptations in sidewinding vipersid snakes</td>
<td>Rieser JM, Li TD, Goldman DI, Mendelson III JR; Georgia Tech, CUNY, Zoo Atlanta</td>
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<tr>
<td>08:45</td>
<td>114-4</td>
<td>A Kinematic Analysis of Micrurus Coral Snake Thrash Duration and Curvature Enables Quantitative Characterization of Non-Locomotory Behavioral Motion</td>
<td>Danforth SM, Larson JG, Davis Rabosky AR, Moore TY, University of Michigan</td>
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<tr>
<td>09:00</td>
<td>114-5</td>
<td>The advantage of gait of mosquito larvae over undulatory swimming</td>
<td>Paez L, Melo K, Ijspeert A.J; EPFL</td>
</tr>
<tr>
<td>09:15</td>
<td>114-6</td>
<td>Revisiting the Kinematic Parameters that Define Eel-like Swimming</td>
<td>Kenaley CP, Kraemer K, Kunkle H; Boston College</td>
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<tr>
<td>09:30</td>
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<td>Coffee Break</td>
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</table>

The relationship between glucocorticoids and movement behavior during breeding in a free-living passerine.
Tuesday 7 January 2020


Neon Goby Larvae have Sufficiently Developed Sensory Systems and Swimming Abilities to Orient Directionally Beginning Shortly After Hatching

8:30 am 115-3  Spierer AN, Mossman JA, Rand DM; Brown University

Dissecting the genetic modifiers of flight performance using the Drosophila Genetic Reference Panel

8:45 am 115-4  Wyeth RC, Ucciferri C, Yousef K, Stevens H; St Francis Xavier University

Environment-Dependent Switching of Odour-Based Navigation Strategies by the Freshwater Gastropod, Lymnaea stagnalis

9:00 am 115-5  Fuiman LA, Williams TM, Davis RW; University of Texas at Austin, University of California Santa Cruz, Texas A&M University - Galveston

Underwater Navigation by Weddell Seals (Leptonychotes weddellii) in the Antarctic Fast-Ice Environment

9:15 am 115-6  Kamran M, Pollock AMM, Dittman AH, Noakes DLG; Oregon State University, NOAA, Oregon Hatchery Research Center

Homeward Bound: What the Salmon Nose Knows?

9:30 am Coffee Break

8:00 AM – 9:45 AM  Session 116  Rooms 203-204

Reproduction & Development - Hormonally Speaking

Chairs: Andrea Liebl, Aubrey Converse

8:00 am 116-1  Martin RJ, Kruger MC, MacDougall-Shackleton SA, Sherry DF; Western University

Temperature as a supplementary cue in the reproductive timing of the Black-capped chickadees (Poecile atricapillus)

8:15 am 116-2  Assis BA, Avery JD, Tylan C, Earley RL, Langkilde T; Pen State, University of Alabama

Honest Signaling, Sexual Conflict and Female Ornamentation: an Undesired Quality Signal?

8:30 am 116-3  Gifford ME, Robinson CD; University of Central Arkansas, University of Virginia

T3 as a source of hormonally-mediated maternal effects in a lizard

8:45 am 116-4  Liebl AL, Duprey ER, Russell AF; University of South Dakota, University of Exeter

What is the relationship between developmental stress hormones and adult helping behavior in a cooperatively breeding bird?

9:00 am 116-5  Farrar VS, Viernes RC, Flores L, Calisi RM; University of California Davis

Prolactin maintains a parental phenotype in both sexes of the biparental rock dove

9:15 am 116-6  Converse A, Thomas P; University of Texas Marine Science Institute

Female ZIP9-Knockout Zebrafish Exhibit Abnormal Egg Activation and Reduced Fecundity

9:30 am 116-7  Whelan S, Hatch SA, Benowitz-Fredericks ZM, Chastel O, Elliott KH; McGill University, Institute for Seabird Research and Conservation, Bucknell University, CNRS–Université de La Rochelle, France

Experimental effects of energy status on reproductive hormones, movement, and laying phenology of female black-legged kittiwakes

9:45 am Coffee Break

8:00 AM – 9:45 AM  Session 117  Brazos

Reproduction and Sensory Biology

Chair: Brooke Vetter

8:00 am 117-1  Bastaans E, Javaly N, O'Loughlin C, McCormick L, Wegrzyn P; SUNY Oneonta, Portland State University

Can I Buy You a Drink? The Effect of Male Hydration Status on Male Mating Behavior and Female Life History in Bean Beetles

8:15 am 117-2  Brown TA, Tsurusaki N, Burns M; UMBC, Tottori University

Genotyping-By-Sequencing via 3RAD Capture to Determine Reproductive Mode in a Facultative Parthenogen

8:30 am 117-3  Baleball S, Sisneros JA; University of Washington

Relationship of advertisement call parameters with phenotypic traits in "singing" male plainfin midshipman

8:45 am 117-4  Nowicki S, Caves EM, Schweikert LE, Green PA, Taboada C, Zipple MN, Peters S, Johnsen S; Duke University, University of Exeter, Florida International University

Carotenoid Concentration in Avian Retinal Oil Droplets Correlates with Color Discrimination Across a Perceptual Category Boundary
Tuesday 7 January 2020

9:00 am 117-5  Florkowski MF, Yorzinski JL; Texas A&M University
D2 Dopamine Receptor Activation Induces Aggression in Male House Sparrows (Passer domesticus)

9:15 am 117-6  Bush JM, Ellison M, Simberloff D; University of Tennessee Knoxville
Are brown anoles bullies? Insights into interactions between an invasive and native lizard species

9:30 am 117-7  Vetter BJ, Sisneros JA; University of Washington
The swim bladder enhances sound pressure sensitivity and bandwidth of the lagena in female plainfin midshipman (Porichthys notatus)

9:45 am  Coffee Break  Grand Ballroom Foyer

8:00 AM – 9:30 AM  Session 118  Rooms 402-403

Evolutionary Morphology and Modularity
Chair: Todd Oakley

8:00 am 118-2  Fabre AC, Bardua C, Clavel J, Felice RN, Bonnel J, Blackburn D, Stanley E, Streicher J, Goswami A, NHM, UCL, University of Florida
Morphological evolution of the head of Caudata is correlated to rapid diversification and dispersion during warming events

8:15 am 118-3  Zelditch ML, Swiderski DL; University of Michigan, Ann Arbor
An Incisor Runs Through It I. Variational modularity of the squirrel mandible

8:30 am 118-4  Swiderski DL, Zelditch ML; University of Michigan, Ann Arbor
An Incisor Runs Through It II. Evolutionary modularity of the squirrel mandible

8:45 am 118-5  Conith AJ, Hope S, Liu M, Albertson RC; UMass Amherst
The Developmental and Functional Origins of a Key Feeding Innovation in the Cichlid Pharyngeal Jaw

9:00 am 118-6  Gómez-Bahamón V, Chen E, Assis M, Heming N, Marin M, Tuero D, Bates J; University of Illinois, Field Museum, University of Brasilia, Universidad de Buenos Aires
Egg Shape and Flight Capacity in Birds Implementing a Novel Geometric Model

9:15 am 118-7  Martinez CM, Friedman ST, Corn KA, Larouche O, Price SA, Wainwright PC; University of California, Davis, Clemson University
Large Mouths and Tapered Tails: Morphological Disparity Increases with Ocean Depth

9:30 am  Coffee Break  Grand Ballroom Foyer

10:15 AM – 12:00 PM  Session 119  Lone Star A

Complementary to S7: Building Bridges from Genome to Phenome: Molecules, Methods and Models, Part II
Chairs: Todd Oakley, Billie Swalla

10:15 am 119-1  Vazquez-Medina JP, Allen KN, Torres-Velarde JM, Lam EK; University of California, Berkeley
Primary tissue culture provides a system for functional genome-to-phenome investigations in marine mammals

10:30 am 119-2  Musser JM, Schippers K, Nickel M, Kohn A, Moroz L, Arendt D; European Molecular Biology Laboratory, University of Florida
Whole-body single-cell RNA sequencing reveals neural elements in a sponge

10:45 am 119-3  Crawford K, Albertin CB, Koenig KM, Rosenthal J; St Mary’s College of Maryland, Marine Biological Laboratory, Harvard University
CRISPR-Cas9 Genome Editing in the Cephalopod Doryteuthis (Loligo) pealeii

11:00 am 119-4  Swalla BJ, Fodor A, Lowe EK, Stolfi A; Friday Harbor Laboratories, University of Washington, Georgia Institute of Technology
Tailless Molgulid Ascidiains express Larval Pseudogenes

11:15 am 119-5  Ragland GJ, Dowie EJ, Powell THQ, Feder JL, Hahn DA; University of Colorado Denver, University of Otago, State University of New York, University of Notre Dame, University of Florida
Genome-wide variation and transcriptional changes in diverse developmental processes underly the rapid evolution of seasonality in a temperate fly

11:30 am 119-6  Lenz PH, Roncalli V, Cieslak MC, Castelfranco AM, Hartline DK; University of Hawaii at Manoa, University of Barcelona
Organism-Environment Interactions in Marine Zooplankton: Transcriptomic Characterization of a Copepod Phenome
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Title</th>
<th>Chairs</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:45 am</td>
<td>119-7</td>
<td>Lone Star B</td>
<td>From Chaos Came Beauty: The Origin of a Novel Bioluminescence Gene with Ecosystem Impacts</td>
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<td>Oakley TH, Hensley NM, Ellis EA, Goodheart JA, Varney RM, Gerrish GA, Torres E; UCSB, U Alabama, UW-Madison, CSULA</td>
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<tr>
<td>12:00 pm</td>
<td></td>
<td>Lone Star B</td>
<td>Lunch Break</td>
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<tr>
<td>10:15 AM – 12:00 PM</td>
<td>Session 120</td>
<td>Lone Star B</td>
<td>Robot Chicken of the Sea</td>
<td>George Lauder</td>
<td>Lauder GV, Wainwright DK, DiSanto V, White C, Zhu J, Bart-Smith H, Harvard Univ, Univ Virginia</td>
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<td>10:30 am</td>
<td>120-2</td>
<td>Lone Star B</td>
<td>Tuna robotics: impact of body flexibility and fin-fin interactions on swimming performance of a new tuna-inspired robotic platform</td>
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<td>White CH, Lauder GV, Bart-Smith H, University of Virginia, Harvard University</td>
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<td>10:45 am</td>
<td>120-3</td>
<td>Lone Star B</td>
<td>Tuna robotics: design and control of an autonomous underwater vehicle inspired by tuna</td>
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<td>Zhu JJ, Wainwright DK, Lauder GV, Bart-Smith H, University of Virginia, Harvard University</td>
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<tr>
<td>11:00 am</td>
<td>120-4</td>
<td>Lone Star B</td>
<td>Tuna robotics: Computational FSI optimization of a tuna-tail- inspired propulsor with high efficiency</td>
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<td>Wang J, Qi Z, Han P, Dong H, Wainwright DK, Lauder GV, Zhu J*, Bart-Smith H; University of Virginia, Harvard University</td>
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<tr>
<td>11:15 am</td>
<td>120-5</td>
<td>Lone Star B</td>
<td>Bio-inspired Control Algorithms Integrating Steady Swimming and Maneuvering in Fish Robots</td>
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<td>Howe SP, Astley HC; University of Akron</td>
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<td>11:30 am</td>
<td>120-6</td>
<td>Lone Star B</td>
<td>Gait dynamics of a quadriflagellate robophysical model</td>
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<td>Robinson TL, Diaz K, Ozkan-Aydin Y, Wan KY, Goldman DI, Georgia Tech, University of Exeter</td>
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<td>11:45 am</td>
<td>120-7</td>
<td>Lone Star B</td>
<td>Too close for comfort: importance of inter-appendage spacing in metachronal swimming performance</td>
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<td>Ford MP, Santhanakrishnan A; Oklahoma State University</td>
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<td>12:00 pm</td>
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<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Session 121</td>
<td>Lone Star C</td>
<td>Ionic and Osmotic Regulation: From Molecules to Organisms</td>
<td>Charles Booth, Kady Lyons</td>
<td>Pipes BL, Nishiguchi MK; New Mexico State University</td>
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<td>10:30 am</td>
<td>121-1</td>
<td>Lone Star C</td>
<td>mCherry-pHluorin Tagging Illuminates the Role of Light Organ pH Modulation in the Vibrio fischeri-Euprymna scolopes Symbiosis</td>
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<td>Orr SE, Buchwalter DB; North Carolina State University</td>
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<tr>
<td>10:45 am</td>
<td>121-2</td>
<td>Lone Star C</td>
<td>It's All About the Fluxes: Temperature Influences Ion Transport and Toxicity in Aquatic Insects</td>
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<td>Starling JA, Guatam S, Howard LJ, Madsen SS, Tipmark CK; University of Arkansas, University of Southern Denmark</td>
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<tr>
<td>11:00 am</td>
<td>121-3</td>
<td>Lone Star C</td>
<td>Salinity effects on water and salt transport components in the intestine of Atlantic killifish (Fundulus heteroclitus)</td>
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<td>Gillen CM, Piemarini PM, Romero MF; Kenyon College, Ohio State University, Mayo Clinic</td>
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<td>11:15 am</td>
<td>121-4</td>
<td>Lone Star C</td>
<td>Electrogenic Sodium Transport by Insect Cation-Chloride Cotransporters?</td>
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<td>Lyons K, Wynne-Edwards KE; Georgia Aquarium, University of Calgary</td>
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<td>11:30 am</td>
<td>121-5</td>
<td>Lone Star C</td>
<td>Legacy PCB Contamination Negatively Impacts Osmoregulatory Biomarkers in Pregnant Stingrays and their Embryos</td>
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<td>Ellis LV, Bollinger RJ, Weber HM, Madsen SS, Tipmark CK; University of Arkansas, University of Arkansas and University of Southern Denmark</td>
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<tr>
<td>11:45 am</td>
<td>121-6</td>
<td>Lone Star C</td>
<td>Aquaporin Expression in the Gill of Japanese Medaka</td>
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<td>Gignac PM, Kley NJ; Oklahoma State University Center for Health Sciences, Stony Brook University</td>
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<td>12:00 pm</td>
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<td>Lone Star C</td>
<td>Lunch Break</td>
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<tr>
<td>10:15 AM – 12:00 PM</td>
<td>Session 122</td>
<td>Lone Star F</td>
<td>Into the Interstitial Matrix</td>
<td>Molly Gabler, Marianne Alleyne</td>
<td>Gignac PM, Kley NJ; Oklahoma State University Center for Health Sciences, Stony Brook University</td>
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<td>10:15 am</td>
<td>122-1</td>
<td>Lone Star F</td>
<td>At the nexus of iodine staining duration and specimen size: repeated-measures study to improve visualization of vertebrate soft-tissue anatomy using diceCT imaging</td>
<td></td>
<td>Gignac PM, Kley NJ; Oklahoma State University Center for Health Sciences, Stony Brook University</td>
</tr>
</tbody>
</table>
Tuesday 7 January 2020

10:30 am 122-2 Taylor MS, O’Brien HD, Gignac PM; Oklahoma State University Center for Health Sciences
Shrinkage after swimming in iodine? Evaluating the use of hydrogel stabilization for reinforcing nervous tissues before iodine diffusion

10:45 am 122-3 Smith MG, Westgate AJ, Koopman HN; Harvard University, UNC Wilmington
Adipose tissue in diving animals: measuring the potential for gas exchange

11:00 am 122-4 Jankauski MA; Montana State University
On the Nonlinear Mechanics of the Honeybee Thorax

11:15 am 122-5 Wei L, Reiter KE, McElrath TC, Dunn AC, Alleyne M*; University of Illinois at Urbana-Champaign, Illinois Natural History Survey
The role of cuticular diffraction gratings in beetle iridescence, wetting and friction interactions

11:30 am 122-6 Davis AL, Nijhout HF, Johnsen S; Duke University
Convergent evolution of ultra-black butterfly scales

11:45 am 122-7 Gueill BA, Caldwell MS, Warkentin KM; Boston University, Gettysburg College, Boston University
Treefrog egg-clutch biomechanics and their effect on embryo escape-hatching behavior

12:00 pm Lunch Break

10:00 AM – 12:00 PM Session 123 Lone Star G

Growing Pains
Chair: Louis Zachos

10:00 am 123-1 Zachos LG; University of Mississippi
Matrix Models for Logistic Plate Growth in Sea Urchins

10:15 am 123-2 Regan MC, Ashley-Ross MA; Wake Forest University
Morphological Scaling and Ontogeny of Shark Caudal Fins

10:30 am 123-3 Marce-Nogue J, Liu J; University at Buffalo
Testing an Isometric Ontogenetic Model for Vibrations of Weberian Ossicles in Zebrafish

10:45 am 123-4 Ollroyd SL, Sidor CA; University of Washington, Burke Museum
Allometry and porosity of the novel sound reception structure of chameleons

11:00 am 123-5 Cheu AY, Bergmann PJ; Clark University
Ontogenetic allometry of locomotor performance in basilisk lizards

11:15 am 123-6 Green TL, Gignac PM, Oklahoma State University Center for Health Sciences
Cassowary Casques are Lightning Rods for Speculation: Anatomical Development and Phenotypic Variation Clarifies Potential Biological Roles

11:30 am 123-7 White HE, Tucker AS, Goswami A; Natural History Museum, King’s College London
Quantification of Suture Morphology in an Ontogenetic Framework across Laurasiatheria

11:45 am 123-8 Graham ZG, Garde E, Heide-Jørgensen MP, Palaoro AV; Arizona State University, Greenland Institute of Natural Resources, Universidade Federal de São Paulo
What is the Function of the Narwhal’s Tusk? Insights from Morphology

12:00 pm Lunch Break

10:30 AM – 11:45 AM Session 124 Lone Star H

Huevos to Ninos-Larvae, Yolks and Hatching
Chair: Douglas Pace

10:30 am 124-1 Birch S, Plachetzki D; University of New Hampshire
Investigating Sensory Integration and Settlement Responses to Sensory Stimuli in the Hydrozoan Ectopleura crocea

10:45 am 124-2 Nguyen H, Hoang T, Hawkins D, Drechsler J, Nilsson P, Steiner B, Pernet B*; California State University Long Beach
Are larvae of the sand dollar Dendraster excentricus food-limited in nearshore waters of southern California?

11:00 am 124-3 Ellison A, Pace DA*; California State University Long Beach
Protein metabolism and food-induced developmental plasticity during echinoid larval development

11:15 am 124-5 Barkhouse JM, Newbrey JL, Newbrey MG; Columbus State University
Laying-Sequence Variation in the Yolk Carotenoids of Eastern Bluebirds

11:30 am 124-6 Newbrey JL, Love Q, Newbrey MG; Columbus State University
Differences in Yolk Carotenoid Concentrations of Three Songbird Species Breeding in Nest Boxes in Georgia, USA

11:45 pm Lunch Break
### Tuesday 7 January 2020

#### Session 125  
**How Hormones Make Animals do What They do**  
**Chairs:** Aurora Solla, Roslyn Dakin

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 125</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>125-2</td>
<td>Room 303-304</td>
</tr>
<tr>
<td></td>
<td>Christianso BM, Howey CAF; University of Scranton, Penn State University</td>
<td>Timber rattlesnakes (<em>Crotalus horridus</em>) that move more often maintain higher baseline corticosterone levels</td>
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<td>10:30 am</td>
<td>125-3</td>
<td>Room 303-304</td>
</tr>
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<td></td>
<td>Solla AL, O’ourke C, Anderson A, Renn SCP; Reed College</td>
<td>Secret’s in the Sauce: Hormones and Behavior in <em>Julidochromis marlieri</em></td>
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<tr>
<td>10:45 am</td>
<td>125-4</td>
<td>Room 303-304</td>
</tr>
<tr>
<td></td>
<td>McMahon E, Youatt E, Braithwaite V, Cavigelli S; Pennsylvania State University</td>
<td>Stability of behavioral traits and associated physiology</td>
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<tr>
<td>11:00 am</td>
<td>125-5</td>
<td>Room 303-304</td>
</tr>
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<td></td>
<td>Grece JK, Angelier F; Texas A&amp;M University, Centre d’Etudes Biologiques de Chize</td>
<td>Post-natal Glucocorticoids Negatively Affect Adult Anti-predator Behavior in House Sparrows</td>
</tr>
<tr>
<td>11:15 am</td>
<td>125-6</td>
<td>Room 303-304</td>
</tr>
<tr>
<td></td>
<td>Ryder TB, Dakin R*, Vernasco BJ, Evans BS, Horton BM, Moore IT, Smithsonian Institution, Carleton University, Virginia Tech, Millersville University</td>
<td>Testosterone modulates status-specific patterns of cooperation in a social network</td>
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<tr>
<td>11:30 am</td>
<td>125-7</td>
<td>Room 303-304</td>
</tr>
<tr>
<td></td>
<td>Greville LJ, Pollock T, Decatanzaro D, Faure PA; McMaster University</td>
<td>Seasonal Variation in Estradiol Transfer Among Male and Female Big Brown Bats</td>
</tr>
<tr>
<td>11:45 am</td>
<td>Lunch Break</td>
<td></td>
</tr>
</tbody>
</table>

### Lunch Break

#### Session 126

**Social Communication and Competition**  
**Chair:** Sarah Wofford

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 126</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>126-2</td>
<td>Room 205</td>
</tr>
<tr>
<td></td>
<td>Westerman EL, Ernst DA, Sullivan TJ; University of Arkansas, Gloucester Marine Genomics Institute</td>
<td>The genetic basis of mate preference learning in <em>Bicyclus</em> butterflies</td>
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<tr>
<td>10:30 am</td>
<td>126-3</td>
<td>Room 205</td>
</tr>
<tr>
<td></td>
<td>Wofford SJ; Jacksonville State University</td>
<td>Urine for a fight: Sex-based differences in crayfish contest signaling</td>
</tr>
<tr>
<td>10:45 am</td>
<td>126-4</td>
<td>Room 205</td>
</tr>
<tr>
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<td>Rocco AJ, Wofford SJ; Jacksonville State University</td>
<td>Battle of the Benthic: Studying Agonistic Interactions Between a Native and Invasive Crayfish Species</td>
</tr>
<tr>
<td>11:00 am</td>
<td>126-5</td>
<td>Room 205</td>
</tr>
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<td>Earl AD, Kimmitt AA, Simson RK, Yorzinski JL; Columbia University, Indiana University, University of Windsor, Texas A&amp;M University</td>
<td>Female Ornamentation in a Lekking Bird: Bright Females Dominate</td>
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<tr>
<td>11:15 am</td>
<td>126-6</td>
<td>Room 205</td>
</tr>
<tr>
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<td>Buchinger TJ, Fissette SD, Brant CO, Li K, Johnson NS, Li W; Michigan State University, US Geological Survey’s Hammond Bay Biological Station</td>
<td>A Pheromone Antagonist Liberates Female Sea Lamprey From a Sensory Trap</td>
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<tr>
<td>11:30 am</td>
<td>126-7</td>
<td>Room 205</td>
</tr>
<tr>
<td></td>
<td>Jones MM, Nuñez CMV*; University of Florida Gainesville, University of Memphis</td>
<td>Rising up to the challenge of their rivals: mare behavior alters stallion response to opponent playback</td>
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<td>11:45 am</td>
<td>126-8</td>
<td>Room 205</td>
</tr>
<tr>
<td></td>
<td>Reed AJ, Wofford SJ; Jacksonville State University</td>
<td>Turn It Down! The Effects of Acoustic Stimuli on Contest Dynamics in Crayfish</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch Break</td>
<td>Room 205</td>
</tr>
</tbody>
</table>

### Session 127

**"One Ant, One Bird, One Tree", Biodiversity**  
**Chair:** James Waters

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 127</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 am</td>
<td>127-1</td>
<td>Room 201-202</td>
</tr>
<tr>
<td></td>
<td>Goodman AM, Esposito LA; California Academy of Sciences</td>
<td>Spatial and Ecological Niche Partitioning in Congeneric Scorpions</td>
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<tr>
<td>10:45 am</td>
<td>127-2</td>
<td>Room 201-202</td>
</tr>
<tr>
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<td>Germeroth LM, Sumnicht TP, Verble RM; Missouri University of Science and Technology</td>
<td>Maintaining Biodiversity of Ant Communities in the Crocker Range, Malaysian Borneo</td>
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<tr>
<td>11:00 am</td>
<td>127-3</td>
<td>Room 201-202</td>
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<td>Waters JS, Providence College</td>
<td>Ants of Providence</td>
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<tr>
<td>11:15 am</td>
<td>127-4</td>
<td>Room 201-202</td>
</tr>
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<td>Davis-Berg EC, Wilson BA, Arnold C, Almario-Kopp D; Columbia College Chicago, Liberty Public Schools, Prairie State College</td>
<td>Molluscs of Anderson County Prairies, a native tallgrass prairie in Eastern Kansas</td>
</tr>
</tbody>
</table>
Tuesday 7 January 2020

11:30 am 127-5 Cerda PA, Crowe-Riddell J, Larson JG, Nagesan R, Callahan S, Rabosky DL, Davis Rabosky AR; University of Michigan
Comparisons of Interspecific and Intraspecific Variation in Rear-Fanged Snake Venom Expression

11:45 am Lunch Break

10:15 AM – 11:45 AM Session 128 Rooms 203-204

**Behavioural Phenotypes**
Chair: Anna Dornhaus

10:15 am 128-1 Foquet B, Song H; Texas A&M University
Behavioral and molecular reaction norms of locust phase polyphenism in a phylogenetic frame work

10:30 am 128-2 Hellmann JK, Bensky M, Zielinski C, Anderson S, Bell A; University of Illinois, Urbana-Champaign
The Evolution of Sex-Specific Paternal Effects in Threespined Sticklebacks

10:45 am 128-3 Stein LR, Hoke KL; University of Oklahoma, Colorado State University
Parental and personal experience with predation risk interact in shaping phenotypes in a sex-specific manner

11:00 am 128-4 Minicozzi MR, Axlid E, Wilson T, Buck CL, Von Hippel FA; Minnesota State University Mankato, Northern Arizona University
Sodium perchlorate causes behavioral changes in developing zebrafish larva

11:15 am 128-5 Ison T, Charbonneau D, Waugh A, Linksvayer T, Dornhaus A; University of Arizona, Arizona State University, University of Pennsylvania
The Effects of Aging: Task Allocation and Inactivity in Two Ant Species

11:30 am 128-6 Dornhaus A, Kelemen EP, Rivera MD; University of Arizona, York University, University of Illinois at Urbana-Champaign
Designed for Comparative Advantage: Body size, Division of Labor, and the Benefits of Worse Workers in Bumble Bees

11:45 am Lunch Break

10:15 AM – 12:00 PM Session 129 Brazos

**Shedding Light on Adaptation and Co-evolution**
Chair: Emily Kane

10:15 am 129-1 Cohen HE, Kane EA; Georgia Southern University
When the Expected Doesn’t Happen: A Lack of Local Adaptation in Trinidadian Guppies

10:30 am 129-2 St. John ME, Martin CH; University of California - Berkeley
A tale of scales and snails: behaviorally mediated traits drive the evolution of novelty in a radiation of Cyprinodon pupfishes

10:45 am 129-3 Justyn NM, Heine KB, Peteya JA, Hood WR, Shawkey MD, Wang B, Hill GE; Auburn University, John Carroll University, Ghent University
Persistence of Carotenoids in the Red Eyespots of Copepods (Tigriopus californicus) on Carotenoid-free Diets

11:00 am 129-4 Huie JM, Thacker C, Tomabene L; University of Washington, Natural History Museum of Los Angeles County
Co-evolution of cleaning and feeding morphology in Caribbean and eastern Pacific gobies

11:15 am 129-5 Coryell RL, Nishiguchi MK; New Mexico State University
Temperature Adaptation Influences Environmental and Symbiotic Fitness in the Squid-Vibrio Mutualism

11:30 am 129-6 Gould A, Fritts-Penniman A; California Academy of Sciences
Shedding light on specificity: the phylogeography of a bioluminescent symbiosis

11:45 am 129-7 Bracken-Grissom HD, Deleo DM, Porter ML, Iwanicki T, Sickles J, Frank TM; Florida International University, University of Hawai‘i at Mānoa, Nova Southeastern University
Evidence for Extraocular Photosensitivity in the Bioluminescent Organs of Deep-sea Shrimp

12:00 pm Lunch Break
Tuesday Program Afternoon Sessions

Note: Presenter is first author unless noted by an asterisk (*).

1:30 PM – 3:15 PM  Session 131  Lone Star A

**Find Food, Eat or be Eaten**
*Chair: Bahnisikha Dutta*

1:30 pm  **131-1**  Lessig EK, Nonacs PN; University of California Los Angeles

Foraging choices, learning, and behavior across paths that vary in risk

1:45 pm  **131-2**  Dutta B, Goodisman MAD, Goldman DI; Georgia Institute of Technology

Prey and mound manipulation by fire ant collectives

2:00 pm  **131-3**  Schwener MJ, Freymiller GA, Clark RW, McGowan CP; University of Idaho, San Diego State University

A heightened vigilance state alters mechanics of jump backs in kangaroo rats (*D. deserti*)

2:15 pm  **131-4**  Talal S, Farington R, Harrison JF, Cease AJ; Arizona State University

Diet Preference and Requirements Shift Substantially with Age in the South American Locust (*Schistocerca cancellata*)

2:30 pm  **131-5**  Wargin AH, Combes SA; University of California Davis

BEEhavior under pressure: Testing the effects of barometric pressure change on bumblebee foraging behavior

2:45 pm  **131-6**  Reichert MS, Kulahtci IG, Davidson GL, Quinn JL; Oklahoma State University, University College Cork, Cambridge University

Scrounging Versus Learning Strategies in Foraging Songbirds

3:00 pm  **131-7**  Erdmann JA; Oklahoma State University

Aggressive anglerfish, seductive serpents, and titillating toads: a discussion of luring and prey manipulation strategies

1:30 PM – 3:15 PM  Session 132  Lone Star B

**Paddles, Fins and Schools: Variety in Swimming Tools**
*Chairs: James Townsend, Arvind Santhanakrishnan*

1:30 pm  **132-1**  Townsend JP, Gemmel BJ, Sutherland KR, Colin SP, Costello JH; Providence College, Marine Biological Laboratory, University of South Florida, University of Oregon, Roger Williams University

Ink release and swimming behavior in an oceanic ctenophore, *Eurhamphaea vexilligera* Gegenbaur, 1856
Tuesday 7 January 2020

1:45 pm 132-2  Daniels J, Osborn K, Aoki N, Havassy J, Mushegian N, Katja K; Monterey Bay Aquarium Research Institute, Smithsonian Institution  A Midwater Polychaete on the Move: Swimming of Tomopteris

2:00 pm 132-3  Santhanakrishnan A, Ford MP; Oklahoma State University  (Un)synchronized rowing: importance of phase lag in metachronal swimming performance

2:15 pm 132-4  Lucas KN, Lauder GV, Tytell ED; University of Michigan, Harvard University, Tufts University  Revisiting Dubois: the roles of positive and negative pressure in force production during fish swimming

2:30 pm 132-5  Ruddy BT, Long Jr JH, Verma S, Porter ME; Florida Atlantic University, Vassar College  Swimming efficiency influences schooling position of volitionally swimming blacktip sharks.

2:45 pm 132-6  Xargay E, Barton K, Gough W, Adams D, Fish F, Antoniak G, Shorter KA; UM, SU, CU, WCU, UM  Inverse Dynamics Analysis of Dolphin Swimming

3:00 pm 132-7  Wu C, Howle LE, McGregor AE, McGregor R, Nowacek DP; Duke University, University of Glasgow, HiDef Aerial Surveying Ltd  Computational Fluid Dynamics Analysis of Gliding North Atlantic Right Whale Models with Variable Body Shapes

1:30 PM – 3:15 PM  Session 133  Lone Star C

Muscle Physiology and Function  Chairs: Andrea Rummel, David Williams

1:30 pm 133-1  Levendosky MW, Lanier M, Bedore CN; Georgia Southern University  Effect of Anesthesia Immersion on the Coral Catshark, Atelomycterus marmoratus

1:45 pm 133-2  Tune TC, Ma W, Irving T, Sprouse S; Georgia Tech, Illinois Institute of Technology  X-Ray Diffraction of Synchronous Flight Muscle Reveals Thick Filament Force-Length Hysteresis Varies With Muscle Function

2:00 pm 133-4  Rummel AD, Faure PA, Smotherman MS, Swartz SM, Marsh RL; Brown University, McMaster University, Texas A&M  Is Reduced Thermal Sensitivity in Distal Wing Muscles a Functional Adaptation to Bats' Unique Wing Morphology?

2:15 pm 133-5  Williams CD, Knijnenburg TA; Allen Institute for Cell Science  Spatial reorganization and clustering during the formation of myofibrils

2:30 pm 133-6  Neurohr JM, Kinsey ST; University of North Carolina Wilmington  The Impact of Tissue Aerobic Capacity and Life Stage on Oxidative Damage and Protein Turnover in Skeletal Muscle of the Blue Crab, Callinectes sapidus

2:45 pm 133-7  Kirkpatrick A, Kanatous S, Crocker D, Trumble S; Baylor University, Colorado State University, Sonoma State University  Fatty acids and Diving Development: Age class and sex differences in skeletal muscle fatty acid compositions the northern elephant seal Mirounga angustirostris

3:00 pm 133-8  Gau JF, Lynch J, Gravish N, Sprouse S; Georgia Tech, UC San Diego  Asynchronous properties of synchronous hawkmoth flight muscles

1:30 PM – 3:15 PM  Session 134  Lone Star F

Biological Velcro  Chairs: David Labonte, Adam Summers

1:30 pm 134-1  Diaz C, Tanikawa A, Long JH; Vassar College, University of Tokyo  Some Spider Glue is Super: Modeling the Fast Spreading Bioadhesive That Defeats the Scale Shedding Defense of Moths

1:45 pm 134-2  Matherne M, Howington O, Lenaghan O, Hu DL; Georgia Tech  The Effect of Nectar on the Honey Bee Pollen Pellet Removal Force

2:00 pm 134-3  Mitchell CT, Drotlef D, Dayan CB, Sitti M, Stark AY; Villanova University, Max Planck Institute  Peeling the layers back: Examining the roles of capillary adhesion and material softening on gecko and gecko-inspired synthetic adhesive performance in variable temperature and humidity

2:15 pm 134-4  Cobos AJ, Higham TE; University of California Riverside  Get a grip: the effect of asperity size on gecko adhesion

2:30 pm 134-5  Labonte D; Imperial College London  Dynamic biological adhesion: mechanisms for controlling attachment during locomotion
Tuesday 7 January 2020

2:45 pm 134-6 Yang DY, Gamel K, Flammang B, Shorter KA; University of Michigan, University of Akron, New Jersey Institute of Technology  
Modeling and Experimental Evaluation of Traditional and Remora-inspired Suction Cups

3:00 pm 134-7 Summers AP, Tinski T, Hannam S, Conway KW; University of Washington, Auckland War Memorial Museum, Texas A&M  
A diversity of fishes that suck - New Zealand edition

1:30 PM – 3:15 PM  
Session 135  
Lone Star G

Playing with Shape: Plasticity  
Chair: Craig Albertson

1:30 pm 135-1 Akin DR, Geheber AD; Auburn University, University of Central Missouri  
Morphological divergence of a stream fish in altered flow: teasing apart the influences of natural selection and plastic response on body shape

1:45 pm 135-2 Clifton IT, Chamberlain JD, Gifford ME; University of Toledo, Southern Arkansas University, University of Central Arkansas  
The Role of Phenotypic Plasticity in Morphological Differentiation Between Watersnake Populations

2:00 pm 135-3 Seroy SK, Grunbaum D, Padilla DK; University of Washington, Stony Brook University  
Inducible morphology reveals adult dispersal between habitats

2:15 pm 135-4 Charlsion DM, Bourdeau PE, Padilla DK; Stony Brook University, Humboldt State University  
Shell remodeling may circumvent limits to phenotypic plasticity in the marine gastropod, Nucella lamellosa

2:30 pm 135-5 Georgadarellis GL, Jiménez JM, Albertson RC; University of Massachusetts Amherst  
Increased Swimming Speed Induces Differential Bone Remodeling in Zebrafish

2:45 pm 135-6 Lad SE, Cortese SA, Danison AD, Ravosa MJ; University of Notre Dame, College of Wooster  
Bone Remodeling and Cyclic Loading in the Maxilla of White Rabbits (Oryctolagus cuniculus)

3:00 pm 135-7 Herbert AM, Wilga CD; University of Alaska Anchorage  
Varied tooth plate shape, varied diet: Morphology of Spotted Ratfish Tooth Plates

1:30 PM – 3:15 PM  
Session 136  
Lone Star H

Mechanisms of Development  
Chair: Diego Biston Vaz

1:30 pm 136-1 Hu Y, Harper M, Donahue J, Acosta B, McMenamin S; Boston College  
Thyroid Hormone Mediates Proximal-Distal Patterning in Zebrafish Fin Skeleton

1:45 pm 136-2 Vaz DF, Hilton EJ; Virginia Institute of Marine Science, College of William & Mary  
When Five Means Four (and Something Else): Ontogeny of the Pectoral Fin of the Plainfin Midshipmen, Porichthys notatus (Batrachoididae: Batrachoidiformes), with implications to evolution of Batrachoidiformes

2:00 pm 136-3 Funk EC, Kurpios NA, McCune AR; Cornell University  
Ventral-dorsal inversion of the air-filled organ (lungs, gas bladder) in vertebrates

2:15 pm 136-4 Faltine-Gonzalez DZ, Layden MJ; Lehigh University  
Determining the role of oral-aboral patterning on neurogenesis in the sea anemone, Nematostella vectensis

2:30 pm 136-5 Winchell CJ, Lee DT, Reyes-Rivera J, Rodriguez A, Torres MM, Weisblat DA; UC Berkeley  
Functional analysis, by CRISPR mutagenesis, of genes in the atomized Hox cluster of the leech Helobdella austinensis

2:45 pm 136-6 Kishi Y, Brückner A, Thomas IM, Parker J; California Institute of Technology, Columbia University  
Hox-logic of Rove Beetle Chemical Weaponry

3:00 pm 136-7 Albertin CB, Parnaik R, Ragsdale CW; Marine Biological Laboratory, University of Chicago  
Heterodox Ligands in an Ancient Signaling Center in Octopus Brain

1:30 PM – 3:15 PM  
Session 137  
Rooms 303-304

Chairs: Donald Miles, Diego Sustaita

1:30 pm 137-1 Sustata D, Farabaugh SM, Barthman-Thompson L; California State University San Marcos, San Diego Zoo Global, California Department of Fish and Wildlife  
Why morphology matters for management: the role of organismal form and function in wildlife conservation and management
### Tuesday 7 January 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 137</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:45 pm</td>
<td>137-2</td>
<td>Linking Effects of Acid Mine Drainage to Ecology and Morphology of Riparian Birds</td>
<td>Corbin CE, Roper VG; Bloomsburg University</td>
<td></td>
</tr>
<tr>
<td>2:00 pm</td>
<td>137-3</td>
<td>Refuge Populations as Research Populations: Morphology, Reproduction and Ecology in a Captive Population of Devils Hole Pupfish</td>
<td>Gumm JM, Stanton M, Feurbacher OG, Ash Meadows Fish Conservation Facility, USFWS</td>
<td></td>
</tr>
<tr>
<td>2:15 pm</td>
<td>137-4</td>
<td>Implications of muscle performance on the management of recreationally and commercially important fishes.</td>
<td>Moran CJ, Hudson D, Gerry SP; Citadel, Maritime Aquarium, Fairfield University</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>137-5</td>
<td>Responses of Juvenile Eastern Garter Snakes (Thamnophis sirtalis) to Own, Littermate, and Control Chemicals</td>
<td>Pepper HE, Partin AM, Jenkins MS, Rowland JF, Burghardt GM, University of Tennessee, Knoxville</td>
<td></td>
</tr>
<tr>
<td>2:45 pm</td>
<td>137-6</td>
<td>Functional Ecomorphology in the Diamondback Terrapin (Malaclemys terrapin); the Effect of Head-starting on Morphology and Bite Force</td>
<td>Reisenfeld K, McElroy E, Roosenburg W; College of Charleston, Ohio University</td>
<td></td>
</tr>
<tr>
<td>3:00 pm</td>
<td>137-7</td>
<td>Can morphology predict the conservation status of iguanian lizards?</td>
<td>Miles DB; Ohio University</td>
<td></td>
</tr>
</tbody>
</table>

#### 1:30 PM – 3:30 PM

**Session 138**

**Chair: Rosalyn Putland**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 138</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>138-1</td>
<td>It’s too darn hot: Effects of ambient temperature on singing behavior in male song birds</td>
<td>Coomes CM, Derryberry EP; University of Tennessee Knoxville</td>
<td></td>
</tr>
<tr>
<td>1:45 pm</td>
<td>138-2</td>
<td>Male Habronattus pyrrithrix Jumping Spiders Adjust Their Attention-Grabbing Courtship Display Based on Spatial and Environmental Context</td>
<td>Echeverri SA, Zurek DB, Morehouse NI; University of Pittsburgh, University of Cincinnati</td>
<td></td>
</tr>
<tr>
<td>2:00 pm</td>
<td>138-3</td>
<td>Effect of anthropogenic sound on the communication space of the oyster toadfish, Opsanus tau</td>
<td>Putland RL, Mackiewicz AG, Rogers LS, Mensinger AF; University of Minnesota Duluth, University of North Carolina, University of Washington</td>
<td></td>
</tr>
<tr>
<td>2:15 pm</td>
<td>138-4</td>
<td>Vocal activity is coupled to partner proximity and mating during pair-bonding in a monogamous rodent</td>
<td>Gustison ML, Phelps SM; University of Texas at Austin</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>138-5</td>
<td>Playback of female rejection vocalizations modifies male house mouse (Mus musculus) behavior</td>
<td>Hood KE, Navarro E, Hurley LM; Indiana University</td>
<td></td>
</tr>
<tr>
<td>2:45 pm</td>
<td>138-6</td>
<td>Why so many song types? Song sharing, song type matching, and the agonistic function of song type repertoires in Bachman’s sparrow</td>
<td>Anderson RC, Ziad P, Niederhauser J; Florida Atlantic University</td>
<td></td>
</tr>
<tr>
<td>3:00 pm</td>
<td>138-7</td>
<td>Female hummingbirds with male-like coloration may avoid aggressive interaction at food resources</td>
<td>Falk JJ, Rubenstein D, Webster M; Cornell University, Smithsonian Tropical Research Institute, Columbia University</td>
<td></td>
</tr>
<tr>
<td>3:15 pm</td>
<td>138-8</td>
<td>Dialects in the high-frequency song of a hummingbird</td>
<td>Duque FG, Monteros M, Nasir I, Uma S, Rodriguez-Saltos CA, Carruth L, Bonaccorso E, Wilczynski W; Georgia State U, Inst Nacional de Biodiversidad, Emory U, U San Francisco de Quito</td>
<td></td>
</tr>
</tbody>
</table>

#### 1:30 PM – 3:15 PM

**Session 139**

**Chair: Brian Chang**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 139</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>139-1</td>
<td>The influence of uneven terrain and vision on ant walking</td>
<td>Clifton GT, Holway D, Gravish N; Univ of California, San Diego</td>
<td></td>
</tr>
<tr>
<td>1:45 pm</td>
<td>139-2</td>
<td>Improving performance of a legged robot on bumpy ground via gentle tail taps</td>
<td>Soto D, Goldman Di; Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>2:00 pm</td>
<td>139-3</td>
<td>Sand specialists and Non-specialists use Similar Kinematic Strategies for Running on Incline Granular Media</td>
<td>Mantilla DC, Tucker EL, Hsieh ST; Temple University</td>
<td></td>
</tr>
<tr>
<td>2:15 pm</td>
<td>139-4</td>
<td>Force response of climbing sand dunes</td>
<td>Chang B, Nowayti W, Hsieh ST; Temple University</td>
<td></td>
</tr>
<tr>
<td>2:30 pm</td>
<td>139-5</td>
<td>Optimal control predictions of running behavior in cursorial birds: non-rigid terrain, scaling, and maneuvering</td>
<td>Hubicki CM, Daley MA; Florida State University, University of California, Irvine</td>
<td></td>
</tr>
</tbody>
</table>
**Tuesday 7 January 2020**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:45 pm</td>
<td>139-6</td>
<td>Muscle Dynamics During Hopping on Hard and Sandy Surfaces</td>
<td>McGowan CP, Schwaner SJ, Lin DC, University of Idaho, Washington State University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>139-7</td>
<td>Effects of support diameter on vertical leaping performance in tree squirrels (Sciurus carolinensis)</td>
<td>Young JW, Wilson A, Phelp T, Dunham N, NEOMED, Cleveland Metroparks Zoo</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Session 140</td>
<td>Comparative Genomics, Proteomics, Cell Type Evolution</td>
<td>Chairs: Jason Macrander, Leslie Babonis</td>
</tr>
<tr>
<td>1:30 pm</td>
<td>140-1</td>
<td>Cross-species mapping of cell type atlases identifies conservation and divergence in planarian and parasitic flatworms</td>
<td>Tarashansky AJ, Li P, Xue Y, Quake SR, Wang B*, Stanford University</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>140-2</td>
<td>Things cells do</td>
<td>Babonis LS, Ryan JF, Martindale MQ, Univ of Florida</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>140-3</td>
<td>Single Cell Assembly of a Chemical Key Innovation in a Rove Beetle</td>
<td>Brueckner A, Parker J, California Institute of Technology</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>140-7</td>
<td>UV Tolerance in the Portuguese Man of War (Physalia physalis)</td>
<td>Lewis ZR, Dunn CW, Yale University</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>140-8</td>
<td>Comparative Lens Proteomics Across Aves</td>
<td>O’Connell J, Shamble P, Koenig K*, Standford University, Harvard University</td>
</tr>
<tr>
<td>3:45 PM</td>
<td>MOORE Lecture</td>
<td>Prehistoric Road Trip: Crafting a Story 2 Billion Years in the Making</td>
<td>Graslie EG, Field Museum</td>
</tr>
</tbody>
</table>
Keyword Index

G

gait ......................................... S8-3, 5-6
gastropod shell .................................. 135-4
gastropods .................................. 98-5, 115-4, P3-119
gcko .................................. 60-5, 134-3, P1-178, P2-188, P2-232
gender bias .................................. S4-1, S4-2, P2-58, P2-63
gene duplication .................................. 411, 59-3, 67-5
gene expression .................................. 7-2, 15-6, 17-3, 19-2,
20-4, 24-7, 26-1, 32-3, 36-6, 39-1, 45-6, 46-3,
47-5, 48-5, 54-3, 56-5, 74-6, 91-3, 103-4, 107-2,
112-4, 113-1, 140-5, P1-6, P1-7, P1-16, P1-60,
P1-69, P1-248, P1-251, P1-264, P1-276, P3-195
gene expression noise .................................. 107-3
gene family evolution .................................. 59-3, 67-1, P1-14, P1-27
gene flow .................................. P1-31
gene regulation .................................. 36-5, 57-2, 67-7, P2-244
gene regulatory network .................................. P1-106
gene transfer .................................. 54-2
genetic incompatibility .................................. P2-26
genetic variation .................................. S7-8, 20-3, 411, 98-4
genetics .................................. S3-2, S1-2, 115-3, P1-20,
P1-21, P1-33, P1-32, P3-89, P3-214
genital evolution .................................. P3-62
genomic adaptation .................................. 19-1, 34-7, 59-3
genomic architecture .................................. S2-2, 20-4, 67-7,
140-5, P3-27, P3-83
genomics .................................. S1-6, S3-1, S1-7, S1-10,
15-2, 34-2, 36-4, 36-5, 54-2, 98-6, 140-4,
P1-229, P3-22, P3-85, P3-220
genotype to phenotype .................................. 58-6, 107-1
genotyping .................................. 117-2
geographic variation .................................. 52-4, 54-5
geometric methods .................................. S8-11
geometric morphometrics .................................. 37-6, 60-4,
P1-179, P1-199, P2-52
GIMAP .................................. 48-5, 68-2
gliding .................................. 3-3, P1-169, P3-162, P3-165, P3-168
glucocorticoid .................................. 80-4, 80-6, 92-6, 93-2,
93-3, 125-4, P1-65, P1-246, P1-255, P1-258
glucose .................................. 102-5, P1-255
goby .................................. P1-173, P3-68
gonadotropin-inhibitory hormone .................................. P3-40
gonadotropin-releasing hormone .................................. P2-129
granular media .................................. 139-3, 139-4, P3-136
group composition .................................. 13-4
growth .................................. 55-3, 55-5, 60-2, 92-6,
101-2, 123-1, P1-20, P1-209, P1-252
growth rate .................................. P3-208
guppy .................................. 4-1, 22-1, 128-3, 129-1
gut .................................. P1-2, P1-123, P3-89
gut microbiota .................................. 8-4, 8-6, 8-7, 24-6,
26-4, 41-3, P1-269, P3-170
GxE interactions .................................. 20-2

H

habitat use .................................. 127-1
hagfish .................................. P1-205, P1-207
hair cells .................................. P2-112
haltiere .................................. 103-1
harvestman .................................. 79-7
hatching .................................. P3-15
hatching enzyme .................................. P3-203

terms not currently associated with a keyword

Functional morphology .................................. S3-5, S5-3, S9-2,
S10-5, S10-7, S10-8, S10-11, S10-13, 14-7, 28-7,
29-6, 42-2, 50-6, 50-7, 72-1, 90-1, 97-9, 104-9,
110-4, 118-5, 122-4, 123-4, 123-5, P1-39, P1-56,
P1-180, P1-192, P2-206, P2-217, P2-224, P2-33,
P2-55, P2-183, P2-195, P2-225, P3-130
furcula .................................. P1-202
The Society for Integrative and Comparative Biology

Keyword Index

plasticity

protein evolution

Poeciliidae

puncture

plants

plant-herbivore interaction

plebe

plumage color

pneumatics

Poeziucidae

pollination

pollution

polymorphism

polyplody

population genetics

population structure

Porifera

positional information

power amplification

predation

predation risk

predation strategy

predator behavior

predator-prey interactions

preference

pregnancy

pressure

primates

prolactin

propulsion

protein evolution

protein metabolism

protein stability

proteomics

Public Engagement

Puma

Puncture

punishment

quantitative assay

quantitative genetics

RADSeq

range boundary

range of motion

rapid cold hardening

reactive oxygen species

recognition

recreational fisheries

recruitment

reef fishes

regeneration

reintroduction

reproduction

reproductive behavior

reproductive isolation

reproductive morphology

reproductive physiology

reproductive timing

reptiles

respiration

respirometry

restoration

retina

retinoid acid

rhythmicity

righting

ripparian

RNA-seq

RNAi

robots

rodents

roots

Rosemary Knapp

running

sacoglossan

salamanders

salinity

salmonid

scales

sceloporus

schooling

SciArt

science communication

scientific writing

scorpions

sea anemone

sea lion

sea stars

sea turtle

sea turtles

sea urchin

seals

seasonal timing

seasonality

selection

self-fertilization

self-medication

sensory physiology

sense organ

sensory motor

septorin (S-HT)

Serradial

setal morphology

sex changing fish

sex determination

sex differences

sex ratio

sexual conflict

sexual dimorphism

sexual reproduction

sexual selection

shrimp

sibling competition

sickness behavior

signal transduction

signaling

simulation

single-cell biology

single-cell RNA-Seq

skelet development
Keyword Index

W

waggle dance ........................................ P2-106
walking .............................................. 5-6, 40-1, 139-1
water balance ....................................... P2-156
water loss ........................................... 52-4, P2-166
water-land transition ............................... 37-3, 40-4, 62-7,
85-1, P1-196, P2-32
Water-search behavior ............................ 43-7
West Nile virus ................................... P2-239
wetness ............................................. S5-4
wettability .......................................... 96-5
whale ............................................... 14-3, 59-4, 69-1, 93-1,
113-3, P1-187, P3-151
wing shape ......................................... 64-1
wing suspension ................................... 87-8
wings ................................................ S10-9, 5-4, 111-3, P3-140, P3-166
winter ................................................. 44-2
Wnt .................................................... 4-2, P1-1
Woodpecker ....................................... 74-1, 111-6
work loops .......................................... 75-1, 133-2
wound healing .................................... 53-4, P3-214

X

x-ray imaging ........................................ P1-15, P2-53
Xenopus ............................................ P3-36
XRMM ............................................... S8-8, 14-1, 50-1, 76-4, 85-2,
85-3, 85-4, 85-5, 90-2, 97-3, 97-4, 97-5,
P1-220, P2-34, P2-226, P3-158

Z

zebra finch ......................................... 92-4, P1-82, P1-247, P3-40
zebrafish ............................................. 4-1, 4-2, 18-2, 77-1, 108-3, 112-2,
128-4, P1-90, P1-91, P1-92, P2-56,
P2-73, P2-114, P2-121, P3-215
zooplankton ........................................ S1-5, 59-5, 132-1, P2-174

vertebrae ........................................... 110-2, 110-3, P1-201, P1-214, P2-31
vertebral column ................................ P2-47, P3-132
vertebrates .......................................... P8-6, P1-14, P2-123
Vespa Amino Acid Mixture ...................... P1-38
vibration ............................................. P1-111
vibrations .......................................... 122-4, 122-7
Virtual Reality .................................... S8-9
virus .................................................. 49-5, 56-3
viscosity ............................................ 28-8
vision .................................................. 1-1, 6-1, 6-2, 17-4, 39-4, 51-1, 51-5,
51-6, 64-6, 70-1, 70-3, 70-4, 70-5, 70-7, 87-7,
93-6, 113-4, 139-1, P1-93, P1-98, P1-99, P1-100,
P1-103, P1-185, P1-198, P2-122, P2-127
visual acuity ....................................... S8-9, 70-3, 70-6, P1-105, P1-107
visual communication ........................... 71-6, 126-1, 138-2, P1-168
visual cycle ........................................ 17-4
visual ecology ..................................... 17-1, 17-2, 70-7,
P1-101, P1-105, P1-169
visual fields ........................................ P1-198
visual signaling ................................... 12-1, 70-7, P1-66, P1-154, P2-35
vitellogenin ....................................... P3-97
vocal dialects ..................................... P1-153, P1-161
vocal-acoustic behavior ......................... 11-1, 57-6, 138-3,
138-5, P1-161
vocalization ....................................... 71-2, 71-3, P2-134
vortex-induced vibration ....................... 87-5

SAVE THE DATE

The Society for Integrative and Comparative Biology

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## Author Index

<table>
<thead>
<tr>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byrne MZ</td>
<td>92</td>
</tr>
<tr>
<td>Busby MK</td>
<td>102</td>
</tr>
<tr>
<td>Buo C</td>
<td>53</td>
</tr>
<tr>
<td>Burkhard TT</td>
<td>117</td>
</tr>
<tr>
<td>Burley A</td>
<td>56</td>
</tr>
<tr>
<td>Burmeister SS</td>
<td>122</td>
</tr>
<tr>
<td>Burnaford JL</td>
<td>83</td>
</tr>
<tr>
<td>Burnett KG</td>
<td>91</td>
</tr>
<tr>
<td>Burnett NP</td>
<td>42</td>
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<tr>
<td>Burns M</td>
<td>59</td>
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<td>81</td>
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<td>Burress ED</td>
<td>33</td>
</tr>
<tr>
<td>Burroughs RW</td>
<td>61</td>
</tr>
<tr>
<td>Burt DB</td>
<td>36</td>
</tr>
<tr>
<td>Busby MK</td>
<td>102</td>
</tr>
<tr>
<td>Buser TJ</td>
<td>133</td>
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<td>117</td>
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<td>Bush JM</td>
<td>128</td>
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<td>Bushong E</td>
<td>113</td>
</tr>
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<td>Bussy U</td>
<td>40</td>
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<tr>
<td>Bustamante J</td>
<td>40</td>
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<td>Buston PM</td>
<td>127</td>
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<tr>
<td>Butcher MT</td>
<td>125</td>
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<tr>
<td>Butler JM</td>
<td>37</td>
</tr>
<tr>
<td>Butler MA</td>
<td>61</td>
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<tr>
<td>Butler MW</td>
<td>97</td>
</tr>
<tr>
<td>Byrne M</td>
<td>77</td>
</tr>
<tr>
<td>Byrne MZ</td>
<td>78</td>
</tr>
<tr>
<td>Byrnes G</td>
<td>116</td>
</tr>
<tr>
<td>Byron CJ</td>
<td>87</td>
</tr>
<tr>
<td>Bystransky JS</td>
<td>40</td>
</tr>
<tr>
<td>Cannizzaro DN</td>
<td>82</td>
</tr>
<tr>
<td>Cannon JT</td>
<td>44</td>
</tr>
<tr>
<td>Cantley JC</td>
<td>78</td>
</tr>
<tr>
<td>Capano JG</td>
<td>67</td>
</tr>
<tr>
<td>Cape M</td>
<td>27</td>
</tr>
<tr>
<td>Capel B</td>
<td>32</td>
</tr>
<tr>
<td>Capparella AP</td>
<td>33</td>
</tr>
<tr>
<td>Capshaw G</td>
<td>49</td>
</tr>
<tr>
<td>Capuano F</td>
<td>60</td>
</tr>
<tr>
<td>Carey HV</td>
<td>72</td>
</tr>
<tr>
<td>Carey N</td>
<td>38</td>
</tr>
<tr>
<td>Carfago A</td>
<td>43</td>
</tr>
<tr>
<td>Carion A</td>
<td>28</td>
</tr>
<tr>
<td>Carlson TC</td>
<td>50</td>
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<td>Caron DP</td>
<td>82</td>
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<td>Carr CE</td>
<td>49</td>
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<td>Carr JA</td>
<td>101</td>
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<td>Carrier DR</td>
<td>62</td>
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<tr>
<td>Camilo A</td>
<td>109</td>
</tr>
<tr>
<td>Carroll KR</td>
<td>55</td>
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<tr>
<td>Carroll SP</td>
<td>48</td>
</tr>
<tr>
<td>Carmalt L</td>
<td>136</td>
</tr>
<tr>
<td>Carnuths A</td>
<td>95</td>
</tr>
<tr>
<td>Carnuths Ferraro A</td>
<td>71</td>
</tr>
<tr>
<td>Carson IR</td>
<td>78</td>
</tr>
<tr>
<td>Carter AW</td>
<td>94</td>
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<tr>
<td>Carter DJ</td>
<td>115</td>
</tr>
<tr>
<td>Cartwright P</td>
<td>112</td>
</tr>
<tr>
<td>Cartv Y</td>
<td>81</td>
</tr>
<tr>
<td>Caruso A</td>
<td>53</td>
</tr>
<tr>
<td>Carvalho CM</td>
<td>48</td>
</tr>
<tr>
<td>Casas J</td>
<td>60</td>
</tr>
<tr>
<td>Cascio M</td>
<td>73</td>
</tr>
<tr>
<td>Casement B</td>
<td>46</td>
</tr>
<tr>
<td>Casleton R</td>
<td>49</td>
</tr>
<tr>
<td>Cass JA</td>
<td>30</td>
</tr>
<tr>
<td>Cassavaugh CM</td>
<td>43</td>
</tr>
<tr>
<td>Castaño M</td>
<td>60</td>
</tr>
<tr>
<td>Castelfranco AM</td>
<td>128</td>
</tr>
<tr>
<td>Castillo KD</td>
<td>69</td>
</tr>
<tr>
<td>Casto JM</td>
<td>110</td>
</tr>
<tr>
<td>Castoe TA</td>
<td>61</td>
</tr>
<tr>
<td>Castro-Santos T</td>
<td>123</td>
</tr>
<tr>
<td>Caves EM</td>
<td>75</td>
</tr>
<tr>
<td>Cavey LT</td>
<td>85</td>
</tr>
<tr>
<td>Caviedes-Vidal E</td>
<td>72</td>
</tr>
<tr>
<td>Cavigeli S</td>
<td>131</td>
</tr>
<tr>
<td>Cease AJ</td>
<td>81</td>
</tr>
<tr>
<td>Ceja AY</td>
<td>133</td>
</tr>
<tr>
<td>Cellinio B</td>
<td>31</td>
</tr>
<tr>
<td>Cerda PA</td>
<td>132</td>
</tr>
<tr>
<td>Cerrato-Morales CL</td>
<td>63</td>
</tr>
<tr>
<td>Cerveny KL</td>
<td>117</td>
</tr>
<tr>
<td>Chadwell BA</td>
<td>54</td>
</tr>
<tr>
<td>Chagnard BP</td>
<td>31</td>
</tr>
<tr>
<td>Chakravarthi LJ</td>
<td>70</td>
</tr>
<tr>
<td>Chalenger R</td>
<td>55</td>
</tr>
<tr>
<td>Challita EJ</td>
<td>42</td>
</tr>
<tr>
<td>Chamanal A</td>
<td>114</td>
</tr>
<tr>
<td>Chamberlain C</td>
<td>118</td>
</tr>
<tr>
<td>Chamberlain JD</td>
<td>111</td>
</tr>
<tr>
<td>Chambers NM</td>
<td>73</td>
</tr>
<tr>
<td>Champagne FA</td>
<td>28</td>
</tr>
<tr>
<td>Chan J</td>
<td>107</td>
</tr>
<tr>
<td>Chan KY</td>
<td>50</td>
</tr>
<tr>
<td>Chandler C</td>
<td>87</td>
</tr>
<tr>
<td>Chandler CH</td>
<td>74</td>
</tr>
<tr>
<td>Chandler KL</td>
<td>112</td>
</tr>
<tr>
<td>Chandrasekaran K</td>
<td>68</td>
</tr>
<tr>
<td>Chang B</td>
<td>136</td>
</tr>
<tr>
<td>Chang ES</td>
<td>74</td>
</tr>
<tr>
<td>Chang ML</td>
<td>118</td>
</tr>
<tr>
<td>Chang Van Oortd DA</td>
<td>68</td>
</tr>
<tr>
<td>Chapelle V</td>
<td>28</td>
</tr>
<tr>
<td>Chapman BR</td>
<td>62</td>
</tr>
<tr>
<td>Chappell DR</td>
<td>67</td>
</tr>
<tr>
<td>Chappell TC</td>
<td>125</td>
</tr>
<tr>
<td>Chaput P</td>
<td>127</td>
</tr>
<tr>
<td>Charbonneau D</td>
<td>132</td>
</tr>
<tr>
<td>Charlson DM</td>
<td>135</td>
</tr>
<tr>
<td>Chase HT</td>
<td>125</td>
</tr>
<tr>
<td>Chastel O</td>
<td>127</td>
</tr>
<tr>
<td>Chatterjee A</td>
<td>28</td>
</tr>
<tr>
<td>Chauvel M</td>
<td>125</td>
</tr>
<tr>
<td>Chavan AR</td>
<td>98</td>
</tr>
<tr>
<td>Chavaria R</td>
<td>45</td>
</tr>
<tr>
<td>Chen E</td>
<td>128</td>
</tr>
<tr>
<td>Chen L</td>
<td>92</td>
</tr>
<tr>
<td>Chen P</td>
<td>126</td>
</tr>
<tr>
<td>Cheney JA</td>
<td>40</td>
</tr>
<tr>
<td>Chennault M</td>
<td>54</td>
</tr>
<tr>
<td>Chenoweth E</td>
<td>30</td>
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<tr>
<td>Cheu AY</td>
<td>130</td>
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<td>Cheung JA</td>
<td>110</td>
</tr>
<tr>
<td>Chevalier-Horgan C</td>
<td>85</td>
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<tr>
<td>Cheviron Z</td>
<td>97</td>
</tr>
<tr>
<td>Cheviron ZA</td>
<td>64</td>
</tr>
<tr>
<td>Chiang E</td>
<td>72</td>
</tr>
<tr>
<td>Chiel HU</td>
<td>54</td>
</tr>
<tr>
<td>Chin DD</td>
<td>50</td>
</tr>
<tr>
<td>Chin SM</td>
<td>133</td>
</tr>
<tr>
<td>Chiparup S</td>
<td>126</td>
</tr>
<tr>
<td>Chiparup SL</td>
<td>65</td>
</tr>
<tr>
<td>Chirkjian GS</td>
<td>92</td>
</tr>
<tr>
<td>Chittka L</td>
<td>123</td>
</tr>
<tr>
<td>Chmura H</td>
<td>62</td>
</tr>
<tr>
<td>Chmura HE</td>
<td>40</td>
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<tr>
<td>Cho A</td>
<td>83</td>
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<tr>
<td>Cho MS</td>
<td>60</td>
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<tr>
<td>Choi MP</td>
<td>55</td>
</tr>
<tr>
<td>Choi W</td>
<td>102</td>
</tr>
<tr>
<td>Chong B</td>
<td>71</td>
</tr>
<tr>
<td>Choquet H</td>
<td>71</td>
</tr>
<tr>
<td>Choset HM</td>
<td>92</td>
</tr>
<tr>
<td>Choudhry A</td>
<td>111</td>
</tr>
<tr>
<td>Christer A</td>
<td>102</td>
</tr>
<tr>
<td>Christie AE</td>
<td>55</td>
</tr>
<tr>
<td>Christman K</td>
<td>102</td>
</tr>
<tr>
<td>Christensen BA</td>
<td>73</td>
</tr>
<tr>
<td>Christian Dalsgaard J</td>
<td>49</td>
</tr>
<tr>
<td>Christian H</td>
<td>62</td>
</tr>
<tr>
<td>Christian HJ</td>
<td>40</td>
</tr>
<tr>
<td>Christiano BM</td>
<td>131</td>
</tr>
<tr>
<td>Christie AE</td>
<td>83</td>
</tr>
<tr>
<td>Christman K</td>
<td>102</td>
</tr>
<tr>
<td>Christensen A</td>
<td>114</td>
</tr>
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<td>Chrysler J</td>
<td>56</td>
</tr>
<tr>
<td>Chu F</td>
<td>125</td>
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<tr>
<td>Chu W</td>
<td>86</td>
</tr>
<tr>
<td>Chung A</td>
<td>29</td>
</tr>
<tr>
<td>Chuong CM</td>
<td>28</td>
</tr>
<tr>
<td>Churchill M</td>
<td>52</td>
</tr>
<tr>
<td>Churchman EKL</td>
<td>65</td>
</tr>
<tr>
<td>Cirilo LA</td>
<td>133</td>
</tr>
<tr>
<td>Claeysens LPA</td>
<td>94</td>
</tr>
<tr>
<td>Clapp N</td>
<td>110</td>
</tr>
<tr>
<td>Clardy T</td>
<td>119</td>
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<td>Clardy TR</td>
<td>119</td>
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<td>Clark A</td>
<td>53</td>
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<tr>
<td>Clark AC</td>
<td>110</td>
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<td>115</td>
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<td>53</td>
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<td>28</td>
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<td>29</td>
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<td>Clark RW</td>
<td>74</td>
</tr>
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<td>Clift RD</td>
<td>136</td>
</tr>
<tr>
<td>Clifton GT</td>
<td>136</td>
</tr>
<tr>
<td>Clifton IT</td>
<td>84</td>
</tr>
<tr>
<td>Cline NW</td>
<td>77</td>
</tr>
<tr>
<td>Colbert J</td>
<td>108</td>
</tr>
<tr>
<td>Close M</td>
<td>80</td>
</tr>
<tr>
<td>Closs LE</td>
<td>110</td>
</tr>
<tr>
<td>Closer D</td>
<td>80</td>
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<tr>
<td>Coates MI</td>
<td>62</td>
</tr>
<tr>
<td>Cobb BA</td>
<td>34</td>
</tr>
<tr>
<td>Cobos AJ</td>
<td>134</td>
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<td>Cochran JK</td>
<td>84</td>
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<td>Coelho JC</td>
<td>66</td>
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<td>Coffin JL</td>
<td>69</td>
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<td>Cogey T</td>
<td>65</td>
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<td>Cohen HE</td>
<td>132</td>
</tr>
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<td>Cohen JH</td>
<td>29</td>
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<td>Cohen KE</td>
<td>28</td>
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<tr>
<td>Cohen SC</td>
<td>38</td>
</tr>
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<td>133</td>
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<td>47</td>
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<td>Collins C</td>
<td>79</td>
</tr>
<tr>
<td>Collins L</td>
<td>111</td>
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<tr>
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<td>33</td>
</tr>
<tr>
<td>Commero CR</td>
<td>61</td>
</tr>
<tr>
<td>Coislon TJ</td>
<td>69</td>
</tr>
<tr>
<td>Cojfelt B</td>
<td>101</td>
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<tr>
<td>Conbes SA</td>
<td>122</td>
</tr>
<tr>
<td>Connah MS</td>
<td>48</td>
</tr>
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<td>Comito D</td>
<td>110</td>
</tr>
<tr>
<td>Comizzoli P</td>
<td>103</td>
</tr>
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<td>Conetta D</td>
<td>69</td>
</tr>
<tr>
<td>Condon ED</td>
<td>48</td>
</tr>
<tr>
<td>Conith A</td>
<td>52</td>
</tr>
<tr>
<td>Conith A</td>
<td>128</td>
</tr>
<tr>
<td>Conkleing L</td>
<td>77</td>
</tr>
<tr>
<td>Conkleing ME</td>
<td>66</td>
</tr>
<tr>
<td>Conner W</td>
<td>48</td>
</tr>
<tr>
<td>Connolly TP</td>
<td>87</td>
</tr>
<tr>
<td>Connors C</td>
<td>51</td>
</tr>
<tr>
<td>Conrad H</td>
<td>106</td>
</tr>
<tr>
<td>Conroy JA</td>
<td>27</td>
</tr>
</tbody>
</table>
Author Index

Converse A. ... 127
Conway KW. ... 85, 107, 135
Cook A. ... 86
Cook GM ... 43, 88
Cook JG. ... 114
Cook PA ... 30
Cook TO ... 79
Cook W. ... 53
Cooley-Redders CC ... 106
Coomes CM. ... 52, 136
Cooper AN. ... 95
Cooper C. ... 55, 74
Cooper D. ... 110
Cooper LN. ... 45
Cooper RL ... 29
Cooper WJ. ... 64, 94
Corbin CE ... 87, 136
Cordaux R ... 74
Corder KR ... 46
Cordova KC ... 46
Cordova KL ... 69
Corn Har "GM" ... 33, 64, 118, 128
Cornellus J ... 39
Cornellus JM ... 52, 65, 82, 85, 126
Cornellus Ruhs E ... 110
Correa AM$S$ ... 43, 50, 69, 75
Cortese SA ... 135
Coryell RL ... 132
Cost IN ... 105
Costa DP. ... 71, 92, 97
Costello JH ... 133
Costello RA ... 30
Coughlin DJ ... 44, 114
Countway PD ... 27
Courant J ... 92
Coutts VM ... 55
Cowen J ... 31
Cox C. ... 46, 111
Cox CL ... 29, 39, 44, 56, 64, 106, 107, 119
Cox FC ... 53
Cox RM ... 29, 46, 47, 70, 107
Cox SM ... 42, 86, 105
Coy CO ... 68
Coyle JA ... 36
Craig K ... 113
Craig KJ. ... 114
Craith DD ... 75
Cralld DD ... 33
Cramberg M ... 115
Cranle RL ... 35
Crawford CH ... 63, 105
Crawford K ... 128
Cretego RD ... 112
Crespel A. ... 82
Crews SC ... 44, 52
Crile KG ... 109
Criso OL ... 28
Cristol DA ... 83, 124
Crocker D. ... 134
Crocker DE ... 71
Crofts SB ... 28
Crompton AW ... 29
Cronin K ... 33
Crosby AJ ... 42
Crosier AE ... 103
Crossland M ... 28
Crowe S. ... 49
Crowe-Riddell J ... 132
Crowe-Riddell JM ... 78
Crowell HL ... 74
Crowley CJ ... 103
Crownover LA ... 53
Cuevas-Sanchez AY ... 84
Cuff AC ... 95
Cuff AR ... 105
Culmer ZW ... 38
Culverhouse EK ... 114
Cumming M ... 45
Cummings M ... 116
Cummings ME ... 38, 76, 82
Cunning JR ... 70
Cupp PV ... 50
Curis JD ... 39
Currea JP ... 49, 82
Curis HE ... 99
Curis MD ... 77
Curis R ... 116
Cussen VA ... 52
Czapskyn MF ... 114
Czirjak SL ... 68
D'Alessandro MN ... 84
D'Emic M ... 53
Da Silva DP ... 102
Dabiri JO ... 31
Dahillhoff EP ... 112
Dahillhoff WC ... 74
Dahlin CR ... 51
Dakin R ... 49, 51, 96, 122, 131
Dale AS ... 43
Dale JD ... 71
Dale KE ... 93
Daley M ... 48
Daley MA ... 90
Dallas JW ... 110
Dalloul RA ... 111
Dalylome EG ... 123
Dalys CMS ... 45
Daly M ... 46, 112
Dankith SM ... 126
Dang A ... 49
Dang H ... 82
Daniel L ... 45
Daniel TL ... 40, 82, 86, 107, 116, 126
Dandies DT ... 96
Danes J ... 134
Danesa SC ... 97
Danilidis K ... 32
Danison AD ... 135
Danios N ... 98
Dantzler B ... 48, 97
Dantzler BJ ... 113
Danzer AG ... 50
Dao TK ... 45
Darcy HE ... 96
Darnell MZ ... 37, 111
Daracq A ... 67
Das K ... 33
Das PB ... 119
Das S ... 112
Davalos LM ... 100
David KI ... 37, 74, 97
Davidowitz G ... 102
Davidson B ... 54
Davidson BJ ... 70
Davidson GL ... 133
Davies KJ ... 100
Davies S. ... 43, 69, 75
Davies SW ... 43, 69, 70, 74, 75, 88
Davies AC ... 111
Davies AL ... 76, 130
Davies DR ... 61
Davies E ... 81
Davies J ... 51, 81, 87, 112
Davies JE ... 46, 49, 117
Davies ME ... 70
Cup PV ... 50
Curis JD ... 39
Currea JP ... 49, 82
Curis HE ... 99
Curis MD ... 77
Curis R ... 116
Cussen VA ... 52
Czapskyn MF ... 114
Czirjak SL ... 68
D'Alessandro MN ... 84
D'Emic M ... 53
Da Silva DP ... 102
Dabiri JO ... 31
Dahillhoff EP ... 112
Dahillhoff WC ... 74
Dahlin CR ... 51
Dakin R ... 49, 51, 96, 122, 131
Dale AS ... 43
Dale JD ... 71
Dale KE ... 93
Daley M ... 48
Daley MA ... 90
Dallas JW ... 110
Dalloul RA ... 111
Dalylome EG ... 123
Dalys CMS ... 45
Daly M ... 46, 112
Dankith SM ... 126
Dang A ... 49
Dang H ... 82
Daniel L ... 45
Daniel TL ... 40, 82, 86, 107, 116, 126
Dandies DT ... 96
Danes J ... 134
Danesa SC ... 97
Danilidis K ... 32
Danison AD ... 135
Danios N ... 98
Dantzler B ... 48, 97
Dantzler BJ ... 113
Danzer AG ... 50
Dao TK ... 45
Darcy HE ... 96
Darnell MZ ... 37, 111
Daracq A ... 67
Das K ... 33
Das PB ... 119
Das S ... 112
Davalos LM ... 100
Demuth JP ... 104
Den Haan S ... 106
Denardo DF ... 106
Deng J ... 115
Denlinger DL ... 123
Dennis JA ... 111, 116
Denny M ... 30
Denny MW ... 35
Densmore III LD ... 61, 99
Denum L ... 43
Deora T ... 82, 107
Depaola N ... 109
Deppelgrini F ... 48
Derby CD ... 36
Derkarabetian S ... 46
Derryberry EP ... 50, 52, 68, 136
Derting T ... 67, 106
Desimone JG ... 93, 102
Desjardins N ... 65
Dessales R ... 29
Dethier MN ... 46
Deutsch M ... 110
Devers M ... 94
Devine K ... 54
Dey B ... 33
Deyoe JE ... 75
Dhingraja A ... 67
Di Persia CL ... 127
Dial TR ... 30
Diamond KM ... 53, 67, 72, 86, 111
Diamond S ... 94
Diaz ... 134
Diaz Cap ... 65
Diaz LM ... 65
Diaz K ... 71, 129
Diaz L ... 43
Diaz RE ... 79
Diaz-Almeyda E ... 37
Dichiera AM ... 96
Dick MF ... 106
Dickerson AK ... 30
Dickerson H ... 81
Dickerson S ... 52
Dickinson MH ... 38
Dickinson PS ... 83
Dierkhede I ... 40
Dieder A ... 37
Dienel CAK ... 115
Dijkstra PD ... 44
Dillon ME ... 74, 84
Dilly GF ... 71
Dimos B ... 32
Dimos BA ... 32
Ding J ... 71
Ding SJ ... 54
Dingho H ... 52
Degrandi-Hoffman L ... 65
Dehrent RD ... 55
Dehrent G ... 65
Deimel C ... 80
Delaney DM ... 46
Delap SJCL ... 86
Delejos CL ... 37
Demarais D ... 97
Demarais D ... 71
Demarais D ... 129
Direnzo N ... 101, 117
Din S ... 47
Din J ... 73
Din KH ... 84
Din R ... 85
Dinero RD ... 46
Dipalo E ... 79
Direnzo N ... 101, 117
DiSanto V ... 123, 129
Dittrich MH ... 116
Dixon G ... 87, 123
Dixon GV ... 39, 70
Dizinno J ... 87
Do Amaral JPS ... 85

The Society for Integrative and Comparative Biology
Author Index

Dobkowski K............. 82
Dobkowski KA........... 46, 50
Doer H.................. 113
Doh SD.................. 78
Dolan JE................. 43, 72
Dolphin KE.............. 62
Dombroskie J........... 31
Domenici P.............. 38
Donahue S............... 105
Donahue E.............. 60
Donahue J.............. 135
Donatelli CM............ 53, 119
Dong H.................. 72, 129
Donnelly MJ............. 50, 54
Donoughue S............ 122
Dorken M................ 35
Dornhaus A.............. 101, 117, 132
Dorus S................ 103
Dowd WW................. 84, 123
Dowdy N................. 48
Dowle SJ................. 65, 128
Downs AM.............. 124
Downe CJ.............. 63, 110
Drake JE................ 32
Drechsler J............. 130
Drew J.................. 75
Drotlef D.............. 134
Drown D............... 40, 116
Drown RM.............. 34
Drummond JA........... 50
Drummond MS........... 118
Drushel RF............. 105
Dubansky B............. 45
Dubois S................ 109
Dudgeon JV............. 62
Dudley R............... 30, 99, 115
Dugan Z................. 83
Dulaney SO.............. 95
Dulvy NK.............. 37, 43
Duman A................. 30, 86
Dumont ER.............. 100
Duncan CM.............. 40, 62
Dunham AE.............. 45
Dunham N............... 137
Dunham NT.............. 86
Dunn AC................ 130
Dunn CW................. 137
Dunn IC................ 96
Dunn PO................. 47
Dunton AD............... 82
Duong P................ 83
Dupon MK.............. 51
Duprey ER.............. 127
Dupert D............... 118
Duque FG.............. 136
Durant SE.............. , 43, 63, 109
Durica DS.............. 91, 112
Durso AM.............. 87
Durston NE.............. 100
Dutoit L................. 66
Dutta B................ 133
Duval EH.............. 102
Dzialowski EM........ 56

E

Elder AD........ 131
Eley RL..... 28, 47, 111, 116, 117, 127
Early CM......... 78
Easter JH.............. 36
Easton-Calabria A.... 33
Easy RH.............. 106
Eberle JJ.............. 61
Ebersts ER............ 105
Echeverri SA......... 73, 136
Echols MS........... 79
Eddins HMS......... 61
Eder M................ 87
Edmonds KE........... 124
Edon JA.............. 87
Edwards C............ 50
Edwards J........... 59
Edwards KM........... 54
Eerimas DJ........... 44
Egan SP.............. 48, 50
Eisenman H......... 100
Elan T................ 60
El-Shesheny IA...... 84
Elcock JN........... 115
Elefants CPH........... 52
Elías DO.............. 48
Elías M................ 41
Elíason CM........... 33
Ellersby DJ........... 114
Ellen R................ 182
Elliot KH.............. 127
Ellis EA............... 129
Ellis G................. 37
Ellis HI................. 43
Ellis LV................. 43
Ellison A.............. 130
Ellison C.............. 77
Ellison CI.............. 97
Ellison M............ 117, 128
Elowe CE............ 85
Elowe CR........... 83, 105
Elsey R............... 53
Elsey RM............. 56, 87
Elshafie SJ........ 99
Elson J................ 133
Emberts Z.............. 47, 72
Emery AH.............. 97, 112
Emmerson MG........ 52, 75
Embody ED............. 75
Eng CM........... 115
Eng ML................. 32
English P........ 36
Enns JL.............. 37
Enriquez MS........... 52
Ensminger DC........... 102
Erdmann JA.......... 133
Erickson T........... 49
Ernst DA.............. 131
Esbaugh AJ........... 42, 44, 68, 95, 96, 109
Espil Le............. 80
Eshleman MA........... 110
Espinoza AJ........... 44
Esposito LA........... 131
Essendrup I........... 49
Estrada M............. 96
Estrada RS........... 55, 75
Evangelista D........... 50, 52
Evans BS.............. 131
Evans K.............. 94
Evans KM.............. 71, 78, 124
Evans KR.............. 109
Evans MB.............. 48
Extavour CG........... 66
Eyal M................ 104
Eyck HUF.............. 28

F

Faber-Hammond JJ...... 82, 112
Fabit MB................. 73, 100
Fabián ST............. 112
Fabre AC........... 33, 52, 128
Fahrenden C........... 60
Fairbanks J........... 79
Falk JJ................ 136
Fallon TR.............. 118
Falso MS.............. 55, 85
Falso PG.............. 55, 85
Fatima-Gonzalez DZ.... 135
Fan X.................. 115
Fan Z.................. 97
Far R.................. 49, 51
Farabaugh SM........... 38, 135
Farallo VR........... 98
Fard A................ 109
Fargueville A........... 46, 79
Faria S............... 46, 108
Faria S............. 53, 54, 101, 115
Farrington R........... 81, 133
Fargo MN.............. 78
Farmer CG.............. 41
Farmer L.............. 113
Farquhar E........... 75
Far D.............. 46, 50, 82
Farrel VS........... 48, 127
Farrell BD........... 50
Farris HF.............. 49
Fasick JL.............. 49
Fassbind-Orth CA...... 67
Fath M............... 100
Fath MA.............. 53
Faulci L.............. 96
Faure PA.............. 131, 134
Felder JL.............. 128
Federico P.............. 125
Feiler A.............. 86
Feillich KL........... 97
Feingold SR........... 80
Ferman CL........... 87
Felce RN.............. 62, 128
Felder KD.............. 67
Feilous A.............. 28
Felmann A.............. 108
Fenton FH.............. 95
Feo TJ.............. 78
Feord RC.............. 75
Ferguson SH........... 75
Fernandez V........... 28, 52
Fernandez Y........... 48
Fernández-Agü A...... 107
Ferreira LF........... 84, 107, 112
Ferrigno A.............. 118
Fetherstonhaugh S..... 124
Fetke J.K.............. 125
Feuerbacher OG........... 136
Feustel T.............. 48
Fewell J.............. 65
Fewell JH.............. 43
Fello KY.............. 93
Falkowski RJ........... 44
Field E............... 108
Field J................ 30
Filier JE................ 43
Figueras S.............. 52
Finger JW........... 55, 56
Finke MS........... 117
Finnekagan S.......... 102
Finton C.............. 82
Firmino TJ.............. 97, 112
Fischer EK........... 37, 52, 62
Fish F................ 134
Fish PE.............. 114, 124
Fish O................ 37
Fisher HS........... 59, 113
Fisher II AL........... 65
Fisher RE.............. 49
Fissette SD........... 40, 131
Fitak RR.............. 126
Fitschen-Brown MS..... 108
Fitt W................... 37
Fitzgerald RP........... 110
Fitzpatrick SW........... 69
Flammang B........... 135
Flammang BE........... 63, 72, 105
Flannery C........... 113
Fleming JML........... 99
Fletcher ML........... 113
Fletcher SJ........... 80, 81, 116
Flick RW.............. 125
Flood S................ 109
Florendo J........... 86
Flores E.............. 86
Flores JP.............. 113
Flores L.............. 48, 127
Flores-Santin JR..... 109
Florkowski MF......... 128
Fodor A.............. 128
Foflas E.............. 111
Foltz S................ 51
Foltz SL.............. 48, 49, 112
Fontaine R.............. 110
Fontaine SS........... 37
Fontana R............... 74
Foquet B.............. 132
Ford J.............. 109
Ford KL.............. 93
Ford M............. 51, 78
Ford MP.............. 114, 129, 134
Ford Versyp A......... 33
Foretich MA........... 127
Forlano PM........... 51, 70, 80
Foro F................ 30, 72
Fornos K.K........... 114
Foroughrad H......... 103
Forsburg ZR........... 102
Forthman M......... 67
Forther J.............. 62
Fortunato JA........... 47

2020 Final Program

151
Author Index

G

Gabor C. 47
Gabor CR 55, 70, 116
Gabriel AN 115
Gabriel M 43
Gabrielle C 75
Gad M 113
Gaddum MG 41
Gagliardi SF 125
Gaignet R 105
Gainett G 44
Galante H 80
Gall MD 60
Galloway KA 52, 53
Gamble DE 64
Gamble T 53
Gamboa MP 108
Gamel K 51
Gamel KM 115
Gams HC 48
Gao T 64
Garayev K 114
Garbuglio De Oliveira A 77
Garcia A 77
Garcia Carreño F 65
Garcia L 112
Garcia M 68, 76, 82, 106
Garcia MJ 37
Garcia N 86
Garcia Neto PG 107, 112
Garcia PA 53
Garde E 130
Gardner EM 104
Gardner J 72
Gardner LE 55
Gardner S 73, 103, 113
Gardner SA 32
Garland T 108
Garl AL 78
Garnier AM 67, 85, 118
Garnier JT 104
Garnier TWJ 64
Garrett AD 91
Garlick SR 78
Garrison NL 46, 104
Gart SW 92
Gartner SM 64, 104, 116
Gaspar JC 43
Gasser TR 63
Gast RJ 27
Gates RD 70, 75
Gatesy SM 35, 95
Gau JP 31, 99, 134
Gauthier SM 54
Gaviazzi LM 45
Gavish-Regen E 44
Gawehns-Bruning F 28
Gawne R 125
Ge C 32
Gecelter R 95
Gefen E 85
Geberer AD 135
Geller JB 77, 87
Gellman E 114
Gemiliere R 99
Gemmel BJ 133
Gemmill NJ 66
Genin A 94
Georgadarellis GL 135
George AB 67, 78
George EM 36, 103, 116
Germain RM 64
Germain D 106
Germain R 86
Germain RZ 54, 99
Germeroth LM 131
Gerrard DL 44
Gerinne M 47
Gerrish GA 51, 129
Gerry SP 136
Gerson AR 83, 85, 105
Gerstner G 54
Gesu EM 113
Gess RW 62
Getty T 51
Gholamor CK 91, 108, 117
Ghone C 46
Gikas J 47
Giambrone SA 37
Giancari SM 45
Gibb A 86, 115
Gibb AC 46, 72, 93, 101
Gibbs HL 69
Gibbs S 80
Gibson BL 80
Gibson JC 42
Gibson JD 34, 77, 78
Gibson L 124
Gidmark NJ 64, 78, 118
Gifford M 81, 108
Gifford ME 85, 86, 127, 135
Giglio EM 75
Gignac P 53, 79
Gignac PM 29, 61, 78, 79, 129, 130
Gilbert AL 108
Gilbert ER 52, 75
Gilbert MC 52, 53
Gilchrist LS 50, 118
Gillen CM 83, 129
Gillen K 45
Gillvret PM 43, 88
Gilly W 30
Gilly WF 30
Giral P 92
Gingery T 102
Gingras M 36
Giraud I 74
Giray T 80, 81, 118
Giribet G 33, 44
Gladden LB 83
Gladder KE 92
Glass JR 68, 86
Gleason LU 123
Gledden CA 83
Glinski DA 109
Glogová K 70
Glover AR 77
Glover JR 70
Glover AR 77
Golaris EG 137
Gonzalez P 102, 107, 110, 112
Gonzalez S 102, 107, 110, 112
Gonzalez VA 74, 112, 137
Gonzalez L 81, 84
Gonzalez L 81, 84
Gonzalez VH 51, 84
Gonzalez Bellido PT 67, 75
Goodbody-Gringley G 108
Goodchild CG 43, 109
Goodheart JA 36, 118, 129
Goodheart JG 79
Goodisman MAD 133
Goodisman AM 131
Goodman CM 108
Goodreau JL 113
Goodwin DM 53
Goolabian AW 63
Gordon WC 49
Gormally BMG 55, 75
Gorman CE 35
Gosliner TM 38
Goswami A 33, 52, 62, 128, 130
Gough W 134
Gough WT 81, 114
Goujon V 28
Gould A 132
Gould FDH 54, 99
Govindaraju A 42
Gower DJ 100
Grace JK 55, 131
Gladen K 79
Graham M 81, 109, 116
Graham MA 33, 79
Graham ZA 116
Granatovskiy MC 31, 101, 104
Grand Pre CA 41
Granger E 127
Granger J 70
Grant AR 102
Grasug E 137
Graves S 56
Gravish N 31, 134, 136
Gray JA 64
Grayson KL 29
Grazzini T 69

The Society for Integrative and Comparative Biology
Author Index

Grazzini FG 54
Green PA 127
Green TL 130
Greene MJ 117
Greenway G 111
Greenway R 30
Greives T 80
Greives TJ 110
Gresham JD 111, 116
Greville LJ 131
Griffin C 47
Griffin L 80
Griffith S 55
Griffiths JS 39
Grimaudo A 80
Grimes C 56, 64
Grindstaff J 73
Grindstaff JL 48, 55
Griener JG 53, 67
Grinspoon RD 117
Gripshover ND 43
Grimshaw K 63
Grissler 50
Grober MS 65, 70
Groom DJE 83, 85
Gross JB 45, 53, 108
Grubb O 80
Gruen V 76, 82
Grunbaum D 135
Grunstehaus CGB 69
Gu K 117
Guadela E 125
Guatam S 129
Guell BA 80, 130
Guenter MF 36
Guentzel N 80
Guernsey MW 41
Guerra Canedo VI 69
Guevara Molina SC 80
Guglielmo CG 60, 105
Gubinga Michalka A 74
Guidry ME 32
Gundre-Parker S 97
Gum JM 136
Gunderson A 84, 116
Gunderson AR 96
Guo Y 116
Gurgis GP 71
Gurka R 60, 115
Gust KA 91
Gustafson KL 55, 85
Gustison ML 136
Gutierrez-Andrade D 112
Guzman A 47

Habib MB 114
Haddad A 63
Haddad NM 97
Haddad WA 100
Hadeed MN 109
Hagen OL 117
Hagey TJ 119
Hagood ME 115
Hahn DA 91, 113, 128
Hahn KH 78

Hahon T 39
Hahan TP 52, 82, 102
Hahon-Woernle L 27
Haila F 63
Hain TJA 65, 111
Hakansson J 52
Halanych CN 97
Halanych K 117
Halanych KM 27, 37, 46, 74, 97, 104, 110, 113
Hale HJ 104
Hale MD 31, 117
Hale ME 48, 63, 82, 83
Hall AS 79
Hall BE 36
Hall EM 100
Hall HR 78
Hall IC 110
Hall JM 46
Hall HC 47, 115
Hall LM 52
Hall M 50
Hall Mi 107
Hall RJ 63
Hall RP 100
Hallagan J 80
Halsey L 133
Halsey MK 104
Hamilton N 46
Hamilton PT 117
Hamilton S 113
Hamlyn S 45
Hammond III FL 87
Hammond KA 43, 72, 86
Hammond TA 118
Hampton RR 38
Han J 101
Han JW 83
Han P 129
Handy SD 115
Hanes SD 88
Hanes WA 29
Hanken J 41
Hannam S 135
Hannon MC 77
Hansen AK 87
Hanson H 27
Hanson HE 27
Harbison CW 51
Harold B 51
Hardy AR 82
Hardy DJ 115
Hare-Harris A 109
Hargreaves AL 64
Harley CM 87
Harman AR 81
Haro D 84
Harper FM 46
Harper M 135
Harris BN 101, 113
Harris HS 95
Harris JC 83
Harris JL 78
Harris OK 36, 49
Harris P 109
Harris RM 96
Harrison J 65
Harrison JF 43, 81, 86, 96, 133
Harrington JS 35
Hart MW 69
Harten L 68
Harter LN 84
Hartley JG 51
Hartline DK 128
Harvey M 44
Hassanalliah M 115
Hastings BT 117
Hastings PA 84
Hatch SA 127
Hatcher M 86
Hatle JD 113
Hatsopoulos NG 99
Hau M 80
Hauumann MF 96
HAVASSY J 134
Havens LT 83
Havrid JC 33, 91, 110, 123
Hawkes K 59
Hawkins D 130
Hawkins PK 73
Hawkins TM 113
Hawthorne-Maddell J 70
Hayes D 82
Haynes L 37
Hayssen V 59, 79
He L 69
He X 49
He Y 122
Heagy FK 36
Heal M 39
Healy JE 81
Heald SD 123
Heath-Heckman E 113
Hebbon N 122
Hebert AK 36, 118
Hecksher ES 107
Hedrick BP 41, 79, 94, 98, 100
Hedrick TL 30, 122
Heerdelgen I 53
Heesy CP 76
Hefele KR 113
Hegarty BE 117
Heide-Jorgensen MP 107, 130
Heidinger BJ 124
Heine KB 34, 124, 132
Heinicke M 53
Heinle MJ 119
Heins DC 130
Heizts R 92
Heiser S 27
Heiss E 81
Heitzman NS 56
Hejmaidi P 43
Helm JB 132
Helmich DL 51
Hellum AM 100
Helsens Calman 94
Hemming N 128
Hemmer BL 109
Henderson Kw 48
Henderson WM 109
Hennessey PJ 119

Henopia C 30
Henschen A 47
Henschen AE 100, 111
Hensley NM 51, 129
Heppner JJ 110
Herath E 37
Herbert AM 135
Hermans CO 85
Hernandez Al 53, 78
Hernandez AM 50
Hernandez CA 53
Hernandez E 40
Hernandez J 102
Hernandez LP 42, 64, 82, 86, 94, 101, 104, 115, 119
Hernandez LP 104
Hernandez R 119
Hernandez T 76, 82
Heidorn CJ 95
Heidorn N 73
Herrel A 33, 92, 106
Hernaiza Montalvo LG 68
Hervas-Sotomayor F 66
Hesp K 66
Hess A 50
Heatr J 28
Hewes A 67
Hewes AE 67
Hewes D 70
Heydat S 63, 86
Hickey T 34
Hidalgo F 87
Higgins B 106
Higham TE 34, 94, 96, 98, 104, 134
Hightower BJ 60
Hikmatawai TN 119
Hileman LC 35
Hill EC 61, 74, 105
Hill GE 34, 83, 124, 132
Hill JE 108, 126
Hill RI 49
Hilliard J 77
Hills DM 61
Hills MH 123
Hilton EJ 135
Hindley AG 27
Hinds AD 48, 87
Hines JK 97
Ho S 46
Ho Y 70
Hoang T 130
Hobson B 42
Hogge JR 53
Hodges A 111
Hogdon ML 81
 Hodinka BL 37, 97
Hoeje WJ 83, 109, 118
Hoffman AJ 55
Hoffman DK 47
Hoffman EA 129
Hoffman SK 91
Hoffmann J 122
Hoffmann S 53
Hoffmann EP 54, 69
Hoffmann HA 38, 46, 63, 83, 101, 116, 117
Author Index

Kawano SM ............... 63, 72
Kay DI .................. 61
Kaye R .................. 83, 85
Kazmi JS .................. 83
Keaveney EC ............. 84
Keck CMT ................. 111
Keelh E .................. 74
Keener W ................ 98
Keep S ................... 69
Kehl C .................... 49
Kehl CE ................... 54, 105
Kellemen EP ............. 132
Kell A ...................... 36
Keller ES ................. 110
Keller JS ................ 61
Kelley J ................... 30, 48
Kelley JL ................. 69
Kelley MD ............... 49, 56
Kelly AP .................. 47
Kelly JB ................... 34
Kelly MW .................. 32, 39, 64, 104
Kelly PW .................. 39
Kelly TR ................... 97, 106
Kemp AK ................ 73
Kemp DW ................ 70
Kemp M .................... 62
Kemp ME .................. 47, 97
Kenaley CP ............... 54, 126
Kendall T ................ 43, 92
Kenkel C ................... 43, 69, 123
Kennamer RA ............ 80
Kennedy A ............... 101
Kennedy J ............... 114
Kennedy JR .............. 32
Kenny E .................. 111
Kenny MC ............... 115
Keogh SM ................ 78
Kepas ME .................. 111
Kephart MK .............. 43
Kephart ML .............. 88
Kerbis Petersen HC ..... 98
Kernbach ME ............ 39
Kerr SJ .................. 124
Ketchum R ............... 137
Ketterson ED ............. 59, 63, 106
Kilver L .................. 31
Kgeisi L .................. 34
Khali S ................... 75
Khanddelwal PC .......... 30
Khawaja Y ............... 83
Khoja A .................. 62
Khoshaba E .............. 48, 79
Khusisara AJ ........... 42
Kiars H ................... 83, 124
Kienie SS ............... 71, 92
Kiflawi M ............... 50
Kikel M .................. 95
Kile R .................... 54
Killion KD ............... 36
Kim H ..................... 110
Kim JS .................... 92
Kim LN ................... 78
Kim S ..................... 31
Kim SL .................... 61
Kim W ...................... 125
Kimball D ............... 86
Kimball MG .............. 55, 102
Kimmitt AA .............. 59, 131
Kimura J ................. 66
King EE ................... 96
King RW ................. 39, 80
King T ..................... 66
King TK ................... 33
Kingston ACN ............. 36, 49, 75, 77
Kinsey CT ................ 114
Kinsey ST ............... 31, 114, 134
Kierboe T ................ 101
Kirkpatrick A .......... 134
Kironde E ................ 52
Kirwan DJ ................ 14
Kishi Y .................... 41, 44, 135
Kitahara M ............ 108
Kitchen SA ............... 44
Kittison J ............... 124
Klar EA .................. 80
Klassen M ................ 15
Kleinheerenbrink M ... 30
Klepac CN ............... 29
Kley NJ ................. 129
Kleyhans EJ ............. 64
Kligman BT ............... 61
Klok JC ................... 86
Kloppen AML .......... 112, 124
Klug PE ................... 110
Knapp R ................. 65, 111
Knerr RJ .................. 64
Kniahnskaya K .......... 94
Knijnenburg TA ....... 30, 134
Knoche L ............... 115
Knojton AC ............. 69
Ko D ...................... 63
Ko I ...................... 71
Koch RW ................. 87
Kocot KM ............... 44, 50, 66, 77, 113
Koehl MAR .............. 96, 101
Koenig K ............... 137
Koenig KM ............... 45, 49, 118, 128
Koepfli KP ............ 69
Koh KI ................... 32, 37, 50, 67, 106
Kohruss PS ............ 108
Kohlsdorf T ............. 107
Kohn A .................. 128
Kolbe JJ .................. 54
Kolber BJ ............... 73
Kolchenko S .......... 74, 137
Kolker Ghatan M ... 50
Kollath DR .............. 100
Kolman MA .............. 47, 64, 94
Kolodziej G .......... 43
Kolonin A ............... 47, 116
Kolotko K ............... 51
Kopas A ................. 124
Kondrashov P .......... 82
Konow N ............... 86, 95, 99
Koopman HN ........... 130
Koplay C ................ 117
Koptur S ............... 50
Korens ................. 137
Kornev K .......... 41
Kosma M ............... 30
Kostka AL ............. 54
Kovacs J ............... 50, 110, 118
Kovacs JL .............. 69
Koyama T ................ 69
Kraemer K ............ 126
Krajnik K ............. 113
Krajnik KG ............ 83
Kramer EM ............. 35
Kramer L ............... 79
Krans JL ............... 113
Krantz J ............... 45, 112, 118
Kratovich LB .......... 110
Krause J ................ 39
Krause JS .............. 40, 97
Krider L ............... 133
Krieffer NG ........... 70, 88
Krieg CA ............... 51
Kniemen G ............. 60
Khimann K .................. 60
Klanz I ................... 127
Krupka M ............... 117
Kruppa J ............... 117
Kruppa K .............. 117
Kruschke Z .......... 115
Kryszczczyk E ....... 103
Ksiezek-Mikenkas K .. 36, 181
Kubicek KM .......... 85
Kudla AM .............. 118
Kueneman JD .......... 114
Kuhfu ................. 34
Kuhaich HG ........... 133
Kukaric HA .......... 124
Kutz D ................. 43
Kunkel EL ............... 126
Kunkle H .............. 115
Kupris NA ............ 135
Kvis S ................ 116
Kwinty M .............. 82
Kyle AM ............... 46

L

L’Ecuuyer Z .......... 111
Labar J ............... 51
Labonte D ............. 52, 81, 85, 134
Labonté J .............. 56
Labay CD ................ 109
Lacy-Hultberg A ...... 124
Lad SE ................. 135
Ladage LD ............ 122
LAGARDE R ........... 67
Lagerstrom KM ....... 37
Lailvap SA .......... 34, 69, 93
Laine V ............... 28
Laine VN .......... 28
Laird MF .......... 31
Lait C ................. 114
Lajeunesse TC ........ 70
Lam C ................. 48
Lam EK ............... 128
Lamanna F .......... 66
Lambert JD .......... 45
Lammers A ........... 99
Lammers AR .......... 54
Lamont S ............. 43, 88
Lancaster LT ........ 27
Landry D ............ 97
Lane JE ............... 48, 97, 113
Lane SJ ............... 75, 111
Lane ZM ............. 111
Lang KL ............... 85
Langager MM ......... 116
Langalski A ......... 96
Langdon TR .......... 87
Langkilde T ........... 61, 63, 102, 127
Landier M ........... 134
Lanza AR ............ 41
Lapolle TM .......... 46
Lappin AK ............ 53
Lapsansky AB ...... 98
Larrichiuta J ........ 74
Lark R .................. 98
Larkin B ............... 74
Larocca-Savalle Z ... 45
Larocoque H .......... 54
Larouche O ............ 37, 64, 128
Larson AM .......... 113
Larson JO ............ 126, 132
Larson TR ........... 48
Lasala JA ............. 96
Latta SC ............... 32
Lattin C ............... 81
Lattin CR .............. 97
Lau B ................. 113
Lau E .................. 117
Lauder GV ............... 30, 61, 72
Lawrence-Chase J ...... 99, 101, 104
Lawrence-CM ........ 109
Law C ................. 38, 78
Law D ................. 87
Laving AM ............ 53, 102
Lawrence JP .......... 49
Lawson AB ........... 79
Layden MJ .......... 135
Lds-Vip ............... 99
Le Plane K ............. 60
Leach W ............... 137
Leathy AL ............ 124
Leathy AM ............ 124
Leal M ............... 84, 123
Leary CJ .............. 85
Leavitt HE .......... 51
Lebow CL ............ 36
Lecesne RL .......... 117
Lecheta MC .......... 37
Ledesma D ......... 62
Lee DT ............... 135
Lee JS ............... 32
Lee M .................. 98
Lee MA ............. 99
Lee RE ............... 123
Lee STM .......... 47
Lee T ................. 117
Lee V ................. 118
Le eb- Robinson B .... 115
Leese JM ........... 48, 51
Lefauve MK ........... 42, 82
Lefftwich MC .......... 124
Lehmann D .......... 74
Lehner K .......... 103
Leibowitz M .......... 49
Leigh S .......... 109
Leigh SC ............ 126
Leininger EC .......... 83
Leite JV ............ 79

2020 Final Program 155
Author Index

Ma J. 43, 106
Ma A. 106
MacDougall-Shackleton EA. 106
MacDougall-Shackleton SA. 37
Macias H. 117
Macias-Muñoz A. 36, 49
Mack J. 66
Mackenzie DS. 80, 107
Mackessy SP. 61, 69, 104, 124
MacKewicz AG. 116, 136
MacKnight N. 32
MacKnight NJ. 39
MacLean E. 122
MacLeod PF. 79
MacManes MD. 32
MacManus MD. 46, 65
MacMillan D. 109
Macomber GE. 116
Macrander J. 45, 112, 118, 137
Macy RR. 55
Madal M. 32, 122
Madariaga ME. 72
Magen EM. 109
Mahadevan L. 32, 127
Mahaffy AR. 27, 104
Mahony C. 64
Maia A. 86, 114
Maier M. 106
Maier MA. 82
Mainwaring MC. 34
Maisano J. 82
Maisely JG. 53
Majors JE. 127
Malangi S. 48
Malingen SA. 86, 116
Malaich J.. 102
Matlpy R. 55
Matul D. 104
Man Y. 101
Manafzadeh AR. 29, 35
Maness TJ. 109
Maney DL. 70, 93
Mangemele L. 52
Mann J. 103
Mann SD. 92, 114
Mannava A. 86
Mansouri F. 75
Manthey JD. 113
Mantilla DC. 136
Manzanes R. 136
Manzino S. 118
Manzini V. 109
Marangoi L. 108
Marbach S. 125
Marbell-Ortega C. 99
Marce-Nogue J. 130
Marchant T. 32
Marek P. 100
Marini M. 128
Mark D. 113
Markay A. 28
Markham MR. 51, 55, 83, 108
Marks JR. 34, 69
Markus RP. 107
Marlow H. 74, 137
Marrogo G. 107
Marroquin CM. 85
Marroquin-Flores RA. 84
Marsal M. 125
Marsh A. 61
Marsh P. 134
Marsh TM. 118
Marshall AS. 117
Marshall CA. 108, 117
Marshall CD. 53, 94, 126
Marshall LV. 55, 85
Marshall TL. 61
Martin DE. 66
Martin AL. 112, 116
Martin CH. 132
Martin CM. 34
Martin GG. 77
Martin J. 95
Martin K. 55
Martin JG. 29
Martin LB. 27, 39, 63, 110
Martin LM. 95
Martin MN. 110
Martin RJ. 127

Lema SC. 69
Lemberg JB. 62
Lenaghan O. 134
Lenard A. 94
Lenga SH. 133
Lent D. 87
Lent DD. 83, 87
Lentink D. 60, 78
Lenz AS. 103
Lenz PH. 80, 128
León C. 48
Leonard A. 27
Leonard AS. 38
Leonard KL. 106
Leplande KL. 60
Lepkowski J. 54
Leroy EM. 31
Lerose C. 52, 53
Leslie CE. 49
Lessig EK. 133
Lessner EJ. 79
Leung NL. 79
Levett SL. 103
Levendosky MW. 134
Levin M. 125
Levitan BB. 91
Levy MG. 119
Levy O. 95
Lewis AK. 79
Lewis C. 86
Lewis JA. 117
Lewis JM. 56
Lewis ZR. 137
Leys SP. 40
Li C. 31, 92, 95, 99
Li CY. 117
Li DH. 30
Li J. 87, 91, 117
Li K. 131
Li P. 137
Li QS. 99
Li TD. 126
Li W. 36, 40, 131
Li Y. 37
Liao J. 123
Liao JC. 31, 103
Lidgard AD. 32
Lieb J. 85
Liebl AL. 127
Lighten J. 74
Lightton JRB. 83, 86, 118
Liguori AL. 66
Lilavois NL. 103
Lillywhite HB. 106
Lim NTL. 116
Lima AS. 84, 107
Lin B. 92
Lin C. 48
Lin DC. 137, 73, 100, 112
Lin K. 86
Lindborg AR. 55
Lindner M. 28
Lindsay SM. 76
Linksvayer T. 132
Lipshutz SE. 59, 103
Liu H. 71
Liu S. 105
Luc HM. 45
Lucas KN. 54, 134
Lucia RL. 49
Lucky A. 97
Ludington A. 78
Ludington S. 51
Ludington SC. 51
Luebbers KM. 112
Luedeen IK. 47
Lundesgaard Ø. 27
Lungmus J. 62
Lungmus JK. 64
Lunsford ET. 31
Luo YJ. 45, 66
Luo ZX. 64
Luscave E. 49
Lusk EP. 110
Lutkewig B. 34
Lyko F. 111
Lynch J. 31, 134
Lynch KS. 59
Lynch LM. 49
Lyons BA. 49
Lyons DC. 45
Lyons K. 56, 129
Lyons KM. 100
Lyons MP. 99
Author Index

Mukherjee R. 100
Mukhtar V. 114
Mullen SP. 49
Muller E. 39
Muller K. 87
Müller UK. 59, 60, 87, 107
Multikin J. 112
Multikin JC. 137
Mullin SM. 48
Mullins H. 87, 117
Munley KM. 75
Munoz E. 96
Munoz JD. 118
Muñoz MM. 93, 98, 122
Munoz-Garcia A. 85
Munroe S. 66, 77
Munteanu VD. 72, 86
Murphy CT. 100
Murphy DW. 114
Murphy GV. 75
Murphy KM. 56
Murray-Cooper M. 71
Musgrove CM. 48, 87
Mushagewian N. 134
Mushinsky H. 66
Musial NA. 43
Musinsky C. 29
Musser J. 65
Musser JM. 78, 128
Muth F. 38
Mutusuddy A. 111, 117
Mutum GL. 36
Mykles DL. 91, 112
Myers CR. 34
Myers M. 118
Mykles DL. 91, 112
Myre B. 80

N

Naclerio N. 71
Naden L. 87
Nadler J. 95
Nagayasu N. 41
Nagesan R. 132
Nagpal R. 32
Naisbitt-Jones L. 49, 72
Naisbitt-Jones LC. 126
Nakanishi N. 45
Nakata T. 60
Nagam E. 39
Nankivell JH. 78
Naquin TE. 83, 109
Naragon T. 44
Naragon TH. 29
Naric V. 115
Nasi A. 113
Nash SB. 32
Nasimi F. 73, 100
Nasir L. 136
Naug D. 34
Naughton L. 82
Naughton LF. 82
Navara KJ. 79, 103
Navarro E. 136
Navas C. 108
Navas CA. 55, 94
Nave GK. 33
Navon D. 94
Naylor ER. 96
Nazar S. 114
Neal S. 45, 118
Nebhut AN. 55
Neel LK. 92
Neely CMD. 85
Neff BD. 66, 115
Negrete Jr. B. 95
Neiman M. 91, 110
Nelson MD. 51
Nelson SN. 36
Nemani S. 50
Nesbitt SJ. 47, 52, 61, 62
Neubauer P. 60
Neurohr JM. 134
Neustadter DM. 54
Newbrey JL. 130
Newbrey MG. 53, 79, 80, 130
Newcomb JM. 36
Newcomb TJ. 68
Ng-Ou H. 36
Nguyen AD. 137
Nguyen H. 96, 130
Nguyen KD. 95
Nicholson DJ. 64, 106
Nicholson T. 38
Nickel M. 128
Nickles KR. 107, 120
Nicolas KR. 49
Nicola T. 134
Niederau H. 136
Nieders K. 115
Nielson DP. 51
Nielson SV. 61
Nieves N. 48
Nieves OC. 69, 70
Niewiarowski PH. 67, 85, 118
Nigam N. 105
Nijhoff HF. 69, 118, 130
Nicolakis ZL. 104
Nila A. 40
Nilsson P. 130
Nippert JB. 64
Nishiguchi MK. 129, 132
Nishikawa K. 62
Nitta JH. 97
Nix RM. 33
Nixon A. 14
Nix M. 125
Nix N. 126
Nolden KH. 33
Norekian TN. 85
Notar JS. 49
Notaryshank R. 83
Novotny MV. 106
Nowack P. 104
Nowakowski AM. 75
Nowayy W. 136
Nowicki S. 127
Ntie S. 74
Nuñez CMV. 131
Nuñez SA. 41
Nunese KE. 98
Nuttall J. 74
Nyakatura JA. 101
Nystrom G. 69
O'Brien H. 41, 79
O'Brien HD. 61, 130
O'Brien KM. 71
O'Brien S. 80, 82
O'Connell J. 137
O'Connell LA. 37, 51, 52
O'Connor MP. 45
O'Connor PM. 62
O'Dea A. 102
O'Donnell MK. 59
O'Keefe JM. 102
O'Leary NE. 87
O'Loughlin C. 127
O'Mara MT. 42
O'Neil JR. 97
O'Rourke C. 131
Oakley TH. 44, 51, 78, 117, 129
Oakley TO. 79
Oaks J. 50
Oberman W. 82
Obokottov P. 105
Ochis RA. 113
Odaka Y. 56, 73, 81
Oel AR. 66, 78
Oidek AH. 37
Oehm MEB. 100
Okubo R. 107
Olbrecht JP. 42
Olenski M. 117
Olenski MS. 101
Olesen J. 44
Olgun AR. 49
Olguin DER. 69
Oliver D. 43
Otoro J. 71
Otoro S. 62
Otoro SL. 130
Olsen A. 115
Olsen AM. 54, 104
Olsen M. 110
Olsen R. 54
Olsen RA. 54, 99
Ollin K. 122
Omane H. 79
Omelan S. 125
OttANO AZ. 44
Othman KL. 119
Opheim A. 111
Opheim AG. 38, 82
Orbach DN. 98
Orcutt JD. 47
Ordonez-Baez A. 107
Orlando D. 87
Opp SE. 84, 129
Orr TJ. 51, 59
Ortega-Jimenez VM. 99
Ori G. 94
Ortiz J. 136
Ortiz TE. 87
Orton RW. 92, 104
Osborn K. 48, 134
Osgood AC. 105
Osmanski AB. 61
Othathoy R. 31, 95
Otter K. 101
Ouliero CE. 52, 84, 108
Ouyang JQ. 110
Owen P. 56, 73, 81
Owerekowicz T. 87
Oyekwe OL. 46
Ozalp MK. 30
Ozkany-Aydin Y. 71, 87, 95, 103, 129

P

Pabst DA. 31
Pace CM. 99
Pace DA. 130
Padda SS. 68, 119
Paddilla DK. 135
Paddilla G. 82
Paddilla GM. 49
Paddilla P. 92
Paez L. 126
Paez VM. 126
Paggeot LX. 38, 116
Paiag-Tram MG. 126
Paiag-Tram M. 79
Painter MN. 39
Painting C. 74
Paitz RT. 84, 94
Paiwa PC. 64
Palairoo AV. 116, 130
Palavall-Nettiri R. 75
Palace-K-McClung AM. 63
Palermo NA. 68
Palm R. 97
Palmsciano M. 113
Paloro AV. 46
Pamfilie AM. 85
Pan TY. 99
Pan Y. 31
Panisseti C. 99
Panisseti CE. 86
Pang YF. 110
Paris CB. 127
Parker J. 29, 33, 44, 110, 135, 137
Parker L. 53
Parker W. 61
Parkinson CL. 54, 69
Parlin A. 85
Parmentier E. 31
Parma R. 135
Parrott BB. 31, 117, 124
Parry D. 29
Parry HA. 83
Parry RM. 136
Partridge CG. 65
Pascal J. 74
Pasch B. 67, 106
Pask G. 82
Pask GM. 36, 82
Patek SN. 31, 35, 42, 73, 122
Patel NH. 41
Paulat NS. 113
Author Index

Pavlic T.................. 92
Payette WI .................. 37
Pearson LE ................. 95
Pearson PR .................. 46
Peele EE .................. 31
Peet MM .................. 49
Peleg O .................. 33
Pelletier A .................. 91
Pendall E .................. 32
Pendar H .................. 115
Pendleton LP ............... 82
Peng LS .................. 99
Pennely CW ................. 40
Pentandou T .. 81, 84, 116
Pepper HE .................. 136
Pericval C .................. 84
Pericval CR .................. 51
Peredo CM .................. 53, 94
Perera C .................. 108
Perevolotsky T .................. 94
Perez JH .. 40, 96, 97
Perez ML .................. 44
Pergola D .................. 14
Perkes AD .................. 32
Pernet B .................. 130
Perry BW .. 61, 104
Perrot UI .................. 111, 116
Pespmi NH .................. 91
Pessareau EJ .................. 46
Petandou T .. 51, 80, 81
Peters JM .................. 33
Peters K .................. 87
Peters S .................. 127
Petersen A .................. 80
Petersen KH ................. 33
Petersen L .................. 64
Petersen AN .................. 94
Petersen BN .................. 77
Petersen CR .................. 46
Petrya JA .................. 132
Petranek C .................. 74
Petricko S .................. 115
Petritilo R .................. 37
Pfieffenberger JA ........... 72
Pfennig DW .................. 39
Pfennig KS .................. 39
Pfleffenberger J .................. 119
Pfommer BG .................. 32
Phan A .................. 99
Phet T .................. 137
Phelps AN .................. 45
Phelps SM .. 28, 52, 75, 93, 136
Phillip A .................. 137
Phillips AN .................. 68
Phillips JR .................. 67
Philcon C .................. 81
Phipps N .................. 38
Phips EJ .................. 50
Piazzia SJ .................. 86
Piccani N .................. 78
Pisier E .................. 119
Pierce ER .................. 77
Pierce SE .................. 41, 85
Piemannini PM .. 83, 129
Pieno E .................. 37
Pieterman L .................. 78
Pilgrim EM .................. 125
Pimenta MC .................. 50
Pinna C .................. 41
Pinto Benito D ............. 49
Pipes BL .................. 129
Pirtle T .................. 113
Pittel T .................. 114
Pitnick S .................. 103
Place NJ .................. 103
Plachetzki D .................. 130
Plachetzki DC .................. 46
Plakke MS .................. 103, 110
Platt II RN .................. 113
Plessier F .................. 74, 137
Plochocki JH .................. 107
Plum F .................. 81
Pom O .................. 63, 86
Pol L .................. 104
Pol D .................. 62
Polavaram T .................. 119
Polito MJ .................. 27, 81
Polon M .................. 107
Pollock AM ................. 127
Pollock B .................. 124
Pollock N .................. 106
Pollock T .................. 131
Polux BJA .................. 41
Polly PD .................. 122
Pomerantz AF .................. 41
Pomponi SA .. 66, 77
Ponton D .................. 67
Poole AZ .. 37, 66, 75
Popp BN .................. 75
Poppinga S .................. 59, 60
Popp K .................. 56
Porras BD .................. 114
Portela-Miguez R ............ 52
Porter M .................. 68
Porter ME .. 52, 53, 114, 115, 125, 134
Porter ML .. 29, 35, 132
Porter NA .................. 78
Portik DM .................. 97
Pos KM .................. 64
Postlesihawk J ............. 80
Potter C .................. 75
Potter D .................. 66
Potvin J .. 38, 81, 114
Powder KE .................. 67
Powell E .................. 34
Powell JB .................. 123
Powell THQ .................. 128
Powers AK .................. 53
Powers B ................. 37, 98
Powers DR .. 84, 98, 118
Powers J .................. 92
Powers JD .................. 86
Powers MJ .................. 34
Powers MM .................. 29
Pradhan D .................. 102
Pradhan DS .. 65, 70, 80, 117
Prado MA .................. 86
Prakash M ................. 115, 125
Prakash VN ................. 115, 125
Prater C .................. 125
Prater CM .................. 101, 113
Prather JF .................. 93
Preininger D ................. 52
Preising GA ................. 112
Prestwich KN ............ 118
Prenteds Eagle TJ .. 80, 81, 116
Price ER .. 56, 67, 109
Price S .................. 116
Price SA .. 33, 53, 62, 64, 118, 128
Price TP .................. 93
Prichard M .................. 97
Piriharto PK .................. 119
Prinzig TS .................. 43, 84
Pritchard C .................. 102
Profetii GM .................. 50
Proffitt MR .................. 98
Proudfoot GA .................. 60
Provete DB .................. 83
Provini P .................. 94
Przeworski M ................. 85
Puffel F .................. 52
Puller K .................. 84
Puller KL .................. 51
Pulliam JN .................. 115, 116
Pullum KB .................. 37
Purdeley L .................. 37
Pusdekara S .................. 75
Putland RL .. 116, 136
Pyatt JE .................. 117
Pyenson ND .................. 94
Qi Z .................. 129
Qian G .................. 32
Quake SR .................. 137
Quimby K .................. 52
Quinn BL .................. 64
Quinn JG .................. 133
Quintana Ramirez GS ....... 85
Qurban MA .................. 119
Rabinowitz S .................. 33
Rabinowitz SA .................. 110
Rabosky DL .................. 132
Rader JA .................. 122
Raffel TR .................. 84
Ragland SJ .. 69, 128
Ragdalle AK .................. 66
Ragdall CW .................. 135
Rahman AF .................. 109
Rahman MD .................. 40, 109
Rahman MS .. 99, 100, 109, 118
Rahman SM .................. 32
Raimondi SL .................. 36, 118
Rainwater TR .................. 31, 117
Raja SV .................. 63
Rajaraman G .................. 118
Rak AK .................. 38
Raley LN .................. 94
Ramenosky M .. 52, 97, 102
Ramer AL .................. 118
Ramirez MD .................. 36, 110
Ramirez RW .................. 105
Ramirez-Estrada J ............. 48
Ramos-Guas B .................. 47
Ramsaran SK ................. 84
Ramsay G .................. 93
Ramsey ME .................. 38
Ranchod P .................. 111
Rand DM .................. 127
Randvile CR .................. 78
Raphael-Quinney P .......... 34
Range RE .................. 32
Rangel-Olguin AG ............ 36
Rank NE .................. 112
Rankins D .................. 106
Rao C .................. 60
Rashid S .................. 117
Ratvoson JC .................. 57
Rauscher M .................. 107
Rautsaw RM .................. 54, 69
Ravil D .................. 85
Ravosa MJ .................. 135
Ray DA .. 61, 104, 113
Razmi AN .................. 63
Raymos A .................. 113
Readmond KM .................. 83
Rebelo H .................. 42
Rebelo R .................. 92
Rechenberg I .................. 60
Redak C .................. 46
Redak CA .................. 104
Redmann E .................. 92, 114
Reed AJ .................. 131
Reed L .................. 37
Reed SA .................. 114
Reed SE .................. 114
Reedy AM .................. 46, 47
Rees BB .................. 83
Reese SJ .................. 98
Reeve C .................. 105
Refsnider JM .................. 84
Regan MC .................. 130
Regan MD .................. 72
Rehorek SJ .................. 53
Reich HG .................. 70
Reichard M .................. 87
Reichert M .. 51, 110
Reichert MS .................. 133
Reichmuth C .. 113, 114
Reid AMA .. 40, 97
Reid HE .................. 115
Reigel AM .................. 32
Reinhart JM .................. 75
Reisenfeld K .................. 136
Reiter KE .................. 130
Reiter PA .................. 94
Reitzel A .................. 137
Ren CC .................. 75
Renn SCP .. 56, 79, 81, 82, 112, 116, 131
Renner K .................. 117
Renninger A .................. 54
Rennolds CW .................. 68, 113
Repope F .................. 87
Resh CA .................. 104
Reyes-Rivera J .................. 135
Reynolds JA .................. 117
Reznick DN .. 41, 54, 103
Rhoda MA .................. 117
Rhodes JS .................. 29
Ribak G .................. 40, 115
### Author Index

**R**
- Ribeiro Gomes F  80
- Ribeiro R.  113
- Ricci L.  45, 66
- Rice AM  65, 78
- Rice N.  62
- Richards-Zawacki CL  72, 100
- Richardson AR  35
- Richardson CS  100
- Richardson EL  77
- Richman J.  28
- Richter A.  32
- Richter B.  92
- Richter BP  43
- Richter MM  37
- Rickards G.  86
- Riddell EA  94, 105
- Ridenour M.  55
- Ridgely RC  78
- Ries JB  69, 75
- Riese J.  95
- Riese JM.  126
- Riffell J.  107
- Riley AK  48
- Riley BB  107
- Riley GF  83
- Rimal A  37
- Rimkus B  86, 95
- Rincon C.  86
- Rinehart RP  85
- Ringenwald BE  85
- Ringo D.  94
- Rippamonti JR  56
- Rippe JP  39, 88
- Risi M  42
- Ritchey TE  47
- Ritchie TE  51, 82, 111, 112
- Rittmeester-Loy SA  77
- Ritson-Williams R  75
- Ritterbus KA  122
- Rivera AS  52
- Rivera G.  85
- Rivera HE  43
- Rivera MD  132
- Rivers TJ  51
- Rix AS  71
- Robark AM  80
- Roberto DP  51
- Roberts A.  108
- Roberts KT  47, 74, 105
- Roberts SB  113
- Roberts TJ  35, 86, 94, 95
- Roberts-Kirchhoff ES  109
- Robertson CE  64
- Robertson CM  47
- Robin H.  85
- Robinson CD  107, 127
- Robinson KE  101
- Robinson PR  49
- Robinson TL  129
- Robishaw TE  59
- Robison B  48
- Robles KD  48
- Rocco AJ  131
- Rocereto SK  112
- Roche AS  48
- Rock S  42
- Rockman M.  70
- Rodder D  92
- Rodel MO  61
- Rodriguez A.  135
- Rodriguez E.  46
- Rodriguez E.  56
- Rodriguez IB  70
- Rodriguez IM  51
- Rodriguez L.  77
- Rodriguez SD  80, 81, 116
- Rodriguez-Saltos CA  93, 136
- Rodriguez-Santiago M  63
- Roederer L  124
- Roelke CE  112
- Rogers LS  36, 136
- Rogers SM.  94
- Roginsky JE  49
- Rojas AM.  45
- Rojo Areola L  65
- Roktya DR  54, 69
- Rolle S  119
- Rollins LA  28
- Rollins-Smith LA  100
- Romagosa CM  106, 108
- Romano L  45
- Romero LM  55, 75
- Romero MF  83, 129
- Romero R.  65
- Roncalli V  80, 128
- Ron H  33
- Roosenburg W.  136
- Roper VG  136
- Rosado KA  114
- Rose CS  110
- Rose E  48, 133
- Rosenbach KL  53
- Rosenbloom JE  78
- Rosenthal J.  128
- Rosenthal MF  48
- Ross CF  31, 99, 104
- Ross RC  104
- Ross SA  95
- Rossi ML  97
- Rossiter JA  54
- Rossiter SJ  100
- Rosso AA  44, 106
- Rossell KA  36, 55, 59, 81, 102, 103, 116
- Roth TC  78
- Rowland TF  136
- Rowley AA  111
- Rowsey LE  105
- Rozzi R.  112
- Rubenson J.  86
- Rubenstein D.  136
- Rubenstein DR  28
- Rubin AM  55
- Ruddy B.  53
- Ruddy BT  114, 134
- Rudzki EN  106
- Ruiz CA  50, 68
- Rull M.  86, 99
- Rummel AD  134
- Rundell SM  27
- Rupp AE  67
- Rusch DB  36
- Russell A.  74
- Russell AF  127
- Russell AP  67
- Rutledge KM  100
- Rutschmann A.  108
- Ruvina K.  51
- Ryan DS  105
- Ryan JF  41, 112, 137
- Ryan LM  116
- Ryan MJ  59, 111
- Ryan TA  68
- Ryder TB  96, 131
- Ryerson WG  93
- S
- Saavedra R.  54
- Sabin R.  75
- Sachkova M  137
- Sacks PE  50, 54
- Sadler A.  29, 100
- Saenger EK  69
- Saenz DE  108
- Saenz V.  42
- Sah K.  117
- Saha R.  51
- Saintjrsing AJ  86
- Saiz LV  110
- Sajdah-Bey N.  119
- Salas H.  96
- Salazar-Nicholls MJ  117
- Salcedo MK  115, 116, 122
- Salem W  52
- Salesa MJ  34
- Salinas-Ramos VB  68
- Sallan L.  119
- Salmon M.  92
- Saltz JB.  81
- Salzano MQ  86
- Sam A.  48
- Samuel A.  63
- Samuel MD  112
- Samuels T.  49
- San Francisco S  43
- Sanders E.  119
- Sanders JC  38
- Sanders K.  75
- Sanders KL  78
- Sanders RW  27
- Sanders SM  112, 124
- Sanders TL  102
- Sandfoss MR  106
- Sandmeier FC  39, 106
- Sandovol K  66
- Sane SP  63
- Sanford CP  99
- Sanger TC  45
- Sanger TJ.  41, 111
- Sangha G.  42
- Santana A.  49
- Santana S.  29
- Santana SE  54
- Santangelo N.  48
- Santhanakrishnan A  30, 41, 114, 129, 134
- Santiestevan J.  103
- Santos SR  91, 123
- Sarathy J.  110
- Sarma RR  28
- Sartoretti G.  71
- Sasson D.  96
- Sathe EA  30, 115
- Sattlerie RA.  85
- Saudemont B  137
- Savoca MS  35, 114
- Savoy T  105
- Sawaya M  72
- Sayavong N  96
- Sayegh N.  114
- Scacco M  42
- Scanlan LG.  53, 78
- Scanlan MM  126
- Scannella J.  79
- Scapanovic J  74
- Schachner ER  41, 79
- Schaefer RJ  91
- Schaeffer PJ  85
- Schapker N.  86
- Schenker H.  83
- Schenker E.  118
- Schiebel P.  95
- Schiebel PE  86, 92
- Schild DR  61, 104
- Schippers K  128
- Schlatter E.  127
- Schlingel B  102
- Schmidt MF  32
- Schmitz L  53, 78, 118, 125
- Schneider CE.  111
- Schneider SQ.  46
- Schnitzler CE  74, 137
- Schobel T  96
- Schock SF  97
- Schoenfuss HL  67
- Schoenle LA  63
- Schott RK  100
- Schotte M.  125
- Schraut HA  107
- Schrey A  66
- Schrey AW  27
- Schuech R  101
- Schuette S.  50, 118
- Schultz DT  118
- Schultz E  39
- Schultz EM  63
- Schultz AK  33, 86
- Schultz J.  82
- Schultz JR  42, 49, 113
- Schulte A.  56, 64, 77
- Schumer M.  116
- Schumm MR  38
- Schurch RA  182
- Schwab R.  40
- Schwalb H.  75
- Schwaia T  108
- Schweal A.  54
- Schwalm MAB  100
- Schwaner J.  86
- Schwaner MU  73, 98, 133
- Schwaner SJ  137
- Schwartz ML  50
- Schwartz T  55
- Schwartz TS  61, 69
- Schwar D.  99
- Schwarz R.  30
Author Index

Schweikert LE ...................... 76, 127
Schweizer RM ................. 46, 64, 69
Schwenk K ....................... 67
Scibelli AE ...................... 71, 82
Scobell SK ....................... 80
Scoggin N ....................... 45
Scollack JA ...................... 111
Scott BR ......................... 47
Scott Chialvo C ............... 37
Scott E .......................... 96
Scott J .................. 56, 109
Scott-Elliston A ............. 32
Sears K ....................... 29, 100
Sears MW ...................... 68, 98
Seaver EC ...................... 41, 112
Sebright Z ...................... 66
Secor SM ....................... 53, 67, 85, 114, 117
See MJ ...................... 125
Seetharaman K .............. 84
Sefati S ....................... 31
Segre PS ....................... 35, 114, 122, 124
Seidell P ....................... 125
Seim RF ....................... 109
Seis C .......................... 42
Seitz KW ....................... 91
Seitz T ....................... 40, 116
Sekits N ....................... 78
Sekits NF ....................... 53
Seleb B ........................ 85
Sellers KC ..................... 67, 105
Semanchik P ................. 51, 82
Semel MA ..................... 55
Semro MR ..................... 55
Senatore A ..................... 36
Seneviratne G .............. 41
Senner NR ...................... 69, 105
Sentivhasan S ............... 115
Sepers B ....................... 28
Serb JM ....................... 36
Serba KM ...................... 49
Sermersheim LO .......... 55, 81
Seroy SK ........................ 111, 117, 135
Serra Martinez A .......... 92
Serrano-Rojas S ........... 81
Sessions AL .................... 29
Seth D ....................... 72, 73
Setton EVW .................. 66, 71
Sevigny JL .................... 43, 88
Sewell KB .................... 52, 69, 75, 111
Sforfino T ...................... 84
Shafer ABA .................... 125
Shah AA ....................... 63
Shaikh S ....................... 59
Shamble P ..................... 37
Shampay J ...................... 116
Shankar A ...................... 40, 116
Shannon ES .................... 84, 98
Shannon RP ..................... 87
Shapiro LJ ...................... 86
Shapiro MD ..................... 51
Sharabi L ....................... 98
Sharbrough J ................ 91
Sharkey CR .................... 34, 49
Sharma PP ..................... 44, 66, 71
Sharma VP ..................... 73
Sharp S ......................... 111
Sharp V ......................... 37
Sharpe SL .................... 36, 64
Shaw J ......................... 30
Shawkey MD .................. 132
Shea EK ....................... 118
Shea-Vantine CS ........... 53
Shearer B ...................... 41
Sheedy MD ..................... 39
Sheehan MJ ................... 38
Shehaj A ....................... 86
Sheikh A ....................... 92
Shelburne EC .................. 52
Sheldon KS ..................... 94, 99
Sherratt E ...................... 64
Sherry DF ..................... 38, 127
Shields-Estrada AK .......... 65
Shliki NJ ....................... 18
Shilling AJ ...................... 27, 77
Shin SRU ....................... 69
Shine R ......................... 28
Shinkle JR ..................... 55
Shipley JR ..................... 55
Shipley MM .................... 51, 55, 56
Shore A ......................... 75
Short C ......................... 113
Short RA ..................... 102, 117
Shorter KA .................. 134, 135
Shough AE ..................... 38
Shrestha S ............... 41, 62
Shyamal S ..................... 112
Sibley AL ...................... 80
Sickles J ....................... 132
Siddall RJD .................. 80
Siddiqui SG .................... 68
Sidebottom RB ............... 77
Sidlauskas BL .............. 133
Sidor C ......................... 62
Sidor CA ....................... 130
Sieber KR ...................... 116
Sies W ......................... 28
Siethman BE .................. 78
Sikandar UB .................. 103
Sikkink K ....................... 105
Silcox MT ....................... 47
Siler CD ......................... 53, 92
Sillah A ......................... 100
Sillet TE .................... 108
Silver MA ...................... 83, 109
Silver MAP ..................... 45
Silverthorn DU .............. 36, 188
Silverstre F .................. 28
Simandle ET .................. 98
Simberloff D .................. 126
Simmons NB .................. 64
Simoes BF ...................... 78
Simon MN ..................... 94, 107
Simontis LE .................. 126
Simons AM .................... 78, 124
Simpson DY .................. 61
Simpson RK .................. 131
Simpson S ...................... 43, 88
Singh A ......................... 56
Singh H ......................... 77
Singh K ......................... 87
Sinkiewicz DM ............. 59
Sipkema D ...................... 66
Sirotk LK ....................... 59
Sirovy KA ...................... 64, 104
Sisneros J ..................... 82
Sisneros JA .................. 82, 127, 128
Sisson Z ..................... 96
Siit M ...................... 134
Skanawicz I .................. 100
Sjoblom NP .................. 81
Skelton Z ....................... 43
Skelton ZR ................... 84
Skeeniczykl KS ............... 53
Skutt-Kakaraj KJ .......... 38
Slama SL ....................... 39
Slattery JD ..................... 51
Sloboda DA ................... 35, 95
Slevin MC ....................... 32
Slezacek J ..................... 83, 85
Sliummings R ............... 104
Smaers JB ..................... 79
Small TW .................... 131
Smedley GD .................. 36
Smiley J ....................... 35
Smith AJ ......................... 63
Smith B ......................... 65
Smith C ......................... 51
Smith CF ......................... 72
Smith CH ......................... 78
Smith CR ......................... 27
Smith D ......................... 101
Smith EN ....................... 48, 78, 79
Smith FW ......................... 57
Smith GD ......................... 68
Smith HJ ......................... 114
Smith J ......................... 87
Smith JJ ......................... 111
Smith KE ......................... 77
Smith MB ...................... 28, 54
Smith MG ......................... 130
Smith NM ......................... 30
Smith R ......................... 62
Smith SK ......................... 52
Smith SM ...................... 28, 98, 124
Smith T ......................... 83
Smith TR ......................... 109
Smolikt RC ...................... 105
Smootherman MS .............. 134
Snyder-Mackler N .......... 122
Soares D .................. 49, 125
Socha JJ ...................... 30, 92, 115, 116
Soini HA ......................... 106
Sollie SE ......................... 49
Sollis GM ......................... 111
Solla AL ......................... 121
Solomon-Lane TK ............ 115
Somma K ......................... 102
Somble A ......................... 98
Somjee U ......................... 34
Song H ......................... 132
Song J ......................... 40
Soper DM ....................... 45
Sorge M ......................... 49
Sorlin MV ....................... 34, 69
Sord Analysis .................. 32
Sosa JRR ......................... 77
Soto AP ......................... 126
Soto D ......................... 136
Soto PL ......................... 113
Spagna JC ................... 44, 52
Spaniac M ..................... 113
Speck T ......................... 60
Speers-Roesch B ............ 105
Spieker DI ................... 36, 44, 49,
Stadtmann M .............. 66, 67, 75, 77
Spelet A ......................... 40
Spence JM ...................... 125
Sperzel ZE ....................... 71
Spierer AN ...................... 127
Spinell A ....................... 46
Spinelli JMC ................... 78
Spitz F ......................... 74, 137
Spongberg N .................. 31, 40, 95,
Spongberg SN ................. 73
Sprayberry JHH ................ 107
Square TA ....................... 61
Sreensavan A .................. 30
Srinivas A ....................... 119
Srivastava M ................... 45, 66
Srygley RB .................. 94
St. John ME ...................... 132
St. John P ....................... 109
St. Mary CM ................. 72
St. Pierre R ....................... 42, 105
Stadtmann RC .................. 98
Staebler M ....................... 38
Stager M ....................... 97, 105
Stahlhammer BRZ ........... 68, 84, 109, 119
Stander R ....................... 119
Stanizzi DA ...................... 70
Stankovich T .................. 79
Stanley E ......................... 128
Stanley EL ....................... 33
Stanton DW ..................... 86
Stanton M ....................... 136
Staples A ......................... 41
Stapel AE ....................... 82, 100
Stapp C .......................... 79
Stark AY ...................... 35, 59, 85, 87, 134
Stayton J ......................... 63
Stayton Jr ....................... 63
Stechmann NR .............. 136
Stein JR ......................... 98
Stevens DR ....................... 79, 81
Author Index

Taboada C... 127
Tadic Z... 106
Tait CC... 68, 126
Taft BN... 115
Taft C... 48
Taft NK... 115
Tait C... 110
Talal S... 81, 133
Talbot WA... 74
Talbot KM... 106
Tallackson H... 33
Tan W... 110
Tang C... 116
Tang Y... 114
Tangora JL... 72
Tankawa A... 134
Tanner RL... 54, 123
Tao J... 114
Tapsak S... 84
Tapsak ST... 51, 84
Tarashansky AJ... 137
Tardeli Canedo P... 46
Tarrant AM... 71, 84, 116
Tassia MG... 37, 74, 110
Tate KB... 114
Taylor BK... 49
Taylor E... 102
Taylor EN... 74
Taylor GK... 30, 73
Taylor I... 103
Taylor J... 36
Taylor JRA... 66
Taylor LA... 111, 116
Taylor LD... 73, 102
Taylor MS... 130
Taylor SA... 78
Teaford MF... 92
Teepel JB... 83, 109
Teets N... 106
Teets NM... 37, 64, 10, 123
Teixeira MM... 100
Teixeira RV... 55, 66, 107, 124
Telemeco R... 61
Tellez-Gomez QM... 109
Temazas M... 51
Tewksbury C... 54
Tew VH... 70

Tschelin T... 51, 80, 81, 84, 116
Tse A... 53
Tsukimura B... 96
Tsursanik M... 127
Tucker AS... 28, 130
Tucker B... 49
Tucker DB... 92
Tucker EL 30, 136
Tucker VL... 124
Tuckett OM... 108
Tuero D... 60, 128
Tuffield MS... 78
Tun TC... 134
Tung J... 117
Tunnell Wilson WT... 53, 78
Turner AH... 79
Turner M... 50, 119
Tutkewicz P... 108
Turiel M... 127
Tytell E... 100
Tytell ED... 42, 52, 13, 7, 100, 119, 134

Ucciferri C... 127
Uehling JJ... 126
Uhrman MJ... 110
Ujhegyi N... 70
Ujhegyi N... 109
Ullal-Orshikh N... 51
Uma S... 136
Umbanhowar J... 75
Author Index

V

Valadez J.................83
Valencia MM..........86
Valenti A.............68
Valle PF..............112
Van Breugel F........83
Van Breukelen NA....48
Van Kesteren F......48, 97
Van Kleunen M........35
Van Kruistum H......41
Van Oers K..........28
Van Oosterhout C....74
Van Oppen MJH......70
Van Sant MJ........84
Van Wasserbergh S...125
Van Wert JC...........36
Vandenberg P........116
Vandennebrooks JM...68, 96
Vandepas LE........124
Vandiest U...........75
Vargas C............46, 116
Vargas M.............29
Vargas R.............68
Varney RM.........44, 46, 66, 77, 129
Vasquez C...........123
Vasquez E..........83
Vaughan D...........45
Vavlov NE..........47
Vaz DF..............135
Vaz RI..............55
Vazquez O..........40
Vazquez S...........99
Vazquez-Medina JP...128
Vega CM............95
Vega K..............87
Veglia AJ.......69
Vela S..............107
Velotta JP...........64
Venkadesan M......95, 115
Ventura D...........70
Venuto A...........49
Verbeck GF........66
Verble RM..........131
Verhagen I..........28
Verheist P...........93
Verhoeven KJF......28
Verma S.............134
Vernasco BJ........52, 96, 131
Vetter BJ.............128
Vick CP................86
Viemes RC............48, 127
Vieiro GB.............47
Vietnami H.........28
Villette-Pacheco Z...72
Villarreal N...........45
Vinnerstedt J......68
Vinauger C.........67, 68
Vinkler M..........111
Vinson A.............81
Vinyard CJ...........92
Violuet E.............54
Virgin EC...........111
Virgin EV.............68
Visser M.............28
Vitek NS.............61
Vitousek MN.........39, 68, 126
Vo CP................109
Voegele GM.........107
Voisn AS.............28
Voisin D...........50
Von Hagel AA.......116
Von Hippel FA.......80, 132
Von Holle B........99
Vuu E.............106

W

Wacker DW.............51
Wada H.........55, 83, 102
Wade J..........51
Wade K.........80
Wagener C......64, 110
Wagener GP.......96
Wagener J........44
Wagner JM........33
Wagner ND........125
Wagner R.........55
Wainwright DK......50, 53, 61
Wainwright P......94, 123, 129
Wainwright P......54, 108
Wainwright PC......33, 53, 62
Watts A..........117
Watts DS...........37, 46, 110, 113
Wakeling JM......95, 105
Waladrop LD........115, 122
Walker J..........87
Walker JA..........67
Walker N...........98
Walker NJ..........55
Walker SM..........73
Walkowicz L......126
Walkowski WG.......49
Wall CB..............75
Wallace KJ..........16
Walters JR...........110
Walters LJ...........50, 54
Wan KY.............103, 129
Wang B...........132, 137
Wang C.............27
Wang J.........72, 129
Wang JY..........116
Wang S...........79, 116
Wang SY.............81
Wang T.............71
Wang Y..............32, 49, 95
Wang Z.............69
Ward AB.........92, 114
Ward DL............93
Ward J.............36
Ward MP..........33
Ward RS..........78
Wardill TJ.........49, 75
Wargin AH.........125, 133
Warkentin K.......44
Warkentin KM......80, 81, 117, 130
Warme R.........32
Warme RW.........40, 55, 98, 110
Wanner DA.........46, 56, 79
Wanner ME.........70
Waren S..........63
Wasserman S.......49
Wasserman SM....82
Watanabe A.......79
Watanabe J.......78
Waters JK.........74
Watson CM......37, 84, 131
Watson KS.........87
Watson ST.........118
Webb JF............107, 115, 127
Webb SJ............66
Webber M..........98
Webber RL.........81
Weber AC.........74
Weber AM.........116
Weber CJ.........32
Weber DA.........129
Weber HM.........129
Weber JN.........106
Weber WD.........113
Webster M........136
Webster MS........175
Weed M.............96
Weese DA...........91
Wegele MG.........45
Wegener NC........43, 84
Wegzryn F.........127
Wehling MF.........49
Wehling SA........106
Wei L..............130
Weier D..........111
Weils HS...........96
Weinberg M........68
Weisblatt DA........135
Weishampel JF......99
Weiss A.............113
Weiss TM............116
Weitkamp CA.......117
Weitzman CL........106
Weitner EL.........95
Weich J.............50
Weich KC.........105, 106
Weikel JD.........82, 83, 116
Welles B...........30, 86, 134
Welkin JF.........75
Weller HI.........28, 34, 54, 67, 98
Wells TH..........35
Wendl P...........130
Weng J..........118
Wenner J.........69, 118
Wernher AJ.........35
Wesche LA.........69
Wessinger CA.......35
West J...........115
West JV..........53
Westman EL.......131
Westgate AJ.......130
Westneat MW.......64, 67, 71
Wetley JD............78
Wetzel DP...........74
Wheat CW...........112
Wheatley R.........52
Wheeler BR.........126
Wheeler CR.........31
Wheeler WC.........71
Whelen NV.........46, 104
Whelan S.........127
Whiles MR.........40
Whitaker DL........60
White C...........129
White CF.........42
White CH...........129
White HE.........130
White JK.........70, 80, 117
White LD.........73
Whitehead JG.......30, 116
Whitenack LB.......118
Whiteis CA.........45
Whitford MD.......34, 98
Whitlow KR......101, 104
Whitlow SM.........37
Whitman S.........112
Whitmer E.........95
Whitney NM.......42
Whittaker D.........106
Whittall JB........112
Whittemore KS.......83, 109
Whittingham LA.....47
Whorsky S.........95
Wiebe P.............42
Wieczorek P........66
Wiesenberg J......32
Wijffels RH.........68
Wijker RS.........29
Wikeliski M........42, 82
Milberg EW.........79
Wilburn PA.........109
Wilcoxen TE.........125
Wilczynski W........136
Wild L.............30
Wildler SM..........63
Wilga CD.........135
Wilken AT.........105
Wilkinson K.......54
Williams A.........98
Williams AS.......46, 104
Williams C........62, 83, 116
Williams CD........30, 86, 134
### Author Index

<p>| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |</p>
<table>
<thead>
<tr>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Williams DA</td>
<td>39, 62</td>
</tr>
<tr>
<td>Wolf CJ</td>
<td>37, 133</td>
</tr>
<tr>
<td>Williams TM</td>
<td>43, 127</td>
</tr>
<tr>
<td>Williamson C.J.</td>
<td>52, 137</td>
</tr>
<tr>
<td>Willis KL</td>
<td>47</td>
</tr>
<tr>
<td>Will MA</td>
<td>101</td>
</tr>
<tr>
<td>Willis PS</td>
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<td>Wilson A</td>
<td>56, 73, 81</td>
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<tr>
<td>Wilson AB</td>
<td>39, 62</td>
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<td>47</td>
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<td>53</td>
</tr>
<tr>
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<td>132</td>
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<td>39, 62</td>
</tr>
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<td>67</td>
</tr>
<tr>
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<td>92</td>
</tr>
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<td>119</td>
</tr>
<tr>
<td>Windsor SP</td>
<td>40, 100</td>
</tr>
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<td>108</td>
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<td>75</td>
</tr>
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<td>39</td>
</tr>
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<td>40, 97</td>
</tr>
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<td>Winkler DW</td>
<td>126</td>
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<tr>
<td>Winshing H</td>
<td>56</td>
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<tr>
<td>Wisen SD</td>
<td>51</td>
</tr>
<tr>
<td>Wissa AA</td>
<td>40, 42</td>
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<td>110</td>
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<td>78</td>
</tr>
<tr>
<td>Wittman T</td>
<td>47, 106, 107</td>
</tr>
<tr>
<td>Wittman TN</td>
<td>47</td>
</tr>
<tr>
<td>Woford SJ</td>
<td>50, 131</td>
</tr>
<tr>
<td>Wohlbach AW</td>
<td>87</td>
</tr>
<tr>
<td>Wold ES</td>
<td>35, 95</td>
</tr>
<tr>
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<td>43, 74, 94, 105, 108</td>
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</tr>
<tr>
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<td>69, 108</td>
</tr>
<tr>
<td>Wolf SE</td>
<td>36, 102</td>
</tr>
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<td>112</td>
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<td>59</td>
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<td>65, 73</td>
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<td>55, 81</td>
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<td>49, 62</td>
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<tr>
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<td>27, 74, 83</td>
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<td>Woods JL</td>
<td>118</td>
</tr>
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<td>Woolfolk FR</td>
<td>53</td>
</tr>
<tr>
<td>Worm A</td>
<td>60</td>
</tr>
<tr>
<td>Worrell TA</td>
<td>30, 116</td>
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<td>104</td>
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<td>46</td>
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<td>67</td>
</tr>
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<td>Wright MA</td>
<td>51, 105</td>
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<td>132</td>
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<td>88</td>
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<td>87</td>
</tr>
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<td>119</td>
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<td>52</td>
</tr>
<tr>
<td>Wyneken J</td>
<td>52, 78, 92, 96, 98</td>
</tr>
<tr>
<td>Wynne N</td>
<td>68</td>
</tr>
<tr>
<td>Wynne NE</td>
<td>67</td>
</tr>
<tr>
<td>Wynne-Edwards KE</td>
<td>129</td>
</tr>
<tr>
<td>Xargay E</td>
<td>134</td>
</tr>
<tr>
<td>Xavier C</td>
<td>31, 112</td>
</tr>
<tr>
<td>Xia S</td>
<td>51</td>
</tr>
<tr>
<td>Xiong D</td>
<td>101</td>
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<td>Xu K</td>
<td>112</td>
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</tr>
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<td>137</td>
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<td>39, 62</td>
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<td>80</td>
</tr>
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<td>Yacoo KE</td>
<td>109</td>
</tr>
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<td>Yamada K</td>
<td>98, 124</td>
</tr>
<tr>
<td>Yamada KY</td>
<td>51, 83</td>
</tr>
<tr>
<td>Yaney PH</td>
<td>47</td>
</tr>
<tr>
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<td>135</td>
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<tr>
<td>Yang Y</td>
<td>31, 72</td>
</tr>
<tr>
<td>Yang ZY</td>
<td>106</td>
</tr>
<tr>
<td>Yanovik SP</td>
<td>59</td>
</tr>
<tr>
<td>Yap KN</td>
<td>83, 98, 124, 133</td>
</tr>
<tr>
<td>Yap N</td>
<td>46</td>
</tr>
<tr>
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<td>44</td>
</tr>
<tr>
<td>Yarger AM</td>
<td>63</td>
</tr>
<tr>
<td>Yaw A</td>
<td>61</td>
</tr>
<tr>
<td>Yekel JG</td>
<td>37</td>
</tr>
<tr>
<td>Yeh SY</td>
<td>49</td>
</tr>
<tr>
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<td>36</td>
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<td>77</td>
</tr>
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<td>48</td>
</tr>
<tr>
<td>Yocum GD</td>
<td>105</td>
</tr>
<tr>
<td>Yoerger D</td>
<td>42</td>
</tr>
<tr>
<td>Yohannan K</td>
<td>115</td>
</tr>
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<td>Yohe LR</td>
<td>100</td>
</tr>
<tr>
<td>Yopak KE</td>
<td>31</td>
</tr>
<tr>
<td>York JM</td>
<td>128, 131</td>
</tr>
<tr>
<td>Yorinisi J</td>
<td>131</td>
</tr>
<tr>
<td>Youatt E</td>
<td>131</td>
</tr>
<tr>
<td>Young BA</td>
<td>29, 82, 115</td>
</tr>
<tr>
<td>Young C</td>
<td>38</td>
</tr>
<tr>
<td>Young IR</td>
<td>62, 116</td>
</tr>
<tr>
<td>Young JN</td>
<td>27</td>
</tr>
<tr>
<td>Young JW</td>
<td>86, 137</td>
</tr>
<tr>
<td>Young RL</td>
<td>38, 83, 101, 116, 117</td>
</tr>
<tr>
<td>Young SP</td>
<td>106</td>
</tr>
<tr>
<td>Young VKH</td>
<td>48, 85</td>
</tr>
<tr>
<td>Youngblood J</td>
<td>81</td>
</tr>
<tr>
<td>Yousefaliyeh M</td>
<td>110</td>
</tr>
<tr>
<td>Yousef NH</td>
<td>63</td>
</tr>
<tr>
<td>Yousef K</td>
<td>127</td>
</tr>
<tr>
<td>Yovel Y</td>
<td>60, 68</td>
</tr>
<tr>
<td>Yuan I</td>
<td>69</td>
</tr>
</tbody>
</table>
Dr. Stoddard won this year’s award for her broad, interdisciplinary and innovative research in the evolution of color vision.
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