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3-7 January 2022
Phoenix, Arizona
3-7 January 2023
Austin, Texas

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• The guidance of international Editorial Boards.
Welcome to SICB 2021
Message from the President

Welcome to SICB’s first ever virtual meeting! In these uncertain times it has been an enormous pleasure to see the superb abstracts submitted for SICB 2021. Great science is the hallmark of our annual meetings, and despite everything, this year is no exception!

I’m sorry not to get to see everyone in person this year, but I’m also excited about the opportunities offered by a virtual meeting. We have decided to break out of the typical 5-day meeting format and run SICB 2021 over a two month period from January 3rd to February 28th. The goal is to maximize participation by offering flexibility for people attending from time zones worldwide and for all of us who have exceptional family, personal and professional challenges this year.

Our guiding principles in designing the virtual meeting have been: (1) to capture the spirit, scientific value, and networking value of our in-person meetings, (2) to embrace this digital format as an opportunity to broaden the reach of SICB and make our community more accessible and inclusive for all scientists and students, and (3) to offer many ways to participate in the meeting at your own pace and schedule over an extended period during January and February.

The first five days of the meeting will be the most intense, with live-streaming symposia, student prize sessions and plenary events. These will all be recorded for on-demand viewing. Contributed oral and poster presentations will be available on demand throughout the two month period and there will be extensive opportunities for “live” (Zoom) interactions as well as text-based chat conversations. SICB has selected Pathable as the virtual meeting platform for SICB 2021 with integrated Zoom for webinars and meetings. No platform has all of the features we would like, but we think Pathable is the best for promoting exciting interactions and networking opportunities across the two months of SICB 2021.

In short, SICB 2021 is still your SICB meeting with the same outstanding science, but with more flexibility and opportunities for broader participation.

Beth Brainerd
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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

PLATINUM

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Special Lectures

Opening Plenary
Dr. Cassandra Extavour
Sunday 3 January,
12:00 PM – 1:30 PM
Impact and discovery: extreme movement in an interdisciplinary and political world

Gans Award Address
Dr. Martha Muñoz
Sunday 3 January,
7:00 PM – 7:30 PM
‘Constraint’, a double-edged sword for evolution

Bartholomew Lecture
Dr. Roslyn Dakin
Monday 4 January,
12:30 PM – 1:30 PM
The scaling of behavior: insights into competitive and cooperative systems

Moore Lecture
Dr. Claude Steele
Thursday 7 January,
12:30 PM – 1:30 PM
Stereotype threat and identity threat: The science of a diverse community

Bern Award Lecture
Dr. Michaela Hau
Wednesday 5 January,
12:30 PM – 1:30 PM
Hormone-mediated phenotypic plasticity: is there an optimal hormonal phenotype?
Symposia

Monday 4 January
S1: Blinded By the Light: Effects of Light Pollution Across Diverse Natural Systems
S2: Genomic Perspectives in Comparative Physiology of Mollusks: Integration Across Disciplines
S3: Physical Mechanisms of Behavior

Tuesday 5 January
S4: Biology Beyond the Classroom: Experiential Learning Through Authentic Research, Design, and Community Engagement
S5: An Evolutionary Tail: Evo-Devo, Structure, and Function of Post-Anal Appendages
S6: Spatiotemporal Dynamics of Animal Communication

Wednesday 6 January
S7: The Integrative Biology of Pigment Organelles
S8: The Biology of Sticky: Adhesive Silk, Fiber, and Glue Biomaterials Across Eukaryota
S9: Sending and Receiving Signals: Endocrine Modulation of Social Communication

Thursday 7 January
S10: Metachronal Coordination of Multiple Appendages for Swimming and Pumping
S11: Biology’s Best Friend: Bridging Disciplinary Gaps to Advance Canine Science
S12: Manakin Genomics: Comparative Studies of Evolution And Behavior an a Unique Clade of Birds

Best Student Presentations

Sunday 3 January
BSP-1: DAB Best Student Presentation: Marlene Zuk Award
BSP-2: DCB Best Student Presentation: Mimi A.R. Koehl and Steven Wainwright Award; Gans Award Address
BSP-3: DCE Best Student Presentation: Aubrey Gorbman Award
BSP-4: DEDB Best Student Presentation
BSP-5: DEDE Best Student Presentation
BSP-6: DEE Best Student Presentation: Huey Award
BSP-7: DIZ Best Student Presentation: Mary Rice Award
BSP-8: DNNSB Best Student Presentation
BSP-9: DOB Best Student Presentation: Rising Star in Organismal Botany Award
BSP-10: DPCB Best Student Presentation: Wake Award
BSP-11: DVM Best Student Presentation: D. Dwight Davis Award
Dr. Dakin won this year’s award for her impressive breadth of research ranging from biomechanics to behavior and endocrinology to morphology.

We look forward to her lecture entitled “The scaling of behavior: insights into competitive and cooperative systems”.

The lecture will be 12:30 PM EDT on Tuesday, January 5, 2021.
Special Events

Wednesday 6 January
Open Conversation about SICB and Events in DC
5:30 PM – 6:00 PM

Thursday 7 January
Can We Talk 2: “White Allies”
1:00 PM – 2:10 PM
We invite all to view a special screening of the film Can We Talk 2: “White Allies”. This film, hosted by the Broadening Participation Committee, is a follow-up to last year’s screening of Can We Talk: Difficult Conversations with Underrepresented People of Color on Allyship in STEM. Can We Talk 2: “White Allies” explores the issue of sense-of-belonging in STEM for underrepresented people of color (UR-POC) and focuses on the complexity of allyship, offers different strategies for supporting UR-POC, and emphasizes the importance of cultural humility. Please join filmmaker Dr. Kendall Moore (from the University of Rhode Island) for this screening of “White Allies”. Also, please join us for one of three brief hour-long discussions that Dr. Moore will facilitate.

Open Conversation about the events in DC
3:30 PM – 4:00 PM
Please join the SICB leadership for a town-hall conversation about the events in Washington DC and their impact on SICB 2021. This will be a Zoom meeting (not a webinar) where everyone is invited to unmute themselves and speak.

Discussion on Allyship
7:00 PM – 8:30 PM

Open Conversation about the events in DC
7:30 PM – 8:00 PM

Wednesday 13 January
Ask An Expert: Help with R stats, comparative methods, and trait evolution
4:30 PM – 6:30 PM

Friday 15 January
A Conversation: Support and Sense of Belonging in STEM
1:00 PM – 2:00 PM
“White Allies” explores the issue of sense of belonging in STEM for underrepresented people of color (UR-POC) and focuses on the complexity of allyship, offers different strategies for supporting UR-POC, and emphasizes the importance of cultural humility. Attendance is limited to 75.

A Conversation on Intersectionality in STEM
5:00 PM – 6:00 PM
“White Allies” explores the issue of sense of belonging in STEM for underrepresented people of color (UR-POC) and focuses on the complexity of allyship, offers different strategies for supporting UR-POC, and emphasizes the importance of cultural humility. Attendance is limited to 75.

Tuesday 19 January
Ask An Expert: R Stats, Morphometrics, Multivariate Analysis, Trait Evolution
4:30 PM – 6:30 PM

Thursday 21 January
Ask An Expert: Genetics, Genomics, Ancient DNA, Bioinformatics
4:30 PM – 6:30 PM

Tuesday 26 January
Ask An Expert: Anatomical Imaging (CT scanning, diceCT, image segmentation)
4:30 PM – 6:30 PM

Friday 26 February
Evolution and Biogeography of Islands: A Session in Honor of Dr. Vicki Funk
12:00 PM – 2:30 PM

Saturday 27 February
Honoring the Life and Legacy of Dr. George Gilchrist: Evolution, Evolution, and Physiology
10:15 AM – 3:30 PM
Meetings

Thursday 7 January
TCS Board Meeting
10:00 AM – 2:00 PM

Society-Wide Member Meeting
12:00 PM – 1:00 PM
Join us for our annual society-wide member meeting. In today’s meeting we’ll present some happy SICB 2021 meeting statistics and open the floor for questions in the Chat box. All questions for the SICB leadership will be welcome.

Friday 8 January
TCS Member Meeting
10:00 AM – 11:00 AM

DEE Member Meeting
12:00 PM – 1:00 PM

AMS Executive Committee Meeting
1:00 PM – 3:00 PM

DCB Member Meeting
1:00 PM – 2:00 PM

DAB Member Meeting
2:00 PM – 3:15 PM

DCE Member Meeting
3:00 PM – 4:15 PM

DVM Member Meeting
4:00 PM – 5:00 PM

Monday 11 January
DIZ Member Meeting
2:00 PM – 3:15 PM

DOB Member Meeting
3:00 PM – 4:15 PM

Tuesday 12 January
AMS Member Meeting
4:00 PM – 5:15 PM

Wednesday 13 January
DNNSB Member Meeting
12:00 PM – 1:15 PM

DPCB Member Meeting
1:00 PM – 2:15 PM

DEDB Member Meeting
2:00 PM – 3:15 PM

Thursday 14 January
DCPB Member Meeting
3:00 PM – 4:15 PM

Tuesday 19 January
DEDE Member Meeting
2:00 PM – 3:15 PM

Monday 25 January
Division Secretaries Meeting
11:00 AM – 12:30 PM

Executive Committee Meeting #1
1:00 PM – 4:00 PM

Tuesday 26 January
IOB Editorial Board Meeting
10:00 AM – 11:00 AM

Student/Postdoctoral Affairs Committee Meeting
12:00 PM – 1:30 PM

Educational Council Meeting
1:00 PM – 4:00 PM

Wednesday 27 January
Membership Committee Meeting
12:00 PM – 1:00 PM

Broadening Participation Committee Meeting
1:00 PM – 2:00 PM

Society-wide Member Meeting
2:00 PM – 3:15 PM

Development Committee Meeting
3:00 PM – 4:30 PM

Thursday 28 January
Student Support Committee Meeting
11:00 AM – 12:30 PM

Public Affairs Committee Meeting
1:00 PM – 2:30 PM

Division Chairs, President/President-Elect Meeting
1:00 PM – 2:00 PM

POs, ICB editor and Symposium Organizers for SICB 2022 Meeting
2:00 PM – 3:30 PM

Advisory Committee Meeting
3:00 PM – 4:00 PM

Friday 29 January
Nominating Committee Meeting
2:00 PM – 3:30 PM

Monday 22 February
Executive Committee Meeting #2
1:00 PM – 3:00 PM

Sunday 28 February
Closing Ceremony
1:00 PM – 2:00 PM
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Our journals
Socials

Saturday 2 January
Outgroup LGBTQIA+ Social
8:00 PM – 9:30 PM
You’re invited to our annual Outgroup LGBTQIA+ social! Come join us to connect with other LGBTQIA+ SICB members for casual conversations.

Friday 8 January
DAB Social
3:00 PM – 4:30 PM
DPCB Social
3:00 PM – 5:00 PM
DCB-DVM Social
5:00 PM – 7:00 PM

Saturday 9 January
Game time! Trivia
5:00 PM – 7:00 PM
The PAC invites you to celebrate the weekend with fun online games with PAC and fellow SICB members! Each Saturday we’ll play different games, including Celebrity, Dungeons & Dragons, Werewolf/Mafia, Jackbox games and more! Steam Remote Play will be used for some of these events. Individual events will be announced during the live conference dates (Jan 3-8).

Saturday 16 January
Game time! DnD
5:00 PM – 7:00 PM

Tuesday 19 January
DEDE Social
3:00 PM – 5:00 PM

Wednesday 20 January
DEDDB Social
1:00 PM – 2:00 PM

Saturday 23 January
Game time! Jackbox Games/Among US
5:00 PM – 7:00 PM

Friday 29 January
DEE - Division of Ecology & Evolution Social
12:00 PM – 1:00 PM

Saturday 30 January
DCB-DVM Social Version 2.0
3:00 PM – 5:00 PM
Game time! Werewolf/Mafia Among Us
5:00 PM – 7:00 PM

Saturday 2 February
Game time! SICB Trivia *BIPOC NIGHT*
5:00 PM – 7:00 PM

Saturday 13 February
Game time! DnD (Valentine)
5:00 PM – 7:00 PM

Friday 19 February
DNNSB Social
5:00 PM – 7:00 PM

Saturday 20 February
Game time! Jackbox Games
5:00 PM – 7:00 PM

Saturday 27 February
Game time! Werewolf/Mafia
5:00 PM – 7:00 PM

Sunday 28 February
End of SICB Society-wide Social
2:00 PM – 4:00 PM
Workshops

Wednesday 6 January

PAC Wellness Wednesdays - Chaos, A People’s Medicine
1:30 PM – 2:00 PM
What is resilience in the face of disastrous, unpredictable and unprecedented change? What happens when our epistemologies, our scientific rationality, our understanding of the known universe is not diverse enough to serve and predict those things which stare us in the face causing us to bow to their power? In this workshop, we will explore herbal medicine as people’s medicine and come to terms with chaos as we move forwards in this new reality.

Tuesday 12 January

Setting up a small animal respirometry system
4:00 PM – 6:00 PM
Respirometry is a versatile and powerful tool that can seem complicated until you try it. In this video, we will set up a basic respirometry system and explain the principles that go into system design.

Wednesday 13 January

PAC Wellness Wednesdays - Simple and Effective Practices for Digital Wellness
1:30 PM – 2:00 PM
COVID-19 and working from home have resulted in more time spent on our devices, leading to increased digital distraction and stress. In this 30-minute workshop you will learn concrete, simple changes you can make to your digital environment to reduce distraction and work more efficiently; as well as short, effective practices you can do throughout your screen-filled day to modulate your nervous system toward desired states of calm, focus, and creativity.

Friday 15 January

Transferrable skills in academia and non-academia
12:00 PM – 1:30 PM
Whatever career students and postdocs from biological backgrounds choose, there are often transferrable skills that can help them along in that career, and it helps to know in advance what those skills are so they can be incorporated into training, or emphasized more, where possible. This SPDAC workshop will bring together experts from diverse fields to first hold a panel discussion of what transferrable skills are in different fields, and then have “breakout sessions” focused on their particular fields so that students and postdocs can have discussions focused on careers and skills (and how to match them).

Engaging in local policy and government
3:00 PM – 4:00 PM
Increasingly, the decisions made by local government are of a scientific nature. However, it can be difficult for local governments to obtain the scientific expertise necessary to evaluate complicated scientific issues. Members of SICB can help to fill this gap by engaging in local government. This workshop will cover determining avenues of engagement locally, the best way to communicate with local policy makers, and how to run for office yourself.
Workshops

Tuesday 19 January

**NSF updates with program officers**
3:00 PM – 4:30 PM
Come join this workshop to learn about NSF funding opportunities, integrative research and education, and Q&A with NSF staff.

Wednesday 20 January

**PAC Wellness Wednesdays - Simple and Effective Practices for Digital Wellness**
11:00 AM – 11:30 AM
COVID-19 and working from home have resulted in more time spent on our devices, leading to increased digital distraction and stress. In this 30-minute workshop you will learn concrete, simple changes you can make to your digital environment to reduce distraction and work more efficiently; as well as short, effective practices you can do throughout your screen-filled day to modulate your nervous system toward desired states of calm, focus, and creativity.

Thursday 21 January

**A Natural Historian’s Guide to the CT Galaxy: Step-by-Step Instructions for Preparing and Analyzing Computed Tomographic (CT) Data Using Cross-Platform, Open Access Software**
1:00 PM – 4:00 PM
In this workshop, we present a workflow for working with computed tomographic (CT) data using free, open source, cross-platform software. We provide step-by-step instructions that start with acquiring CT data from an imaging center or open access repository, and progress through visualizing, measuring, landmarking, segmenting, and constructing digital 3D models of anatomical structures. We also include instructions for digital dissection, data reduction, and exporting data for use in downstream applications such as Finite Element Analysis or 3D printing. The workshop is especially designed to guide participants with little to no previous experience in working with CT data, but will be useful to any researcher who is interested in learning to work with CT data in the programs Fiji (ImageJ) and 3D Slicer. The workshop consists of two parts: the first is a demonstration of the steps of the workflow, where participants follow along on their own computers processing a CT scan of a fish skeleton downloaded from MorphoSource.org along with the instructor (MorphoSource ID: 15090-27349). In the second half of the workshop, participants have the option to process their own CT datasets, which they can either downloaded from an open-access repository or bring from their own work, with the instructors available for guidance and troubleshooting.

**PAC presents: Tech tools for a virtual world**
2:00 PM – 3:00 PM
Let’s face it, we’re spending a lot of time on a computer these days...more than we usually do. Learn about the tools to create a fulfilling online experience, be it teaching, hosting group events, or social gatherings. We’ll give special focus to accessibility tools such as auto-captioning, interpretation and describing visual images. This event will feature a 40-minute demonstration and a 20 minute Q&A.

**Job hunting tips and tricks: A panel discussion on finding a faculty position in Ecology and Evolutionary Biology**
3:00 PM – 4:30 PM
Navigating the faculty job search process is difficult and confusing at the best of times, and perhaps even more so with a pandemic. This workshop will feature a panel with five early career faculty from both research and teaching institutions to discuss their experiences on the job market. Bring your questions and pick the brains of five folks who’ve ‘made’ it!
**Sunday 24 January**

**Movement and science: Integrating movement arts to explore and communicate science**

12:00 PM – 5:00 PM

Movement is a fundamental part of the biological world and at the core of many art forms. Movement arts (e.g. dance, improvisation, circus, etc.) are especially well-suited for science outreach and education in diverse communities, due to their kinesthetic and deeply communicative nature. Movement can help facilitate a deeper connection to scientific ideas and concepts- making them directly relatable while building one’s physical empowerment. In this workshop participants will explore how movement arts can benefit professional science preparation and science communication at all levels (K-12, undergraduate, graduate), and develop strategies for integrating movement exercises into course modules, outreach activities, and even high-impact science communication- from online videos to full theatrical productions. Ultimately these integrative techniques have the power to span disciplines and cultures, and can help alleviate many of the diversity, inclusivity, and equity challenges that currently face STEM research and education.

In this interactive workshop, participants will engage in various movement exercises to tell science- and research-based stories, culminating in a showcase of what groups have created and recorded throughout the workshop. After an interactive discussion and overview, we will explore a series of diverse movement exercises and techniques. We will then work in groups to create original material using these techniques with specific biology foci, which will be recorded and published online. Participants will gain specific tools valuable for use in classrooms and outreach venues and will be better prepared to pursue the integration of art and science at many levels. Participants will also receive tips & tricks for keeping their bodies engaged and healthy throughout the virtual conference.

Due to the virtual nature of this workshop, exercises will focus more on small-scale movements that are especially well suited to classrooms, seated audiences, remote learning, and accessibility. However, there will be portions of the workshop when participants are encouraged to use their whole bodies, space permitting. Two follow-up sessions will be held to aid in finalizing and disseminating each participant’s creative material and successfully implementing these techniques in each participant’s work/life.

**Follow-up Session 1: Original Material.** During the main workshop, participants will be designing and creating their own movement-based material in collaborative groups. This first follow-up session will give participants an opportunity to fully peer-edit each other’s material, more deeply discuss broader impacts and design, and troubleshoot any technical needs they may have for finalizing their material.

**Follow-up Session 2: Implementation and Dissemination.** Participants will address peer-edits together and receive collaborative technical assistance in finalizing material for online (and live where relevant) use. Direct guidance and troubleshooting will be given to ensure said material can have the intended impact in whatever area participants have chosen. We will also discuss professional-development aspects and career applications of this type of creative, integrative art-science work; from CV’s and grant-writing to whole paradigm shifts in scientific research, education, and outreach.

**Wednesday 27 January**

**PAC Wellness Wednesdays – Beginner pilates**

12:00 PM – 1:00 PM

Pilates is an exercise method designed to work the whole body efficiently while building balance, control and precision. The movements are focused and deliberate towards a specific goal and require great concentration. The Pilates method was created by Joseph Pilates who began developing his method of exercise then called "Contrology" during World War One. It has since been developed to incorporate modern knowledge of the body and biomechanics into the Pilates repertoire. Tenley Spencer has been teaching Pilates since 2017. She is additionally trained in Yoga, and Personal Training which helps her approach translate to different body types. Her virtual studio Rhythms Pilates focuses on maintaining the integrity of Joseph Pilates method while meeting the needs of individual body types. Additionally, she is going through training in Somatic Breath Therapy to further aid Joseph’s "return to life" principle.
Monday 1 February

The spandrels of San Marco: The power of role-playing games to help students engage with tricky concepts
3:00 PM – 5:00 PM
Students often have difficulty engaging with or forming opinions about complex theoretical topics in biology. In this workshop, participants will learn how to address this through role-playing games. The workshop will include an actual game focused on the “Spandrels of San Marco” adaptationism debate in evolution sparked by Gould and Lewontin’s classic paper. Participants will be assigned a game role based on their responses to a pre-workshop survey, and will be expected to complete some background reading ahead of time. We’ll follow the game with a discussion of role-playing game as a pedagogical tool in science education.

Wednesday 3 February

PAC Wellness Wednesdays - Yoga with Minelli - A Practice to Feel at Home in Your Body
11:00 AM – 12:00 PM

PAC Wellness Wednesdays - Fermenting Power
1:00 PM – 2:00 PM
The process of fermenting food is creating a safe container for things to fall apart. The holding of this container reminds us that life and death can never be understood as two things and that our transformation is depending on beings that we can barely behold. In this workshop, we will be exploring the indigenous technology of fermentation while exploring its implications on social movement and community organizing. In this workshop, we'll be making sauerkraut while learning about the roles and impacts of microbiota.

Saturday 6 February

Inclusive science storytelling
12:00 PM – 2:00 PM
Storytelling is an essential skill for good science communication. But it’s also essential to tell stories that are as inclusive as possible. In this interactive virtual workshop, we will explore how to engage both general and specialist audiences with technical content using storytelling strategies. We will especially consider how to make our stories inclusive for audiences that are often marginalized from science. Whether you want to improve your conversation skills, presentations, papers, or grants, this workshop will help you prepare for any communication opportunity – and have fun in the process! Key Skills:
• Connect with audiences through your personal motivation for your work.
• Engage and maintain the interest of a target audience.
• Distill content into clear and concise narrative elements.
• Make content inclusive and accessible.

BioMaking with bacterial cellulose: character clothing craft
2:00 PM – 3:30 PM
In this workshop, BioJam teens will invite participants to explore a biomaking creative craft activity using pre-grown and dried bacterial cellulose. Participants will imagine the future of fashion using laser cut paper figures that they can dress. By blending the familiar with the foreign, this project highlights bacteria and microbes as collaborators in a future based on sustainable, circular design. In a time of intense fear of the microbial world, we create an opportunity for a positive, playful, and hands-on interaction with our microscopic environment. Recipes and biomaking explorations will be shared from the BioJam camp program.
Tuesday 9 February

**Increasing your publishing success (for early career researchers)**
2:00 PM – 3:30 PM

Join this session to learn how the journals publishing process works, and gain some practical tools and skills to help to increase your chance of publishing your work successfully. We will cover aspects such as the different models of peer review, what editors are looking for in submissions, open access, data archiving, preprints and more.

The session will be run by members of the Editorial Board of Proceedings of the Royal Society B, and members of the Royal Society publishing staff, but information given will help you with submitting to any journal. There will be opportunity to ask questions about any aspect of journals publishing.

Wednesday 10 February

**PAC Wellness Wednesdays - Yoga with Minelli - pranayama session - Stress Relieving Breath Practices**
11:30 AM – 12:00 PM

Thursday 11 February

**SlicerMorph: An open source platform for biologists working with 3D specimen data**
12:30 PM – 5:00 PM

This workshop will be an overview of the SlicerMorph toolkit, which enables biologists to retrieve, visualize, measure, annotate, and perform geometric morphometric analyses from high-resolution specimen data both from volumetric scans (CTs and MRs) as well as from 3D surface scanners effectively within 3D-Slicer.

Friday 12 February

**Creative writing in the teaching and learning of biology**
12:00 PM – 2:00 PM

Do creative writing exercises improve technical writing skills? Can creative writing stimulate new research directions? Will incorporation of creative writing in our curricula improve retention and recruitment of students from diverse backgrounds? Can asking students to write poetry about science improve their learning? In this hands-on workshop, participants will explore the uses of creative writing in the teaching and learning of biology. Participants will engage in creative writing activities, then consider how such exercises could be used in our teaching and mentoring as well as in our own scholarship.
Workshops

Wednesday 17 February

**PAC Wellness Wednesdays - Come out Stronger - Building up resilience during adversity**
1:00 PM – 1:45 PM

**Meet the JEB Editors**
2:00 PM – 3:00 PM
Find out more about the *Journal of Experimental Biology* and our publishing and charitable activities in an informal session hosted by some of the journal Editors. The session will start with a short presentation, including information about what topics the journal covers, what we look for when assessing articles and how we support the comparative physiology and biomechanics communities, in particular ECRs. This will be followed by an informal Q&A session – the perfect opportunity to ask the editors about science, the journal, careers in publishing or anything else! Members of the editorial team that will be on hand to answer questions include: Editor-in-Chief, Craig Franklin; Deputy Editors-in-Chief, Sheila Patek and Patricia Wright; Reviews Editor, Charlotte Rutledge; and Managing Editor, Michaela Handel.

Friday 19 February

**Extracting More Out of X-ray Micro-CT Scans**
1:00 PM – 2:30 PM
This workshop will give better insight on how to use X-ray computed tomography (micro-CT) to generate 3D imaging of the internal structures of specimens nondestructively, prepare a variety of tissue types for maximum contrast—going beyond just resolving calcified tissue—and explore a wide range of organism and applications.

Wednesday 24 February

**PAC Wellness Wednesdays - Taking the High Ground - Practices for being less reactive and more grounded at work and in life**
1:00 PM – 1:45 PM
Join the Public Affairs Committee each Wednesday for different tips, strategies and activities to manage stress and mental health in academia. Events include mental practices including neurohacking (using creative means to achieve desired nervous regulation) and using embodiment practices to champion imposter syndrome. We’ll also have yoga, meditation, and talks on mental health management and creating affirming, inclusive spaces.

These events center around decolonizing mental health and fitness. Anyone and everyone is welcome! Individual events will be announced during the live conference dates (Jan 3-8), and recordings will be available post hoc.

**Blender for biologists**
3:00 PM – 5:00 PM
In this virtual workshop attendees will learn basic techniques in Blender, a free and open-source 3D computer graphics software toolset, by completing a Blender project on their own computer. We will focus in particular on techniques useful to biologists including: importing scans of specimens as meshes (e.g. from Morphosource), manipulating meshes, creating an animation, and preparing scanned specimens for 3D printing. The workshop will be led by postdoc Aaron Olsen, an experienced Blender user and co-founder of a new cooperative company, 3D Anatomy Studios. No prior experience with Blender is required and the instructor will provide step-by-step instructions and demonstration throughout the workshop and attendees are encouraged to ask questions at any time. Attendees should have the most recent version of Blender installed prior the workshop (Blender is free for all uses); all other necessary files will be provided to attendees during the workshop.
Best Student Presentation Awardees 2020

Cash prizes and journal subscriptions are provided to the awardees by Wiley-Blackwell Publishers.

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DCPB

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Louis Guillette Award
Sarah Orr, North Carolina State University

Poster Presentation
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David Hubert, Oregon State University

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Bradford Dimos, University of Texas, Arlington

Poster Presentation
Emily Virgin, Utah State University

DNNSB

Oral Presentation
Jess Kanwal, Harvard University

Poster Presentation
Emily Virgin, Utah State University

Poster Presentation, Honorable Mention
Lydia Naughton, Bucknell University

DAB

Oral Presentation
Marlene Zuk Award
Kayla Goforth, University of North Carolina, Chapel Hill

Poster Presentation
Elizabeth Adkins-Regan Award
Angela Riley, Oklahoma State University

Wenner Strong Inference Award
Yusan Yang, University of Pittsburgh

DCE

Oral Presentation
Aubrey Gorbman Award
Jordan Boersma, Washington State University

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Lynn Riddiford Award
Mary Woodruff, Indiana University
Best Student Presentation Awardees 2020

DCB

Oral Presentation
Mimi A.R. Koehl and Steven Wainwright Award
Rachel Crane, Stanford University

Poster Presentation
Steven Vogel Award
Samantha Smith, University of Texas, Austin

Honorable Mention
Mimi A.R. Koehl and Steven Wainwright Award
David Sleboda, Brown University

DVM

Oral Presentation
D. Dwight Davis Award
Jack Phillips, University of Connecticut

Poster Presentation
Karel F. Liem Award
Brenan Wynd, Virginia Tech

DEDB

Oral Presentation
Alexis Lanza Whitney Laboratory

Poster Presentation
Raul Chavarria, University of North Florida

DEE

Oral Presentation
Raymond Huey Award
Nick Barts, Kansas State University

Poster Presentation
Raymond Huey Award
Isaac Miller-Crews, University of Texas, Austin

DPCB

Oral Presentation
David and Marvalee Wake Award
Katherine Corn, University of California, Davis
Sarah Friedman, University of California, Davis

Poster Presentation
David and Marvalee Wake Award
Natasha Picciani, University of California, Santa Barbara

David and Marvalee Wake Award, Honorable Mention
Shannon Dohr, Macalaster College
**Best Student Presentation Awardees 2020**

**DIZ**

**Oral Presentation**
Mary Rice Award
Samuel Bedgood, University of California, Irvine

Mary Rice Award, Runner-up
Alyssa Liguori, Stony Brook University

**Poster Presentation**
Alan Kohn Award
Paige Caine, Bucknell University

Alan Kohn Award, Runner-up
Elizabeth Urban-Gedamke, Florida Atlantic University

**DOB**

**Oral Presentation**
Rising Star in Organismal Botany
Min Ya, Harvard University
Grey Monroe, Max Planck Institute for Developmental Biology

**Poster Presentation**
Maria Pimienta, Florida International University
American Microscopical Society
141 E. College Ave.
Decatur, GA 30030
312-369-7395
www.amicros.org

The American Microscopical Society is an international society of biologists organized to encourage the use of microscopy. We were founded in 1878 and are proud to be affiliated with SICB. We run a photomicrograph contest, sponsor student research awards and training awards for our members and publish Invertebrate Biology.

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The mission of the Crustacean Society is to advance the study of all aspects of the biology of the Crustacea by promoting the exchange and dissemination of information throughout the world.

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# Symposia and Special Sessions

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

## Sunday 3 January

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chair/Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM – 12:30 PM</td>
<td>President’s Opening Address</td>
<td>Jake Socha, Welcome to the SICB Virtual Meeting!</td>
</tr>
<tr>
<td>12:30 PM – 1:30 PM</td>
<td>Opening Plenary</td>
<td>Jake Socha, From soma to germ line: birth, growth and transformation of a novel gene</td>
</tr>
<tr>
<td>7:00 PM – 7:30 PM</td>
<td>Gans Award Address</td>
<td>Stacey Combes, ’Constraint’, a double-edged sword for evolution</td>
</tr>
</tbody>
</table>

## Monday 4 January

### Symposium 1

**Blinded By the Light: Effects of Light Pollution Across Diverse Natural Systems**

**Chair:** Meredith Kernbach

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>Light at night in the spotlight: an introduction to the symposium</td>
<td>Ferguson SM, Aloasam VJ, College of Wooster, University of Nevada - Reno</td>
</tr>
<tr>
<td>6:30 pm</td>
<td>ALAN in freshwater vertebrates: physiology, growth, and behavioral perspectives</td>
<td>Gabor CR, Miner K, Forsburg Z, Texas State University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>Ecological impacts of horizontal artificial nighttime light emissions</td>
<td>Gaston KJ, Ackermann S, University of Exeter, Environment &amp; Sustainability Institute</td>
</tr>
<tr>
<td>11:00 am</td>
<td>The effects of experimental light pollution on behaviour, physiology and fitness of a wild songbird</td>
<td>Dominoni DM, Visser ME, Spoelstra K, University of Glasgow, Netherlands Institute of Ecology</td>
</tr>
<tr>
<td>11:30 am</td>
<td>Effects of artificial light at night on the spatiotemporal pattern of bats and insects</td>
<td>Hermans C, Kobiliz JC, Litovska I, Visser ME, Spoelstra K, Netherlands Institute of Ecology (NIOO-KNAW), Max Planck Institute of Animal Behavior</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>Heterogeneity in avian responses to light pollution from a continental perspective</td>
<td>Francis CD, Cal Poly</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>Light waters: How anthropogenic light alters river ecosystems</td>
<td>Perkin EK, Wilson MJ, Hatfield Consultants, Susquehanna University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>Impact of different colors of artificial light at night on phototaxis in aquatic insects</td>
<td>Holker F, Kühne JL, Jechow A, van Grunsven RHA, Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB), Dutch Butterfly Conservation, Wageningen</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>Experimental investigation of the effects of artificial light at night on avian parental behavior, offspring glucocorticoids, and reproductive success</td>
<td>Injaian AS, Uehling JJ, Taft CC, Vitousek MN, Cornell University, University of Georgia</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>Effects of light at night and disrupted circadian rhythms on brain and behavior</td>
<td>Nelson RJ, West Virginia University</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>Mechanisms and mitigation: effects of light pollution on West Nile virus dynamics</td>
<td>Kernbach ME, Martin LB, Unnasch TR, Hall RJ, Jiang RHY, Francis CD, University of South Florida, University of Georgia, California Polytechnic State University</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>Artificial light at night disrupts trophic and population dynamics of lady beetles and pea aphids in cool conditions</td>
<td>Miller CR, Vitousek MN, Thaler JS, Cornell University</td>
</tr>
</tbody>
</table>
### Symposia and Special Sessions

#### 10:15 AM – 6:30 PM  Symposium 2

**Genomic Perspectives in Comparative Physiology of Mollusks: Integration Across Disciplines**  
*Chair: Omera Matoo*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S2-1</td>
<td>Introduction to genomic perspectives in comparative physiology of mollusks: Integration across disciplines</td>
<td>Neiman M, Matoo O; University of Iowa, University of Nebraska</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S2-2</td>
<td>Fielding freshwater snail immunity</td>
<td>Adema CM, McQuirk KA, Seppala O, Castillo MG; University of New Mexico, University of Innsbruck, New Mexico State University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S2-3</td>
<td>Multi-omic approaches to reveal interactions between the hard clam and its parasite QPX</td>
<td>Alam B; Stony Brook University</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S2-4</td>
<td>Exploring the genomic underpinnings of symbiosis in bobtail squid</td>
<td>Heath-Heckman EAC, Nishiguchi M; Michigan State University, University of California Merced</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S2-5</td>
<td>Bivalve molluscs as model systems for studying mitochondrial biology</td>
<td>Ghiselli F, Milani L, Iannello M, Piccinini G; University of Bologna</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S2-6</td>
<td>Phenotypic variation in energy metabolism across New Zealand snail populations</td>
<td>Matoo OB, Sharbrough J, Neiman M, Montooth KL; University of Nebraska-Lincoln, New Mexico Institute of Mining and Technology, University of Iowa</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S2-7</td>
<td>Testing how broad physiological tolerances are shaped by selection: transcriptomic variation in salinity, temperature, and hypoxia responses in the eastern oyster</td>
<td>Kelly MW, Smith HN, Sirovy KA, LaPeyre JF, List SM, Johnson KM; Louisiana State University, California Polytechnic State University</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S2-8</td>
<td>Genetic and environmental correlates of physiology and gene expression for the eastern oyster in the southeastern United States</td>
<td>Furr D, Ketchum RN, Leach WB, Ivanina AV, Reitzel AM*; University of North Carolina Charlotte</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S2-9</td>
<td>Pacific oysters (Crassostrea gigas) dramatically recalibrate the model for the upper limit of the eukaryotic mutation rate</td>
<td>Churches N, Chancellor J, Chang P, Nuzhdin S*; University of California Southern California, Seedoffshore, LLC</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S2-10</td>
<td>A perspective on DNA methylation in bivalves</td>
<td>Roberts SR; University of Washington</td>
</tr>
</tbody>
</table>

#### 10:15 AM – 7:00 PM  Symposium 3

**Physical Mechanisms of Behavior**  
*Chair: Patrick Green*

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S3-1</td>
<td>Introduction to the symposium: Physical mechanisms of behavior</td>
<td>Green PA, Rico-Guevara A; University of Exeter, University of Washington</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S3-2</td>
<td>When the uterus is a vagina: Intra-horn insemination in the alpaca and consequences to genital morphology coevolution and 3-D shape</td>
<td>Brennan PLR, Sterett M, DiBuono M, Klo K, Marsden R, Schleing P, Tanner L, Purdy S, Mount Holyoke College</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S3-3</td>
<td>Field studies of lizard copulation: from physiological mechanisms of mating to behavioral correlates of paternity</td>
<td>Johnson MA, Kirby R, Fressez CC, Wang S, Stehle CM, Templeton AR, Losos JB, Kamath A; Trinity University, US Fish and Wildlife Service, University of California Davis, Movement Specialists Physical Therapy, Washington University, University of California Berkeley</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S3-4</td>
<td>Seven ways that wings produce sound in flight</td>
<td>Clark CJ; University of California Riverside</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S3-5</td>
<td>Ecological and evolutionary consequences of flexible foraging behavior for bees and flowers</td>
<td>Russell AL; Missouri State University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S3-6</td>
<td>Hummingbird bill-flower matching</td>
<td>Rico-Guevara A; University of Washington</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S3-7</td>
<td>Chance events and strategic behavior in the predator-prey interactions of fishes</td>
<td>McHenry MJ, Peterson AN, Sato AP; University of California Irvine</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S3-8</td>
<td>What is the point of defensive spines?</td>
<td>Crofts SB; College of the Holy Cross</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S3-9</td>
<td>Don’t touch! The function and evolution of defensive spines in mammals</td>
<td>Stankowich T; California State University Long Beach</td>
</tr>
</tbody>
</table>
### Symposia and Special Sessions

<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:00 pm</td>
<td>S3-10</td>
<td>Q&amp;A on foraging and avoidance: Russell, Rico-Guevara, McHenry, Crofts, and Stankowich</td>
<td>Green PA, Rico-Guevara A; University of Exeter, University of Washington</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>S3-11</td>
<td>From Behavior to Architecture and Back: the Evolution of Social (so-shell) Life in Social Hermit Crabs</td>
<td>Laidre ME; Dartmouth College</td>
</tr>
<tr>
<td>6:30 pm</td>
<td>S3-12</td>
<td>Exoskeleton weapons and defenses in crustacean conflicts</td>
<td>Taylor JRA, Lowder K, devVries M; University of California San Diego, NOAA, San Jose State University</td>
</tr>
<tr>
<td>7:00 pm</td>
<td>S3-13</td>
<td>Q&amp;A on sexual selection: Brennan, Johnson, Clark, Laidre, and Taylor</td>
<td>Rico-Guevara A, Green PA, University of Washington, University of Exeter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30 PM – 1:30 PM</td>
<td></td>
<td>George A. Bartholomew Award Lecture</td>
<td>Dakin R; Carleton University</td>
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</table>

### Tuesday 5 January

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM – 7:00 PM</td>
<td>Symposium 4</td>
<td>Biology Beyond the Classroom: Experiential Learning Through Authentic Research, Design, and Community Engagement</td>
<td>Hansen AK; California State University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S4-1</td>
<td>Introduction to the symposium: biology beyond the classroom</td>
<td>Hansen AK; California State University</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>S4-10</td>
<td>Skill-building in a molecular biology CURE: A delicate balance of structure and student independence</td>
<td>Beatty AE, Ballen C, Driessen EP, Graze RM, Schwartz TS; Auburn University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S4-11</td>
<td>Using zoos as a context to teach authentic research: reflections from first and second experience students taking introductory chemistry</td>
<td>Hernandez T, Donnelly-Hermosillo D*, Person E, Hansen A; California State University Fresno</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>S4-12</td>
<td>Connected while distant: Networking CUREs across classrooms to create community and inspire students</td>
<td>Lanier HC, Connors PK, Varner J, Dizney L, Duggan JM, Erb LP, Yahneke CJ, Flaherty EA, Hanson JD; University of Oklahoma, Colorado Mesa University, University of Portland, California State University Monterey Bay, Warren Wilson College, University of Wisconsin Stevens Point, Purdue University, Biodiversity Research and Education</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S4-13</td>
<td>Interdisciplinary collaboration in undergraduate service-learning</td>
<td>Tucker KP, Glaser RL, Marx M, Kniss A, Moran CE; Stevenson University</td>
</tr>
<tr>
<td>4:15 pm</td>
<td>S4-14</td>
<td>Students’ experiences in community STEM programs</td>
<td>Nation JM, Hansen AK; California Polytechnic State University, California State University</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S4-15</td>
<td>Nuestra ciencia is our science: microbiology lessons for all</td>
<td>Yep A, Nation JM; California Polytechnic State University San Luis Obispo</td>
</tr>
<tr>
<td>4:45 pm</td>
<td>S4-16</td>
<td>Something Very Fishy: An ocean literacy STEAM exhibit impacts how children, teachers, and university students think about science</td>
<td>Childress MJ, Tallapragada M, Prosser KL; Clemson University, Temple University, Educational Entertainment</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S4-17</td>
<td>Forests after Florence: a model to engage disaster-impacted students in informal learning through relevant field research</td>
<td>Katti M, Mulvey K L, Caslin M, Joy A, Orcutt D, Eseryel D; North Carolina State University</td>
</tr>
<tr>
<td>5:15 pm</td>
<td>S4-18</td>
<td>Using citizen science to assess the effect of wing pattern and weather on butterfly behavior</td>
<td>Merrill AN, Hirzel GE, Westerman E; University of Arkansas Fayetteville</td>
</tr>
<tr>
<td>10:45 am</td>
<td>S4-2</td>
<td>Making interdisciplinary learning continuous across education</td>
<td>Lent DD, Hansen AK; California State University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S4-3</td>
<td>i4's toward tomorrow program: Bioinspired design realized by creativity, collaboration, and connection</td>
<td>Full RJ, Estrada M, Watson L, Bhatti HA; University of California Berkeley, University of California San Francisco</td>
</tr>
<tr>
<td>11:15 am</td>
<td>S4-4</td>
<td>Early technology-based intervention promotes self-efficacy in a bioinspired design course</td>
<td>Bhatti HA, Ruapp R, McPherson A, Full RJ; University of California Berkeley</td>
</tr>
</tbody>
</table>
### Symposia and Special Sessions

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 am</td>
<td>S4-5</td>
<td>Implementing fabrication as a pedagogical tool in vertebrate anatomy courses: motivation, lessons, and outcomes</td>
<td>Staab KL; McDaniel College</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S4-7</td>
<td>Authentic research in the undergraduate classroom increases knowledge and appreciation for plants</td>
<td>Hove AA, Ward JR, Hiatt AL, Ventura L, Neufeld HS, Boyd AE, Clarke HD, Horton JL, Murrell ZE; Warren Wilson College, University of North Carolina, University of Nebraska, East Tennessee State University, Appalachian State University</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>S4-8</td>
<td>How and why does a field course close demographic gaps in EEB?</td>
<td>Zavaleta E, Beltran R, Race A; University of California Santa Cruz</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S4-9</td>
<td>FSBio 201: A CURE-based course that scaffolds research and scientific communication</td>
<td>Whitenack LB, French LB, Hersh BM, Nelson MK, Thu YM; Allegheny College</td>
</tr>
</tbody>
</table>

### 10:15 AM – 7:30 PM Symposium 5

**An Evolutionary Tail: Evo-Devo, Structure, and Function of Post-Anal Appendages**

Chair: Janneke Schwaner

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S5-1</td>
<td>Introduction to an evolutionary tail: Evo-Devo, structure, and function of post-anal appendages</td>
<td>Schwaner MJ, Hsieh ST, McGowan CP; University of Idaho, Temple University, Philadelphia, PA</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S5-2</td>
<td>Fabulous fish tails: Using morphology to model functional diversity across the fish tree</td>
<td>Donatelli CM, Roberts AS, Baxter D, Abu-Badr L, Naughton L, Han L, Ortiz F, Standen EM; University of Ottawa, University of California Davis, Tufts University, College of William and Mary, Bucknell University, Denison University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S5-3</td>
<td>Testing the relationship of prehensile function and the musculo-skeletal morphology of chameleons using multi-body dynamics</td>
<td>Luger AM, Watson PJ, Dutel H, Fagan MJ, Herrel A, Adriaens D; Evolutionary Morphology of Vertebrates, University of Hull, University of Bristol, CNRS/MNHN</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S5-4</td>
<td>Tail responses facilitate lizard reorientation during directed aerial maneuverability</td>
<td>Siddall R, Ibanez V, Byrnes G, Full RJ, Jusufi A*; Max Planck Institute for Intelligent Systems, UZH and MPI for Intelligent Systems, Siena College, University of California Berkeley</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S5-5</td>
<td>Cheetah tail behavior during pursuit</td>
<td>Patel A, Jericevich R, Knemeyer A, Jusufi A; University of Cape Town, Max Planck Institute for Intelligent Systems</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S5-6</td>
<td>How kangaroo rats utilize their tail while re-oriented</td>
<td>Schwaner MJ, Freymiller GA, Clark RW, McGowan CP; University of Idaho, University of California San Diego</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S5-7</td>
<td>The stabilizing function of the tail during arboreal quadrupedalism</td>
<td>Young JW, Chadwell BA, Dunham NT, McNamara A, Phelps T, Hieronymus TL, Shapiro L; Northeast Ohio Medical University, Idaho College of Osteopathic Medicine, Cleveland Metroparks Zoo, University of Texas at Austin</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S5-8</td>
<td>Evolution of the tail and lack thereof for aquatic propulsion in mammals</td>
<td>Fish FE, Rybczynski N, Duff CM; West Chester University, Canadian Museum of Nature</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S5-9</td>
<td>Towards dynamic locomotion of legged robots using biomimetic articulated robotic tails</td>
<td>Liu Y; Ben-Tzi P*; Virginia Tech</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S5-10</td>
<td>Tail beat synchronization of schooling giant danio is altered after lateral line ablation and regeneration</td>
<td>Mekdara PJ, Schwalbe MAB, Tytell ED; National Institute of Health, Lake Forest University, Tufts University</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>S5-11</td>
<td>Genetics and function of repeatedly-evolved tail length differences in deer mice</td>
<td>Hager ER, Kingsley EP, Harringmeyer OS, Hoekstra HE; Harvard University</td>
</tr>
<tr>
<td>6:30 pm</td>
<td>S5-12</td>
<td>Nervous system compensation following tail loss and regeneration in the leopard gecko (Eublepharis macularius)</td>
<td>Bradley S, Bailey CDC, Bent L, Howe E, Vickaryous MK, University of Guelph</td>
</tr>
<tr>
<td>7:00 pm</td>
<td>S5-13</td>
<td>The degenerate tale of ascidian tails</td>
<td>Swalla BJ; University of Washington</td>
</tr>
</tbody>
</table>
### Symposia and Special Sessions

**10:15 AM – 7:30 PM  Symposium 6**

**Spatiotemporal Dynamics of Animal Communication**

*Chair: Kim Hoke*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S6-1</td>
<td>Introduction to the symposium: Spatiotemporal dynamics of animal communication</td>
<td>Hoke KL, Hensley NM, Kanwal JK, Wasserman SM, Morehouse NI, Colorado State University, Cornell University, California Institute of Technology, Wellesley College, University of Cincinnati</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S6-2</td>
<td>Deep learning tools for the analysis of movement, identity and behavior</td>
<td>Mathis A; EPFL</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S6-3</td>
<td>Videography using a fast lock on, gimbal-mounted tracking camera to study animal communication</td>
<td>Vo-Doan TT, Straw AD*; University of Freiburg</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S6-4</td>
<td>Defining neural principles underlying naturalistic behavior through Motion Sequencing</td>
<td>Datta SR; Harvard Medical School Department of Neurobiology</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S6-5</td>
<td>Sexual selection, natural selection, and artificial intelligence: Implementing technological advances to understand variation in signaling behavior</td>
<td>Symes LB, Madhusudhana S, Martinson SJ, Kernan CE, ter Hofstede HM, Cornell University, Dartmouth College</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S6-6</td>
<td>Beyond cognitive templates</td>
<td>Sung JY, Harris OK, Hensley NM, Chemero AP, Morehouse NI; University of Cincinnati, Cornell University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S6-7</td>
<td>How signaling geometry shapes the efficacy and evolution of animal communication systems</td>
<td>Echeverri S, Miller AE, Chen J, McQueen E, Plakke M, Spicer M, Hoke KL, Stoddard MC, Morehouse NI, University of Pittsburgh, Princeton University, Emory University, University of Kansas, University of Puget Sound, Colorado State University, University of Cincinnati</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S6-8</td>
<td>Spatiotemporal dynamics of a hummingbird courtship dive</td>
<td>Stoddard MC, Hogan BG; Princeton University</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S6-9</td>
<td>Social information use in greater sage-grouse in response to habitat structure and social network</td>
<td>Logsdon RM, Krakauer AH, Hylback A, Mitchell K, Dryer B, Forbey JS, Patricelli GL; University of California Davis, Boise State University</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S6-10</td>
<td>Orientation control via spatiotemporal integration in fly flight</td>
<td>Mongeau JM; Penn State University</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>S6-11</td>
<td>Signals, space and time: Exploring the spatiotemporal dimension of animal communication networks</td>
<td>Reichert MS, Carlson NV, Enriquez MS, Roja SV; Oklahoma State University, Max Planck Institute of Animal Behaviour, University of Minnesota, National Centre for Biological Sciences (TIFR)</td>
</tr>
<tr>
<td>7:00 pm</td>
<td>S6-13</td>
<td>Everything in modulation: neuromodulators as keys to understanding behavioral dynamics</td>
<td>Zornik E, Barkan CL, Descant KD, Lloyd-Burchett P, Leininger EC; Reed College, New College of Florida</td>
</tr>
</tbody>
</table>

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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30 PM – 1:30 PM</td>
<td>Moore Lecture</td>
<td>Stereotype threat and identity threat: The science of a diverse community</td>
<td>Steele CM; Stanford University</td>
</tr>
</tbody>
</table>
## Symposia and Special Sessions

### Wednesday 6 January

#### 10:15 AM – 7:00 PM  Symposium 7

**The Integrative Biology of Pigment Organelles**

*Chair: Florent Figon*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S7-1</td>
<td>Introduction to the symposium: The integrative biology of pigment organelles</td>
<td>Figon F, Casas J, Deravi L; Université de Tours, Northeastern University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S7-2</td>
<td>Origin of color in butterflies</td>
<td>Reed RD, Brack BJ; Cornell University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S7-3</td>
<td>Organic crystals in animal coloration and vision</td>
<td>Shavit K, Yalliaprageda VJ, Weiner S, Oron D, Sagi A, Addadi L, Palmer B; Ben-Gurion University, Weizmann Institute</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S7-4</td>
<td>Colors as life history traits: Insights from the pigment-based coloration of two butterfly species</td>
<td>Morehouse NI, University of Cincinnati</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S7-5</td>
<td>Optics and development of highly iridescent feathers: the case of hummingbird melanosomes</td>
<td>D’Alba L, Jeon DJ, Yeo JS, Manceau M, Shawkey MD; Université Gent, Yonsei University, Collège de France</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S7-6</td>
<td>Melanosome protein contents and oculocutaneous albinism: The importance of remaining neutral</td>
<td>Marks MS; Children’s Hospital of Philadelphia, University of Pennsylvania</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S7-7</td>
<td>BLOC-dependent regulation of melanocyte pigmentation and its defects in the Hermansky-Pudlak Syndromes</td>
<td>Delevoye C; PSL Research University</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S7-8</td>
<td>Parallels of melanization in Cryptococcus neoformans and Anopheles gambiae</td>
<td>Camacho E, Anglero-Rodriguez Y, Smith DFQ, Jacobs E, Dong Y, Cordero RJB, Dimopoulos G, Casadevall A; Johns Hopkins University</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S7-9</td>
<td>Protein-pigment interactions facilitate dynamic color change in cephalopod chromatophores</td>
<td>Deravi LF; Northeastern University</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S7-10</td>
<td>Within-cell cycle of endolysosome-related pigment organelles in crab spiders leads to reversible color changes</td>
<td>Figon F, Hurbain I, Heiligenstein X, Trépout S, Medjoubi K, Somogyi A, Delevoye C, Raposo G, Casas J; Université de Tours, Université PSL, Kremlin-Bicêtre France, Université Paris-Saclay, Synchrotron SOLEIL, Saint-Aubin, Gif sur Yvette</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>S7-11</td>
<td>Rainbows in nature: disordered photonic structures tuned by pigments</td>
<td>Wilts BD; Adolphe Merkle Institute</td>
</tr>
<tr>
<td>6:30 pm</td>
<td>S7-12</td>
<td>Synthetic biogenesis of carotenoid-rich plastids for crop biofortification</td>
<td>Liorente B; Macquarie University, CSIRO Synthetic Biology Future Science Platform</td>
</tr>
</tbody>
</table>

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#### 10:15 AM – 5:30 PM  Symposium 8

**The Biology of Sticky: Adhesive Silk, Fiber, and Glue Biomaterials Across Eukaryota**

*Chair: Mercedes Burns*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S8-1</td>
<td>The ties that stick: an introduction to sticky biomaterials</td>
<td>Burns M, Stellwagen SD; University of Maryland Baltimore County, University of North Carolina Charlotte</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S8-2</td>
<td>Sticky predator-prey interactions: The ecology of adhesive secretions in arachnids</td>
<td>Wolff JO; Macquarie University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S8-3</td>
<td>Characterizing frog tongue stickiness and other reversible adhesive mechanisms</td>
<td>Noel AC; Georgia Tech Research Institute</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S8-4</td>
<td>Viscid spider silk shows robust adhesion on varied natural surfaces</td>
<td>Blackledge TA, Alicea A, Onyok A, Htut K, Singla S, Dhinojwala A; University of Akron</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S8-5</td>
<td>The hidden roles of silk fibers during adhesion in arthropod capture threads</td>
<td>Prorkowski D; Tunghai University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S8-6</td>
<td>Molecular correlates of spider aqueous glue mechanics</td>
<td>Ayoub NA, Friend K, Huyashi CY, Opell BD, Washington and Lee University, American Museum of Natural History, Virginia Tech</td>
</tr>
</tbody>
</table>
Symposia and Special Sessions

3:00 pm  S8-7  The genetics of sticky: comparing glue sequences across multicellular eukaryota  Stellwagen SD, Burns M; University of North Carolina at Charlotte, University of Maryland Baltimore County

4:00 pm  S8-8  Adhesion with tough gels: inspiration from the sticky defensive secretions of dusky slugs  Smith AM; Ithaca College

4:30 pm  S8-9  It’s a trap! How sticky fluids help carnivorous plants catch insect prey  Kang V, Federle W; University of Cambridge

5:00 pm  S8-10  Snail epiphragm inspired intrinsically reversible superglues  Yang S, Jolly J, Cho H, Wu G, Fortoul N, He Z, Gao Y, Jagota A; University of Pennsylvania, Lehigh University

10:15 AM – 7:00 PM  Symposium 9

Sending and Receiving Signals: Endocrine Modulation of Social Communication  Chair: Karen Maruska

10:15 am  S9-1  Introduction to the symposium sending and receiving signals: endocrine modulation of social communication  Maruska KP, Butler JM; Louisiana State University, Stanford University

10:30 am  S9-2  Multiple hormonal pathways modulate active sensory and communication signals in weakly electric fish  Markham MR, Nourbakhsh-Rey M, Wiser SD, Maltby RC; University of Oklahoma

11:00 am  S9-3  Circulating prostaglandin F2α rapidly alters olfactory perception in female goldfish causing them to perceive an androgen released by mature conspecific males as an attractive sex pheromone  Sorensen PW, Levesque H; University of Minnesota

11:30 am  S9-4  Chemical signals control our social lives: Lessons from lizards  Campos SM; Swarthmore College

2:00 pm  S9-5  Androgenic modulation of multimodal signal structure in foot-flagging frogs  Mangiamele LA; Smith College

2:30 pm  S9-6  Reproductive state-dependent visual plasticity in a cichlid fish  Butler JM, Maruska KP; Louisiana State University, Stanford University

3:00 pm  S9-7  Modulation of acoustic communication in an African cichlid fish  Maruska KP; Louisiana State University

4:00 pm  S9-8  Dopamine seasonally modulates adaptive sensitivity of the inner ear for reproductive communication in a vocal fish  Perelmuter JT, Sisneros JA, Forlano PM; Cornell University, University of Washington, Brooklyn College

4:30 pm  S9-9  Neuromodulatory feedback to sensory systems: how serotonin conveys contextual information to the auditory midbrain  Petersen CL, Hurley LM*; University of Minnesota Twin Cities, Indiana University

5:00 pm  S9-10  Estrogens synthesized in auditory circuits are neuromodulators of cellular physiology and behavior  Remage-Healey LR; University of Massachusetts Amherst

6:00 pm  S9-11  Social communication across reproductive boundaries: hormones and the auditory periphery  Gall MD, Baugh AT, Lucas JR, Bee MA; Vassar College, Swarthmore College, Purdue University, University of Minnesota

6:30 pm  S9-12  Glucocorticoids, acoustic communication and sexual selection in treefrogs  Leary CJ; University of Mississippi

12:30 PM – 1:30 PM  Bern Award Lecture  Chair: Kathleen Hunt

Hormone-mediated phenotypic plasticity: is there an optimal hormonal phenotype?  Hau M; Max Planck Institute for Ornithology, University of Konstanz
### Thursday 7 January

#### Symposia and Special Sessions

**10:15 AM – 7:00 PM  Symposium 10**

**Metachronal Coordination of Multiple Appendages for Swimming and Pumping**
*Chair: Margaret Byron*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S10-1</td>
<td>Introduction to the symposium</td>
<td>Byron ML, Murphy DW*, Santhanakrishnan A, Penn State University, University of South Florida, Oklahoma State University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S10-2</td>
<td>Transitions in cilia coordination</td>
<td>Kanso E, University of Southern California</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S10-3</td>
<td>The swimming kinematics of barnacle cyprid larvae using permanently fused setules</td>
<td>Lamont EI, Emlet RB, University of Washington, University of Oregon, OMB</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S10-4</td>
<td>Acrobatic maneuvers of larval copepods</td>
<td>Takagi D, University of Hawaii</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S10-5</td>
<td>Pumping by oscillating plates; viscous to inertial transitions in metachronal arrays</td>
<td>Kiger KT, University of Maryland</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S10-6</td>
<td>A fluid-structure model for the parapodia of tomopterids</td>
<td>Hoover AP, Kotija K, Daniels J, Osborn K, University of Akron, Monterey Bay Aquarium Research Institute, Smithsonian Institution</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S10-7</td>
<td>Spatiotemporal asymmetry in ctenophores; metachronal locomotion at intermediate Reynolds number</td>
<td>Herrera-Amaya A, Byrne ML*, Pennsylvania State University</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S10-8</td>
<td>Hydrodynamics of metachronal paddling</td>
<td>Santhanakrishnan A, Ford MP, Oklahoma State University</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S10-9</td>
<td>Vortex interactions among pleopod pairs in a mantis shrimp swimming at high advance ratios</td>
<td>Garayev K, Murphy D, University of South Florida</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S10-10</td>
<td>Dual phase-shifted ipsilateral metachrony in Americamysis bahia</td>
<td>Ruszczyk M, Webster DR, Yen J, Georgia Institute of Technology</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>S10-11</td>
<td>Propulsion and predation in a uniquely shaped oceanic ctenophore</td>
<td>Gemmell BJ, Hawkins O, Colin S, Sutherland K, Costello J; University of South Florida, Roger Williams University, University of Oregon, Providence College</td>
</tr>
<tr>
<td>6:30 pm</td>
<td>S10-12</td>
<td>Metachronal moves in the midwater: Swimming of the polychaete Tomopteris</td>
<td>Daniels J, Aoki N, Havassy J, Mushegian N, Kotija K, Osborn K, MBARI, National Museum of Natural History, Smithsonian Institution</td>
</tr>
</tbody>
</table>

**10:15 AM – 7:00 PM  Symposium 11**

**Biology’s Best Friend: Bridging Disciplinary Gaps to Advance Canine Science**
*Chair: Caleb Bryce*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S11-1</td>
<td>Biology’s best friend: Bridging disciplinary gaps to advance canine science</td>
<td>Jimenez AG, Bryce C; Colgate University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S11-2</td>
<td>Dog domestication through an ancient evolutionary lens</td>
<td>Larson G; University of Oxford</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S11-3</td>
<td>Big and small, short and tall, dog genes tell all</td>
<td>Ostrander EA, Parker HG, Evans JM, Plassais J, Dreger D, Harris A, Davis BW, McIntyre JK, Cairns KM, Ali BM, Hagan AW, National Institutes of Health, University of Rennes, Texas A&amp;M University, New Guinea Highland Wild Dog Foundation, University of New South Wales</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S11-4</td>
<td>Characterizing the dog-human bond: A comparative investigation of attachment relationships</td>
<td>Udell MAR, Sipple N, Smith A, Vitale KR, Thielke LE; Oregon State University, Unity College</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S11-5</td>
<td>Dogs as pets and pests: Global patterns of dog activity and health</td>
<td>Bryce CM; University of California Santa Cruz</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S11-6</td>
<td>Heads or tails – random and not-so-random factors that influence dog lifespan</td>
<td>Urfer SR, Promislow DEL, Kaeberlein M, Crevey KE; University of Washington, Texas A&amp;M Veterinary Medicine, Biomedical Sciences</td>
</tr>
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### Symposia and Special Sessions

<table>
<thead>
<tr>
<th>Time</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3:00 pm</td>
<td>S11-7</td>
<td>The physiological conundrum that is the domestic dog</td>
<td>Jimenez AG; Colgate University</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S11-8</td>
<td>If you want to run with the big dogs, you need to not be so human</td>
<td>Davis MS; Oklahoma State University</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S11-9</td>
<td>Thinking globally about dog populations and their wildlife conservation relevance</td>
<td>Gompper ME; New Mexico State University</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S11-10</td>
<td>“Anatomy” of a conservation detection dog: How an ordinary mutt becomes and elite canine conservationist</td>
<td>Hurt AL; Working Dogs for Conservation</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>S11-11</td>
<td>Broadening the scope of canine science: The dogs of the Nicaraguan forest</td>
<td>Koster JM; University of Cincinnati</td>
</tr>
<tr>
<td>6:30 pm</td>
<td>S11-12</td>
<td>Scavenging effects of large canids</td>
<td>Wirsing AJ; Newsome TM; University of Washington, University of Sydney</td>
</tr>
</tbody>
</table>

### 10:15 AM – 7:00 PM  Symposium 12

**Manakin Genomics: Comparative Studies of Evolution And Behavior an a Unique Clade of Birds**  
Chair: Ignacio Moore

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 am</td>
<td>S12-1</td>
<td>Manakin genomics: comparative studies of evolution and behavior in a unique clade of birds</td>
<td>Moore IT, Jones BC; Virginia Tech, Bennington College</td>
</tr>
<tr>
<td>10:30 am</td>
<td>S12-2</td>
<td>Hormonal control of behavioral sex differences in a tropical bird</td>
<td>Schlinger BA, Chiver I; University of California Los Angeles, Smithsonian Institute, Panama</td>
</tr>
<tr>
<td>10:45 am</td>
<td>S12-3</td>
<td>Physiological basis of display evolution in the golden-collared manakin</td>
<td>Fuxjager MJ; Brown University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>S12-4</td>
<td>Glucocorticoids correlate with and predict social status in the cooperatively breeding lance-tailed manakin (Chiroxiphia lanceolata)</td>
<td>Jones BC, DuVal EH; Bennington College, Florida State University</td>
</tr>
<tr>
<td>11:15 am</td>
<td>S12-5</td>
<td>Gene expression in the social behavior network of the wire-tailed manakin (Pipra filicauda) brain</td>
<td>Horton BM, Ryder TB, Moore IT, Balakrishnan CN; Millersville University, Bird Conservancy of the Rockies, Virginia Tech, East Carolina University</td>
</tr>
<tr>
<td>11:30 am</td>
<td>S12-6</td>
<td>The making of an elaborate courtship display: acrobatics, choreographies, and the role of females</td>
<td>Fusani L, Janisch J, Perinot E, Quigley C; University of Vienna, University of Veterinary Medicine</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>S12-7</td>
<td>Sexual selection for acrobatic courtship complexity drives increases in cerebellum volume and body size</td>
<td>Day LB, Harvey MC, Helmhout W, Olsson U, Pano G, Hoeksema JD, Lindsay WR; University of MS, Göteborg University, Göteborg University</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>S12-8</td>
<td>Dancing in the rain: environmental drivers of behavioral and social variability in White-ruffed Manakin courtship displays</td>
<td>Shogren EH, Boyle WA; University of Rochester, Kansas State University</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>S12-9</td>
<td>A manakin of many friends: unveiling the multi-male cooperative displays of the Swallow-tailed Manakin</td>
<td>Manica LT, Schoedler LM, Ribeiro PHIL; Universidade Federal do Paraná, Instituto Nacional de Pesquisas da Amazônia, Programa de Pós-graduação em Ecologia, Universidade Federal do Paraná, Programa de Pós-graduação em Zoologia</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>S12-10</td>
<td>Leks of Tyranneutes stolzmanni provide insights into male aggregation</td>
<td>Foster MS, Smithsonian Institution</td>
</tr>
<tr>
<td>4:30 pm</td>
<td>S12-11</td>
<td>Genomics of sexually selected traits in an avian hybrid zone</td>
<td>Lim HC, Bennett KFP, Justyn NM, Kingston SE, Long KM, Powers MJ, Brown JD, Hill GE, Braun MJ, George Mason University, Smithsonian Institution, University of Maryland, Auburn University, University of Maine, University of Illinois Urbana-Champaign, University of Illinois Urbana-Champaign, Smithsonian Tropical Research Institute</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>S12-12</td>
<td>Manakin neurogenomics reveal the mechanisms underlying the evolution of skilled motor behavior</td>
<td>Wirthlin M; Carnegie Mellon University</td>
</tr>
</tbody>
</table>
Symposia and Special Sessions

6:00 pm  S12-13  Sexual selection on the behavioral, physiological, and genetic dynamics of an avian hybrid zone  
Long KM, Tobiansky DJ*, Goller F, Braun MJ, Brawn JD, Fuxjager MJ; University of Illinois Urbana-Champaign, Brown University, University of Münster, University of Utah, Smithsonian National Museum of Natural History, University of Maryland

6:30 pm  S12-14  Sexual selection and its impacts on genome evolution: Insights from the Manakin Genomics Research Coordination Network  
Balakrishnan CN, Baldwin MW, Wirthlin M, Toda Y, Manakin RCN; East Carolina University, Max Planck Institute for Ornithology, Carnegie Mellon University, University of Tokyo

1:00 PM – 2:00 PM  Special Event
Can We Talk 2: “White Allies”  
Moore K, Mehta R; University of Rhode Island, UC Santa Cruz

7:00 PM – 8:00 PM  Special Event
Discussion on Allyship  
Moore K, Mehta R; University of Rhode Island, UC Santa Cruz

Friday 26 February

12:00 PM – 2:30 PM  Contributed Talk Session 48
Evolution and Biogeography of Islands: A Session in Honor of Dr. Vicki Funk  
Chair: Chris Martine

12:00 pm  48-1  Welcome to the Special Session: An Introduction  
Martine CT; Bucknell University

1:00 pm  48-2  Vicki Ann Funk (1947–2019), influential Smithsonian botanist  
Wagner W; Smithsonian Institution

1:30 pm  48-3  New perspectives on the evolution of plant breeding systems in the radiation of Hawaiian Schiedea (Caryophyllaceae)  
McDonnell A, Moore M, Sakai AK, Weiller SG, Wickett N; Chicago Botanic Garden, Oberlin College, University of California Irvine

1:45 pm  48-4  Temperate Eurasian origins of Hawaiian Chenopodium (Amaranthaceae), plus description of a new subspecies endemic to Moloka‘i  
Cantley JT, McDonnell AJ, Branson J, Kobara JR, Long S, Garnett W, Martine CT; San Francisco State University, Chicago Botanical Garden, Bucknell University, Wiliwil Native Plants

2:00 pm  48-5  Archipelago-wide patterns of colonization and speciation among an endemic radiation of Galápagos land snails  
Phillips JG, Linscott TM, Rankin AR, Kraemer AC, Shoobs NF, Parent CE; University of Idaho

2:15 pm  48-6  Reconstructing the history and biological consequences of a plant invasion on the Galapagos Islands  
Gibson MJS, Torres ML, Brandvain Y, Moyle LC; Indiana University, Universidad San Francisco de Quito, Galapagos Science Center, University of Minnesota-Twin Cities

2:30 pm  48-7  Overview of the origin and evolution of compositae of Pacific Oceania  
Keeley SC, Funk VA, Cantley JT; University of Hawaii at Manoa, Smithsonian Institution, San Francisco State University

Saturday 27 February

10:15 AM – 2:30 PM  Contributed Talk Session 61
Honoring the Life and Legacy of Dr. George Gilchrist: Evology, Evolution, and Physiology  
Chair: Martha Muñoz

10:15 am  61-1  Welcome to the Special Session: An introduction  
Muñoz MM; Yale University

10:30 am  61-2  Overture for George Gilchrist  
Kingsolver JG; University of North Carolina Chapel Hill

11:00 am  61-3  TiEnCh: Tools for translating environmental change into organismal responses  
Buckley LB; University of Washington

11:15 am  61-4  Constraints on specialist butterfly species range shift responses to recent climate change  
Diamond S; Case Western Reserve University
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 am</td>
<td>61-5</td>
<td>How will climate change affect the variance in fitness?</td>
<td>Muir CD, Sheth SN, Angert AL; University of Hawai'i, North Carolina State University, University of British Columbia</td>
</tr>
<tr>
<td>11:45 am</td>
<td>61-6</td>
<td>Morphological and performance consequences of hybridization between marine and land iguanas</td>
<td>Miles DB, Snell HL, Snell HM, Stone PA; Ohio University, University of New Mexico, University of Central Oklahoma</td>
</tr>
<tr>
<td>1:00 pm</td>
<td>61-8</td>
<td>Comparing thermal performance curves for metabolic rate, growth, and locomotion: evidence for tropical specialists and temperate generalists?</td>
<td>Ghalambor CK, Shah AA, Landeira-Dabarca A, Rugerski AT, Encalada AC, Thomas SA, Flecker AS, Poff NL; Norwegian University of Science and Technology, Colorado State University, University of Montana, Universidad San Francisco de Quito, University of Georgia, University of Nebraska, Cornell University</td>
</tr>
<tr>
<td>1:15 pm</td>
<td>61-9</td>
<td>Understanding phenotypic plasticity through the lens of George Gilchrist’s many contributions to the field</td>
<td>Gunderson AR; Tulane University</td>
</tr>
<tr>
<td>1:30 pm</td>
<td>61-10</td>
<td>Selection on physiological plasticity and balanced polymorphisms during rapid invasions</td>
<td>Lee CE, Stern DB, Posavi M; University of Wisconsin Madison</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>61-11</td>
<td>Shifts in the thermal performance curve across molecular, individual and population levels</td>
<td>El-Shesheny IA, Matoo OB, DeLong JP, Montooth KL*; Tanta University, University of Nebraska-Lincoln</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>61-7</td>
<td>George Gilchrist: Program Officer</td>
<td>Scheiner SM; National Science Foundation</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>61-13</td>
<td>George Gilchrist’s sage advice on everything a new scholar should know</td>
<td>Sidlauskas BL, Botero C, Burleigh JG, Hazkani-Covo E, McGuire J, Meachen J, O’Meara BC, Roberts T, McClain C; Oregon State University, Washington University in Saint Louis, University of Florida, Open University of Israel, Georgia Institute of Technology, Des Moines University, University of Tennessee, Natural History Museum of Los Angeles County, Louisiana Universities Marine Consortium</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>61-14</td>
<td>George Gilchrist — the Drosophila* years</td>
<td>Huey RB; University of Washington Seattle</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>61-15</td>
<td>Group discussion and toast</td>
<td>Muñoz MM; Yale University</td>
</tr>
</tbody>
</table>
### Best Student Presentation Competition Sessions

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

#### Sunday 3 January

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 PM</td>
<td>BSP-1</td>
<td>Perinatal hormones and offspring dispersal in the ovoviviparous Sceloporus jarrovii lizard</td>
<td>Manka-Worthington SE, Hews DK; Indiana State University</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>BSP-1</td>
<td>The effect of hypoxia and turbidity on male courtship behavior</td>
<td>Williams BL, Gray SM, Pinter LM; Ohio State University</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>BSP-1</td>
<td>Can you hear me now? Shoaling in a sensory-limited environment</td>
<td>LeFauve MK, Kawano SM, Hernandez LP, George Washington University</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>BSP-1</td>
<td>Sociality confers energetic savings in a facultatively social bee</td>
<td>Ostwald MM, Fox TP, Harrison JF, Fewell JH; Arizona State University</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>BSP-1</td>
<td>Some like it hot: Do female songbirds discriminate between songs produced under hot and cold temperatures?</td>
<td>Coomes CM, Derryberry EP; University of Tennessee Knoxville</td>
</tr>
<tr>
<td>3:15 PM</td>
<td>BSP-1</td>
<td>Bioluminescent backlighting illuminates the visual signals of a social squid in the deep sea</td>
<td>Burford BP, Robison BH; Stanford University, Monterey Bay Aquarium Research Institute</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>BSP-1</td>
<td>Age-dependent genetic variation in aggression</td>
<td>Fortunato JA, Earley RL; University of Alabama</td>
</tr>
<tr>
<td>3:45 PM</td>
<td>BSP-1</td>
<td>Uncovering the bidirectional link between testosterone and aggression in a female songbird</td>
<td>George EM, Rosvall KA; Indiana University Bloomington</td>
</tr>
</tbody>
</table>

#### 4:30 PM – 8:00 PM    BSP 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:30 PM</td>
<td>BSP-2</td>
<td>Kinematics and hydrodynamics analyses of flapping-wing swimming in a penguin</td>
<td>Harada N, Oura T, Maeda M, Shyen Y, Kikuchi DM, Tanaka H; Tokyo Institute of Technology, Royal Veterinary College</td>
</tr>
<tr>
<td>4:45 PM</td>
<td>BSP-2</td>
<td>The effects of skeletal muscle size on the tissue energy distribution and work output of 3D muscle during cyclic contractions</td>
<td>Ross SA, Dominguez S, Nigam N, Wakeling JM; Simon Fraser University</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>BSP-2</td>
<td>The critical influence of head movements on wing steering responses in fly flight</td>
<td>Cellini B, Mongeau J-M; Pennsylvania State University</td>
</tr>
<tr>
<td>5:15 PM</td>
<td>BSP-2</td>
<td>A biomechanical paradox in the dual-function axial musculature of fish</td>
<td>Jimenez YE, Marsh RL, Brainerd EL; Brown University</td>
</tr>
<tr>
<td>5:30 PM</td>
<td>BSP-2</td>
<td>Aquatic locomotion in non-aquatic birds and the secondary evolution of subsurface swimming</td>
<td>Lapsansky AB, Tobalske BW; University of Montana</td>
</tr>
<tr>
<td>5:45 PM</td>
<td>BSP-2</td>
<td>Flying in an uncertain world: system identification of flight performance following wing damage in fruit flies</td>
<td>Salem W, Mongeau JM; Pennsylvania State University</td>
</tr>
<tr>
<td>6:00 PM</td>
<td>BSP-2</td>
<td>Kinematics of terrestrial walking in balitorid loaches</td>
<td>Crawford CH, Cerrato-Morais CL, Webber-Schultz AC, Hort PB, Randall ZS, Chakrabarty P, Page LM, Suvarnaraksha A, Flamman BE; New Jersey Institute of Technology, Rutgers University, Louisiana State University, Florida Museum of Natural History, Maejo University</td>
</tr>
<tr>
<td>6:15 PM</td>
<td>BSP-2</td>
<td>All six degrees of freedom are essential to reconstructions of articular function</td>
<td>Manafzadeh AR, Gates SM; Brown University</td>
</tr>
<tr>
<td>7:00 PM</td>
<td>BSP-2</td>
<td>Gans Award Address: ‘Constraint’, a double-edged sword for evolution</td>
<td>Muñoz MM; Yale University</td>
</tr>
</tbody>
</table>
2:00 PM – 4:00 PM  BSP 3

**DCE Best Student Presentation: Aubrey Gorbman Award**  
*Chair: Kathleen Hunt*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Title</th>
<th>Authors/Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>BSP-3-1</td>
<td>Are glucocorticoids good indicators of condition across populations that vary in pollutant tolerance?</td>
<td>Shidemantle G, Buss N, Hua J; Binghamton University</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>BSP-3-2</td>
<td>Using claws to compare reproduction, stress, and diet of female bearded and ringed seals in the Bering and Chukchi seas, Alaska, between 1953-1968 and 1998-2014</td>
<td>Crain DD, Karpovich S, Quakenbush L, Polasek L; Baylor University, Alaska Department of Fish and Game</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>BSP-3-3</td>
<td>Testosterone implantation influences gut microbiome diversity, but not diet, in Red-backed Fairywrens</td>
<td>Khalil S, Houtz J, Welklin JF, Schwabi H, Karubian J; Tulane U, Cornell U, WSU</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>BSP-3-4</td>
<td>Determining pregnancy status in an induced ovulating mustelid (Mustela nigripes)</td>
<td>Fowler KJ, Santymire RM, Brown JS; University of Illinois at Chicago, Lincoln Park Zoo, Moffitt Cancer Center</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>BSP-3-5</td>
<td>The ecophysiology of tassel-eared squirrels and its relationship to food, weather, and reproduction</td>
<td>Zhang VY, Buck CL; Northern Arizona University</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>BSP-3-6</td>
<td>Effects of atrazine on the gonads and vocal behavior of Silurana tropicalis</td>
<td>Ferguson QR, Leininger EC; New College of Florida</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>BSP-3-7</td>
<td>Yolk fatty acids, but not androgens, predict offspring fitness in wild birds</td>
<td>Mentesana L, Andersson MN, Casagrande S, Goymann W, Isaksson C, Hau M; Max Planck Institute for Ornithology, Lund University</td>
</tr>
<tr>
<td>3:45 pm</td>
<td>BSP-3-8</td>
<td>Response of the thyroid axis and appetite-regulating peptides to fasting and overfeeding in goldfish, Carassius auratus</td>
<td>Deal CK, Volkoff H; Memorial University of Newfoundland</td>
</tr>
</tbody>
</table>

2:00 PM – 4:00 PM  BSP 4

**DEDB Best Student Presentation**  
*Chair: Deirdre Lyons*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Title</th>
<th>Authors/Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>BSP-4-1</td>
<td>Straw, sticks, and bricks: Genome duplication and the evolution of fibrillar collagens in the vertebrate musculoskeletal system</td>
<td>Root ZD, Allen C, Brewer M, Gould C, Medeiros DM; University of Colorado Boulder</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>BSP-4-2</td>
<td>A conserved transcriptional program underlies mesoderm- and neural crest-derived chondrocytes</td>
<td>Gomez-Picos P, Ovens K, Eames BF; University of Saskatchewan</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>BSP-4-3</td>
<td>Pisiform reduction in hominoids and sloths: phenotypic convergence through developmental diversity</td>
<td>Gavazzi LM, Kjosness KM, Reno PL; Kent State University, NEOMED, Philadelphia College of Osteopathic Medicine</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>BSP-4-4</td>
<td>Development of the amphiblastula of the calcareous sponge Sycon coactum</td>
<td>Verstraete CJ, Leys SP; University of Alberta</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>BSP-4-5</td>
<td>Comparing nervous system development and regeneration in the acelo Hofstienia miamia</td>
<td>Hulett RE, Loubet-Seneor K, Kimura JO, Srivastava M; Harvard University</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>BSP-4-6</td>
<td>The acelo Convolutrilia longifissura fuels up for regeneration through its algal symbionts</td>
<td>Nanes Sarfati D, Xue Y, Byrne AL, Le D, Darmanis S, Sikes J, Wang B; Stanford University, Chan Zuckerberg Biohub, University of San Francisco</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>BSP-4-7</td>
<td>How do arachnids make antennae out of legs? An evo-devo approach in whip spiders (Amblypygi)</td>
<td>Gainett G, Sharma PP; University of Wisconsin-Madison</td>
</tr>
<tr>
<td>3:45 pm</td>
<td>BSP-4-8</td>
<td>Comparative histology of developing sutures in the chicken skull with implications for the homology of the frontal bone</td>
<td>Arnout B, Lantigua KE, Mackenzie EM, McKinnell IW, Maddin HC; Carleton University</td>
</tr>
</tbody>
</table>
### Best Student Presentations

#### 4:30 PM – 6:30 PM  BSP 5

**DEDE Best Student Presentation**  
Chair: Laura Zimmerman

<table>
<thead>
<tr>
<th>Time</th>
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<th>Authors and Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:30 pm</td>
<td>BSP-5-1</td>
<td>Can parasite aggregation stabilize host-parasite populations? Linking individual parasite behaviour to population dynamics</td>
<td>Ramesh A, Jones T, Dorleans R, Totaro L, Bashey F; Indiana University</td>
</tr>
<tr>
<td>4:45 pm</td>
<td>BSP-5-2</td>
<td>Early viral immune challenge alters adult behavioral phenotype in the zebra finch (Taeniopygia guttata)</td>
<td>Williams SG, Grindstaff JL; Oklahoma State University</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>BSP-5-3</td>
<td>Drivers of parasite abundance: Environmental vs host effects</td>
<td>Vasquez D, Park AW; University of Georgia</td>
</tr>
<tr>
<td>5:15 pm</td>
<td>BSP-5-4</td>
<td>Completing the life cycle of QPX: evidence of zoospores and description of a new replication pathway</td>
<td>Brianik CJ, Geraci-Yee S, Collier J, Altam B; Stony brook university</td>
</tr>
<tr>
<td>5:30 pm</td>
<td>BSP-5-5</td>
<td>Transcriptome analysis of five coral species infected with Scleractinian Coral Tissue Loss Disease</td>
<td>Beavers K, Meiling S, MacKnight N, Dimos B, Brandt M, Mydlarz L; University of Texas at Arlington, University of the Virgin Islands</td>
</tr>
<tr>
<td>5:45 pm</td>
<td>BSP-5-6</td>
<td>Exploring the cloacal microbiome and fitness correlates in female tree swallows</td>
<td>Hernandez J, Belden LK, Moore IT; Virginia Tech</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>BSP-5-7</td>
<td>A feature-based analysis of Bombus gut microbiomes and C. bombi infection</td>
<td>Young M, Lee J, Just F, Angelini D; Colby College</td>
</tr>
<tr>
<td>6:15 pm</td>
<td>BSP-5-8</td>
<td>Microbial diversity and flexibility are associated with lay date in a wild songbird</td>
<td>Houtz JL, Taff CC, Vitousek MN; Cornell University</td>
</tr>
</tbody>
</table>

#### 2:00 PM – 4:00 PM  BSP 6

**DEE Best Student Presentation: Huey Award**  
Chair: Christine Miller

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors and Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>BSP-6-1</td>
<td>Reduced endurance and mitochondrial respiration in hybrid asexual lizards (genus: Aspidoscelis)</td>
<td>Klabacka RL, Parry HA, Yap KN, Cook RA, Heron TA, Horne LM, Maldonado JA, Oaks JR, Kavazis AN, Fujita MK, Schwartz TS; Auburn University, Villanova University, University of Missouri, University of Texas at El Paso, University of Texas at Arlington</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>BSP-6-2</td>
<td>The environmental drivers of variation in Junco physiological flexibility</td>
<td>Stager M, Senner NR, Swanson DL, Cheviron ZA; University of South Carolina, University of South Dakota, University of Montana</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>BSP-6-3</td>
<td>Developmental temperatures differentially affect survival across life stages</td>
<td>Pruett JE, Warner DA; Auburn University</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>BSP-6-4</td>
<td>Why are box jellyfish so toxic? Phylogenetic and selection analysis of an expanded family of putatively pore-forming jellyfish toxins across medusozoans (Cnidaria: Medusozoa)</td>
<td>Klompen AML, Kayal E, Collins AG, Cartwright P; University of Kansas, Station Biologique, Smithsonian Institution</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>BSP-6-5</td>
<td>How tradeoffs constrain evolvability at the range limit of the Trinidadian guppy</td>
<td>Mauro AM, Torres-Dowdall J, Marshall CA, Ghalambor CK; Colorado State University, University of Konstanz, Norwegian University of Science and Technology</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>BSP-6-6</td>
<td>Reproductive consequences of environmental stress in a Hawaiian coral reef fish</td>
<td>Tran LL, Johansen JL; University of Hawai‘i at Manoa</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>BSP-6-7</td>
<td>Historical forest stability shapes contemporary patterns of afrobatrachian frog diversity in central africa</td>
<td>Jongsma GFM, Barve N, Allen JM, Blackburn DC; Florida Museum of Natural History, University of Florida, University of Nevada Reno</td>
</tr>
<tr>
<td>3:45 pm</td>
<td>BSP-6-8</td>
<td>A tale of three inks: Comparison of free amino acid composition of ink from california sea hares, common cuttlefish, and pygmy sperm whales</td>
<td>Simonitis LE, Gahn MB, Kaiser K, Pion S, McLeitan WA, Marshall CD; Texas A&amp;M University at Galveston, Bayworld Centre for Research and Education (BCRE), University of North Carolina Wilmington</td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
<td>Title</td>
<td>Presenter</td>
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<tr>
<td>4:30 PM</td>
<td>BSP-7-1</td>
<td>Venom and social behavior: using spiders to evaluate the evolution of sociality under high risk conditions</td>
<td>Gatch L, Stein L, University of Oklahoma</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>BSP-7-3</td>
<td>A living shag rug: Sea urchin spine density differs by habitat and has consequences for vision</td>
<td>Notar JC, Mejia B, Johnsen S, Duke University</td>
</tr>
<tr>
<td>5:15 PM</td>
<td>BSP-7-4</td>
<td>Identification of Photosymbiosis-related genes in marine cockles (Subfamily Fraginae)</td>
<td>Li R, Zarate D, Avila-Magario V, Li J, University of Colorado Boulder</td>
</tr>
<tr>
<td>5:30 PM</td>
<td>BSP-7-5</td>
<td>Biomechanical role of dorsal thoracic spine in swimming of barnacle nauplii</td>
<td>Branam E, Wong JY, Xu K, Chan BKK, Koehi MAR, Chan KYK, Swarthmore College, Academia Sinica, University of California Berkeley</td>
</tr>
<tr>
<td>6:00 PM</td>
<td>BSP-7-6</td>
<td>Environmental predictability: a missing link in ocean acidification sensitivity research</td>
<td>Rojas M, Chan KYK, Swarthmore College</td>
</tr>
<tr>
<td>6:15 PM</td>
<td>BSP-7-7</td>
<td>Large effect of small temperature changes on embryonic development of Antarctic invertebrates</td>
<td>Lobert GT, Toh MWA, Moran AL, University of Hawai’i at Manoa</td>
</tr>
<tr>
<td>4:45 PM</td>
<td>BSP-8-1</td>
<td>Dragonfly wing mechanosensation</td>
<td>Yarger AM, Kluge J, Siwanowicz I, Lin HT, Imperial College London</td>
</tr>
<tr>
<td>4:45 PM</td>
<td>BSP-8-2</td>
<td>How do mosquitoes escape visual threats?</td>
<td>Wynne NE, Chandrasegaran K, Vinauger C, Virginia Polytechnic Institute and State University</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>BSP-8-3</td>
<td>Endocrine modulation of retinal sensitivity in Hyla cinerea</td>
<td>Walkowski WG, Santana A, Gaston T, Gordon WC, Bazan NG, Farris H, Louisiana State University Health Sciences Center</td>
</tr>
<tr>
<td>5:15 PM</td>
<td>BSP-8-4</td>
<td>Decision-making in a social world: sex and status differences in cognition in the cichlid fish Astatotilapia burtoni</td>
<td>Wallace KJ, Hofmann HA, University of Texas at Austin</td>
</tr>
<tr>
<td>5:30 PM</td>
<td>BSP-8-5</td>
<td>Epigenetic regulation of the VIP gene in a polymorphic songbird</td>
<td>Prichard MR, Merritt JR, Root J, Grogan KE, Money DL, Emory University</td>
</tr>
<tr>
<td>6:00 PM</td>
<td>BSP-8-6</td>
<td>Discovery of a highly-conserved behavioral role for an interneuron neuropeptide receptor</td>
<td>Chai CM, Wen C, Wong WR, Park HN, Cohen SM, Sternberg PW, Caltech</td>
</tr>
<tr>
<td>6:15 PM</td>
<td>BSP-8-7</td>
<td>Visual physiology of larval stomatopod crustaceans</td>
<td>McDonald MS, Cohen JH, Porter ML, University of Hawai’i at Mānoa, University of Delaware</td>
</tr>
<tr>
<td>6:30 PM</td>
<td>BSP-8-8</td>
<td>Directional hearing in salamanders</td>
<td>Capshaw G, Soares D, Christensen-Dalsgaard J, Carr CE, University of Maryland College Park, New Jersey Institute of Technology, University of Southern Denmark</td>
</tr>
<tr>
<td>6:45 PM</td>
<td>BSP-8-9</td>
<td>Role of nesfatin-1 in energetic state and maternal mouthbrooding in a cichlid</td>
<td>Chugh S, Maruska K, Louisiana State University</td>
</tr>
<tr>
<td>7:00 PM</td>
<td>BSP-8-10</td>
<td>Getting nature inside the lab using virtual reality</td>
<td>Kaushik PK, Renz M, Olsson SB, National Centre for Biological Sciences, Universität Bielefeld</td>
</tr>
</tbody>
</table>
Best Student Presentations

DOB Best Student Presentation: Rising Star in Organismal Botany Award
Chair: Chris Martine

2:00 pm  BSP-9-1  Granivory impacts on the Pennsylvania threatened species Baptisia australis var. australis (Fabaceae)  Moore CL, McDonnell AJ, Schuette S, Martine CT; University of Pittsburgh, Chicago Botanic Garden, Western Pennsylvania Conservancy, Bucknell University

2:15 pm  BSP-9-2  Resolving relationships within the genus Amorpha using whole chloroplast genomes  MacNeill BN, Stroud SK, Ivey EP, Brewer KZ, McCain MR; University of Alabama, Hobart and William Smith Colleges

2:30 pm  BSP-9-3  Phylogenomics of the rock daisies (Perityleae; Compositae) provides new perspectives on the evolution of fruit and flower traits  Lichter Marck IH, Freyman WA, Siniscalchi CM, Mandel JR, Castro-Castro A, Johnson G, Baldwin BG; UC Berkeley, Smithsonian Institution

2:45 pm  BSP-9-4  Rapid evolution of leaf characteristics in response to drought stress in populations of scarlet monkeyflower (Mimulus cardinalis)  Branch HA, Maxley DR, Anstett DN, Angert AL; University of British Columbia

3:00 pm  BSP-9-5  Structural organization of the spongy mesophyll in laminar leaves with reticulate venation  Borsuk AM, Roddy AB, Theroux-Rancourt G, Brodersen CR; Yale School of the Environment, Florida International University, University of Natural Resources and Life Sciences

4:30 PM – 6:15 PM  BSP 10

DPCB Best Student Presentation: Wake Award  Chair: David Blackburn

4:30 pm  BSP-10-1  Comparative analysis of cephalopod mitochondrial genomes reveals rapid sequence convergence across replicated genes or control regions within individuals  Rosales K, Edsinger E; Salk Institute

4:45 pm  BSP-10-2  Biology-guided neural network for species classification  Elhamod M, Maruf MA, Mandke PK, Karpatea A; Virginia Tech

5:00 pm  BSP-10-3  Evolution of non-visual opsin genes across life history transitions in frogs  Boyette JL, Bell RC, Fujita MK, Thomas KN, Streicher JW, Gower DJ, Schott RK; Berry College, California Academy of Sciences, University of Texas Arlington, Natural History Museum, National Museum of Natural History

5:15 pm  BSP-10-4  The evolution of bold color patterns across teleost fishes  Zapfe KL, Hodge JR, Larouche O, Friedman ST, Wainwright PC, Price SA, Clemson University, Rice University, Yale University, University of California Davis

5:30 pm  BSP-10-5  Convergent evolution of an elaborate display behavior in frogs is associated with similar changes to the androgen hormone system  Anderson NK, Schuppe ER, Gururaja KV, Hebbar P, Mangiaramele LA, Cusi Martinez JC, von May R, Preininger D, Fuxjager MJ; Brown University, Cornell University, Indian Institute of Science, Srishti Institute of Art, Design and Technology, Smith College, Universidad Nacional Mayor de San Marcos, California State University Channel Islands, University of Vienna

5:45 pm  BSP-10-6  Evaluation of body size and shape variation across latitude in teleost fishes  Camper BT, Friedman ST, Wainwright PC, Price SA; Clemson University, University of California Davis

6:00 pm  BSP-10-8  How to get high: Positive selection on mitochondrial genes in high-elevation species  Iverson ENK, Havird JC; University of Texas at Austin

6:15 pm  BSP-10-9  It’s not just a phase: evolutionary and functional consequences of sexually dimorphic color pattern diversity in labrid fishes  Karan EA, Schwartz ST, Perillo M, Alfaro ME; University of California Los Angeles
**Best Student Presentations**

**2:00 PM – 4:00 PM**  
**BSP 11**

**DVM Best Student Presentation: D. Dwight Davis Award**

*Chair: Patricia Hernandez*

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<tr>
<th>Time</th>
<th>Session</th>
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<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 pm</td>
<td>BSP-11-1</td>
<td>Limbs, shoulders, necks, and trunks: A search for the neck-trunk boundary in snakes using a comparative anatomical study of legless lizards</td>
<td>Koehler KL, University of Florida</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>BSP-11-2</td>
<td>Investigating serial homology of the adhesive structures of diplodactylid lizards (Reptilia: Gekkota)</td>
<td>Griffing AH, Sanger TJ, Gamble T, Marquette University, Loyola University in Chicago</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>BSP-11-3</td>
<td>Not to be flip: Anatomy and novel tendon morphology of the California sea lion hindflipper</td>
<td>Leahy AM, Fish FE, West Chester University</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>BSP-11-4</td>
<td>New methods support the possibility of a salamander-like walk in the Permian tetrapod Eryops</td>
<td>Herbst EC, Eberhard E, Manafzadeh AR, Richards C, Hutchinson JR, University of Zurich, EPFL, Brown University, Royal Veterinary College</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>BSP-11-5</td>
<td>Influences on cranial morphology in whales: Investigating the evolutionary history and diversity of the cetacean skull</td>
<td>Coombs E, Clavel J, Felice R, Bernion R, Beatty B, Goswarni A, Park T, Churchill M, Geisler J, University College London, Université Claude Bernard, University of Liège, New York Institute of Technology, University of Wisconsin-Oshkosh</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>BSP-11-6</td>
<td>Exploring the evolution of the tetrapod limb musculature by studying its embryology</td>
<td>Smith Paredes D, Vergara ME, Stundl J, Moses MM, Behringer RR, Cerny R, Bhullar BAS, Yale University, CalTech, University of Texas, Charles University</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>BSP-11-7</td>
<td>Stick with it: convergent evolution of eco-morphotypes in clingfishes</td>
<td>Huie JM, Hall KC, Summers AP, Conway KW, George Washington University, University of Washington, Texas A&amp;M University</td>
</tr>
<tr>
<td>3:45 pm</td>
<td>BSP-11-8</td>
<td>Do the cells in stingray mineralized cartilage perform the roles of bone cells? Quantitative analysis of the lacuno-canalicular network in stingray tesserae</td>
<td>Chaumel J, Schotte M, Bizzarro JJ, Zaslansky P, Fratzl P, Baum D, Dean MN, MPIKG, ZUSE, University of California, Charité Hospital</td>
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Contributed Talk Sessions

All contributed talks and posters for SICB 2021 were pre-recorded and uploaded to the SICB Pathable platform. They are available “on demand” to registered attendees from Jan 3-Feb 28.

Session 1  Complementary to S1: Blinded by the Light: Effects of Light Pollution Across Diverse Natural Systems
Session 2  Complementary to S2: Genomic Perspectives in Comparative Physiology of Mollusks: Integration Across Disciplines
Session 3  Complementary to S3: Physical Mechanisms of Behavior (Foraging)
Session 4  Complementary to S3: Physical Mechanisms of Behavior (Locomotion)
Session 5  Complementary to S3: Physical Mechanisms of Behavior (Sociality)
Session 6  Complementary to S4: Biology Beyond the Classroom: Experiential Learning Through Authentic Research, Design, and Community Engagement
Session 7  Complementary to S5: An Evolutionary Tail: Evo-devo, Structure, and Function of Post-anal Appendages
Session 8  Complementary to S6: Spatiotemporal Dynamics of Animal Communication
Session 9  Complementary to S7: The Integrative Biology of Pigment Organelles
Session 10 Complementary to S8: The Biology of Sticky: Adhesive Silk, Fiber, and Glue Biomaterials Across Eukaryota
Session 11 Complementary to S9: Sending and Receiving Signals: Endocrine Modulation of Social Communication
Session 12 Complementary to S10: Metachronal Coordination of Multiple Appendages for Swimming and Pumping I
Session 13 Complementary to S10: Metachronal Coordination of Multiple Appendages for Swimming and Pumping II
Session 14 Complementary to S11: Biology’s Best Friend: Bridging Disciplinary Gaps to Advance Canine Science I
Session 15 Complementary to S11: Biology’s Best Friend: Bridging Disciplinary Gaps to Advance Canine Science II
Session 16 Complementary to S12: Manakin Genomics: Comparative Studies of Evolution and Behavior in a Unique Clade of Birds
Session 17 Adaptation
Session 18 Aggregations & Migrations
Session 19 Animal Communication
Session 20 Anthropogenic and Urban influence on Behavior I
Session 21 Anthropogenic and Urban influence on Behavior II
Session 22 Biological Materials: (Ultra)Structure & Function I
Session 23 Biological Materials: (Ultra)Structure & Function II
Session 24 Biomimetics & Robotics
Session 25 Bone Structure: Ecology & Phylogeny
Session 26 Cellular and Molecular Physiology
Session 27 Climate Change and Species Interactions
Session 28 Community Ecology and Biodiversity
Session 29 Comparative Genomics
Session 30 Comparative, Environmental & Behavioral Endocrinology
Session 31 Conservation Biology
Session 32 Coral Reef Biology
Session 33 Coral Reefs and Climate Change
Session 34 Determinants of Metabolic Rate
Session 35 Development of Behavior
Session 36 Disparity and Diversification
Session 37 Eco-Evo-Devo & Life-History Transitions
Session 38 Ecomorphology I
Session 39 Ecomorphology II
Session 40 Ecomorphology III
Session 41 Education
Session 42 Endocrine Stress I
Session 43 Endocrine Stress II
Session 44 Endocrinology: Reproduction, Growth & Development
Session 45 Energetics
Session 46 Environmental Effects on Physiology
Session 47 Evo-Devo: Deep Homology
Session 48 Evolution of Behavior
Session 49 Evolutionary Developmental Genetics
Session 50 Evolutionary Ecology
Session 51 Evolutionary Morphology
Session 52 Evolutionary Physiology
Contributed Talks

Session 54  Fish Feeding I
Session 55  Fish Feeding II
Session 56  Flight Dynamics & Mechanics
Session 57  Foraging Behavior and Predator/Prey
Session 58  Foraging Behavior
Session 59  Global Change and Population Ecology
Session 60  Gut Microbiomes
Session 62  Hosts, parasites & pathogens: ecology and evolution
Session 63  Immune-based Trade-offs
Session 64  Immunity
Session 65  Impact of Climate Change on Physiology
Session 66  Insect Wing Structure-Function
Session 67  Larval Ecology
Session 68  Life History and Mating Systems
Session 69  Life in Moving Fluids I
Session 70  Life in Moving Fluids II
Session 71  Limb Biomechanics
Session 72  Locomotion: Body Stiffness & Posture
Session 73  Locomotion: Challenges & Obstacles
Session 74  Locomotion: Climbing & Complex Terrain
Session 75  Locomotion: Gaits & Gait Changes
Session 76  Microbiomes: More Than Guts
Session 77  Molecular Evolution
Session 78  Movement, Migration and Dispersal Behaviors I
Session 79  Movement, Migration and Dispersal Behaviors II
Session 80  Muscle-Tendon Structure-Function
Session 81  Neuroanatomy and Neurobiology
Session 82  Neuroethology
Session 83  Osmoregulation
Session 84  Parental Care
Session 85  Phenotypic Plasticity
Session 86  Photosynthesis, Respiration, and Ventilation
Session 87  Phylogenetics
Session 88  Physiology of Immunity and Reproduction
Session 89  Plasticity, Epigenetics, Stress, and Novelty
Session 90  Pollution and Ecotoxicology
Session 91  Population Genetics and Phylogeography
Session 92  Reproduction
Session 93  Sensory Biology and Neuroethology
Session 94  Sensory Biology I
Session 95  Sensory Biology II
Session 96  Sensory Ecology
Session 97  Sensory Structure-Function
Session 98  Skull & Jaw Functional Morphology & Evolution
Session 99  Social Behavior I
Session 100  Social Behavior II
Session 101  Species Distributions in the Anthropocene
Session 102  Spines & Sutures
Session 103  Structure-Function of Habitat Transitions
Session 104  Suckling, Swallowing & Chewing
Session 105  Swimming: Maneuvering & Stability
Session 106  Symbiosis and Immunity
Session 107  Temperature and Metabolism
Session 108  Thermobiology
Session 109  Thermoregulation
Session 110  (Un)Correlated Evolution
Session 111  Vertebrate Evo-Devo
## Contributed Talk Sessions

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

### Session 1

### Complementary to S1: Blinded by the Light: Effects of Light Pollution Across Diverse Natural Systems

**Chair:** Valentina Alaasam

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<th>Session 1</th>
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<td>1-1</td>
<td>Cold nights, city lights: Artificial light at night reduces photoperiodically induced diapause in urban and rural populations of Aedes albopictus</td>
<td>Westby KM, Medley KA; Washington University in Saint Louis</td>
</tr>
<tr>
<td>1-2</td>
<td>Urbanization masks natural cues of light, noise, and temperature that affect evening cricket chorus</td>
<td>Hopkins GR, Elgar MA, Gaston KJ, Visser ME, Jones TM; Western Oregon University, University of Melbourne, University of Exeter, Nethrlands Institute of Ecology</td>
</tr>
<tr>
<td>1-4</td>
<td>Festival of lights: The ecological benefits of monochromatic illumination vary by insect taxon</td>
<td>Owens ACS, Lewis SM; Tufts University</td>
</tr>
<tr>
<td>1-5</td>
<td>Moth Survival Increases Under High Pressure Sodium Lights</td>
<td>Seymour BM, Parrish T, Egan K, Irwin D, Crooks K, Angeloni L; Washington University, Colorado State University</td>
</tr>
<tr>
<td>1-6</td>
<td>A seabird’s eye view of artificial light and the moon</td>
<td>Moon HE, Porter ML; University of Hawai’i at Mānoa</td>
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<td>1-7</td>
<td>Measuring light pollution and its impact across the National Park Service</td>
<td>White JM; National Park Service</td>
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<tr>
<td>1-8</td>
<td>The effects of artificial light on nesting and feeding behaviors in eastern bluebirds and tree swallows</td>
<td>Utt DJ, Foltz SL; Radford University</td>
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<tr>
<td>1-9</td>
<td>Finding dark routes: A migrating nocturnal bird avoids artificial light during both travel and stopovers</td>
<td>Korpach AM, Garroway CJ, Mills AM, von Zuben V, Davy CM, Fraser KC; University of Manitoba, York University, Ontario Ministry of Natural Resources and Forestry</td>
</tr>
<tr>
<td>1-10</td>
<td>Do ground-based, downward-facing artificial lights affect the flight behavior of nocturnally migrating birds?</td>
<td>Cabrera-Cruz SA, Larkin RP, Gimpel ME, Gruber JG, Buler JJ; University of Delaware, University of Illinois, Washington College</td>
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<td>1-11</td>
<td>Tolerant toadlets: anthropogenic noise and light pollution increases feeding efficiency in juvenile common toads (Bufo bufo)</td>
<td>Ujhegyi N, Bombay B, Bdkony V; Plant Protection Institute, Centre for Agricultural Research, Pangea Cultural and Environmental Association</td>
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<tr>
<td>1-12</td>
<td>Seeing lizards in a new light: How does artificial light at night impact anoles?</td>
<td>Thawley CJ, Kolbe JJ; Neumann University, University of Rhode Island</td>
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### Session 2

### Complementary to S2: Genomic Perspectives in Comparative Physiology of Mollusks: Integration Across Disciplines

**Chair:** Maurine Neiman

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<tr>
<td>2-1</td>
<td>Neuroendocrine regulation of the metamorphic transition in the giant clam, Hippopus hippopus</td>
<td>Tan KP, Degnan SM, Conaco CG; University of the Philippines, University of Queensland</td>
</tr>
<tr>
<td>2-2</td>
<td>Evolve and resequence for egg size in a sea slug with striking life-history plasticity</td>
<td>Caplins SA; University of California Davis</td>
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<td>2-3</td>
<td>Comparative phylogenomics reveal complex evolution of life history strategies in a clade of bivalves with parasitic larvae (Bivalvia: Unionoida: Ambleminae)</td>
<td>Smith CH, Pfeiffer JM, Johnson NA; University of Texas Austin, Smithsonian Institution, U.S. Geological Survey, Wetland and Aquatic Research Center</td>
</tr>
<tr>
<td>2-4</td>
<td>Evolution in Sinocyclocheilus cavefish is marked by rate shifts, reversals, and origin of novel traits</td>
<td>Mao TR, Liu YW, Meegaskumbura M*, Ellepola G, Fu CH, Gross JB, Pie MR; Guangxi University, University of Cincinnati, Universidade Federal do Parana</td>
</tr>
<tr>
<td>2-5</td>
<td>Identifying molecular markers associated with resilience to ocean acidification in the eastern oyster</td>
<td>Schwaner C, Farhat S, Tanguy A, Boutet I, Barbosa M, Pales Espinosa E, Allam B, Stony Brook University, Station Biologique de Roscoff</td>
</tr>
<tr>
<td>2-6</td>
<td>Chitons on the cutting edge: the biomineralization of iron-clad teeth in Acanthopleura granulata</td>
<td>Varney RM, Speiser DI, Kingston ACN, Kocot KM; University of Alabama, University of South Carolina, University of Tulsa</td>
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Contributed Talks

2-7 The bilaterian ancestor possessed a complex apoptosis genetic toolkit that was subsequently dismantled in ecdysozoans but preserved in lophotrochozoans and deuterostomes
Plachetzki DC, Pankey MS, MacManes MD, Lesser ML, Walker CW; University of New Hampshire

2-8 High thermal tolerance, but not its plasticity, driven by habitat temperature and genotype in an intertidal sea hare
Tanner RL, Bowie RCK, Wang-Claypool C, Stillman JH; University of California Davis, University of California Berkeley, San Francisco State University

2-9 Thermal tolerance in the Mytilus species complex across multiple levels of biological organization
Schwartz LC, Truebano M, Strong EE, Hilbish TJ, Gonzalez VL; University of South Carolina at Columbia, University of Plymouth, Smithsonian Institution

2-10 Exploring the tolerance of Pacific geoduck to low pH through comparative physiology, genomics, and DNA methylation
Trigg SA, Putnam HM, Gurr SJ, Mitchell KR, Vadopolas B, Roberts SB; University of Washington, University of Rhode Island

2-11 Influence of ocean acidification on Pacific oyster (Crassostrea gigas) DNA methylation
Venkataraman YR, Roberts SB; University of Washington

2-12 Environmental learning in a tolerant commercial clam; Insights from phenotypic and subcellular adjustments to hypercapnic seawater
Gurr SJ, Trigg SA, Vadopolas B, Roberts SB, Putnam HM; University of Rhode Island, University of Washington

2-13 Physiological and genomic variation among cryptic species of a marsh snail (Melampus bidentatus)
Dennis AB, Inäebnit T; University of Potsdam

2-14 The mitochondrial genome of Melampus bidentatus (Panpulmonata, Ellobioidea)
Inäebnit T, Dennis A; University of Potsdam

Session 3

Complementary to S3: Physical Mechanisms of Behavior (Foraging)
Chair: Alejo Rico-Guevara

3-1 Trap morphology in the carnivorous plant genus Utricularia
Mordvinov Y, Peters KD, Gonzalez MS, Muller UK, Reece JS; CSU Fresno

3-2 Integrating tooth shape with strike mechanics in the process of prey capture in Boa constrictor
Ryerson WG, Van Valkenburg T; Saint Anselm College

3-3 Reassessing hummingbird foraging: Is there a territoriality-trapping continuum?
Sargent AJ, Rico-Guevara A, Groom DJE; University of Washington

3-4 For slow red lionfish, persistence and distance matter when pursuing fast prey
Peterson AN, McHenry MJ; University of California Irvine

3-5 Minimum requirements for an effective web in the grass spider Agelenopsis pennsylvanica
Spagna JC, Lewin D; William Paterson University

3-6 No trick anthers: buzz pollination behavior is elicited, but likely not manipulated, by anther chemical cues
Mosher A, Papaj D, Buchmann S, Eltz T, Russell A; Missouri State University, University of Arizona, University of Bochum

3-7 Does eye morphology predict predator avoidance behavior in the Carolina grasshopper (Dissosteira carolina)?
Brandley NC, Gilbert FR; College of Wooster

Session 4

Complementary to S3: Physical Mechanisms of Behavior (Locomotion)
Chair: Alejo Rico-Guevara

4-1 Remoras pick where they stick on blue whales
Flammang BE, Marras S, Anderson EJ, Lehmkuhl O, Mukherjee A, Cade DE, Beckert M, Nadler JH, Houzeaux G, Vázquez M, Amplo HE, Calambokidis J, Friedlaender A, Goldbogen JA; NJIT, Rutgers University, Woods Hole Oceanographic Institution, Barcelona Supercomputing Center, Stanford University, Georgia Tech Research Institute, University of California Santa Cruz

4-2 Tokay geckos (Gekkonidae: Gekko gecko) preferentially use substrates that elicit maximal adhesive performance
Garner AM, Parnfile AM, Dhinojwala A, Niewiarowski PH; University of Akron

4-3 Laboratory studies of burrowing locomotion in nematodes
Pierce CJ, Sun G, Lu H, Goldman DI; Georgia Institute of Technology

4-4 Unpredictable hummingbirds: Flight path entropy is constrained by speed and wing loading
Berberi I, Segre PS, Altschuler DL, Dokin R; Carleton University, Stanford University, University of British Columbia

4-5 Tardigrade stepping pattern is robust to changes in orientation and substrate
Nirody JA, Duran Rosario LA, Johnston D, Cohen DJ; Rockefeller University and University of Oxford, Princeton University
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<td>Uncovering the role of head flexion during beam obstacle traversal of cockroaches</td>
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<td>Spotted lanternfly nymphs stick the landing using multiple self-righting behaviors</td>
<td>Kane SA, Bien T, Contreras-Orendain L, Ochs MF, Hsieh ST*, Haverford College, College of New Jersey, Temple University</td>
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<td>Reffling: a novel locomotor behavior used by Neotropical armored catfishes (Loricariide) in terrestrial environments</td>
<td>Bressman NR, Morrison CH, Ashley-Ross MA, Chapman University, Wake Forest University</td>
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### Session 5

**Complementary to S3: Physical Mechanisms of Behavior (Sociality)**

**Chair:** Patrick Green

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<td>Fullerton JA, Weesner AT, Bentley I, Kloepper LN, Saint Mary's College</td>
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<td>Adult nutrition affects the defensive performance of an insect weapon</td>
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<td>Gallagher JH, Zonana DM, Broder ED, Tinghitella RM, University of Denver, Saint Ambrose University</td>
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<td>What is it like to be a bat: the physics of flight during high-speed roost re-entry in the Mexican free-tailed bat (Tadarida brasiliensis)</td>
<td>Kloepper LN, Bentley I, Harding C, Taylor GK, Saint Mary's College, Oxford University</td>
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<td>Palaoro AV, Peixoto PEC, Federal University of São Paulo, Federal University of Minas Gerais</td>
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<td>Nest substrate and tool shape significantly affect mechanics and energy requirements of avian eggshell puncture</td>
<td>Clark DL, Hauber ME, Anderson PSL, University of Illinois at Urbana-Champaign</td>
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### Session 6

**Complementary to S4: Biology Beyond the Classroom: Experiential Learning Through Authentic Research, Design, and Community Engagement**

**Chair:** Patrice Connors

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<td>Buendia Castillo D, Stanley C, Naidugar J, McCubbin S, Nethery B, Dupont-Versteegden E, Cooper R L*, University of Kentucky</td>
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### Session 7

**Complementary to S5: An Evolutionary Tail: Evo-devo, Structure, and Function of Post-anal Appendages**

**Chair:** Janneke Schwaner

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<td>Lin YH, Siddal R, Banerjee H, Schwab P*, Jusufi A, Max Planck Institute for Intelligent Systems</td>
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<td>The effect of tail autotomy on prey capture performance in Coleonyx variegatus geckos</td>
<td>Vollin MF, Higham TE, University of California Riverside</td>
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7-3 Markerless automated kinematic tracking of wild birds in agonistic flights
Swinsky CM, Hastings BT, Jackson BE; Longwood University, George Mason University

7-4 Comparative biomechanics of lizard tails during level walking and vertical climbing
Schultz JT, Cieri RL, Proost T, Clemente CJ; University of the Sunshine Coast, CSIRO

7-5 A Tail of Four Fishes: An analysis of kinematics and material properties of elongate fishes
Naughton LF, Jackson B, Porter ME, Donatelli CM; Bucknell University, University of Washington Friday Harbor Labs, Idaho State University, Florida Atlantic University, University of Ottawa

7-6 Caudal and column changes: tail and vertebral spine adaptations in amphibious cyprinodontiformes
Giammona FF, Minicozzi M, Ashley-Ross MA; Wake Forest University, Minnesota State University

7-8 Serotoninlated proteins in spermatozoa flagellum: detection and the possible impact on gametes motility in mammals
Shitikov AD, Voronezhskaya EE, Melnikova VI; Moscow State University, Koltsov Institute of Developmental Biology RAS

7-9 Biomechanics of tail heaving predict preferred walking speed of Tyrannosaurus rex
van Bijlert PA, van Soest AJK, Schulp AS; Vrije Universiteit Amsterdam and Naturalis Biodiversity Center, Vrije Universiteit Amsterdam, Naturalis Biodiversity Center and Utrecht University

Session 8

Complementary to S6: Spatiotemporal Dynamics of Animal Communication
Chair: Jessleen Kanwal

8-1 The evolution of face plumage patterns in amazon parrots
Ali JR, Stoddard MC; Princeton University

8-2 Color in motion: Using photogrammetry to study dynamic displays in virtual environments
Miller AE, Hogan BG, Stoddard MC; Princeton University

8-3 Surveying seasonal changes in behavior and wing coloration in a polyphenic butterfly
Hirzel GE, Westerman EL; University of Arkansas Fayetteville

8-4 Singing in a silent spring: birds respond to a half-century soundscape reversion during the COVID-19 shutdown
Derryberry EP, Phillips JN, Derryberry GE, Blum MJ, Luther D; University of Tennessee, Texas A&M San Antonio, George Mason University

8-5 Immediate effects of song competition on the song of male Lincoln’s sparrows
Sockman KW, Lyons SM, Caro SP; University of North Carolina

8-6 Simultaneous neural encoding of spatial and directional information in the dragonfly
Ko D, Haddad A, Clopath C, Lin HT; Imperial College London

8-7 Electromcommunication signals and aggression are temporally linked in an electric fish with male morphological variation
Freiler MK, Proffitt MR, Smith GT; Indiana University Bloomington

8-8 Self-grooming with an audience in mind, male meadow voles tailor their behaviors based on social contexts
Scauzillo RC, Ferkin MH; University of Memphis

8-9 Towards the neural basis of social attention hierarchies
Lessig EK, Hofmann HA; University of Texas at Austin

8-10 A computational model of locust visual motion detection incorporating global and feedforward inhibition
Olson EGN, Gray JR, Wiens TK; University of Saskatchewan

Session 9

Complementary to S7: The Integrative Biology of Pigment Organelles
Chair: Florent Figon

9-1 Pigment identification and quantification in the jewel beetles (Buprestidae: Stigmoderini)
Weir SE, Lord NP; Louisiana State University

9-2 Hiding in the deep: ultra-black camouflage in fishes
Davis AL, Thomas KN, Goetz FE, Robison BH, Johnsen S, Osborn KJ; Duke University, Natural History Museum, Smithsonian Institution, MBARI

9-3 Jewels of iridescence: Mechanisms of structural color and its significance in insect systematics
Chow A, Lord N; Louisiana State University AgCenter

9-4 Heating rates in jewel beetles are more strongly influenced by near-infrared than visible reflectance
Wang L-Y, Franklin AM, Black JR, Stuart-Fox D; University of Melbourne

9-5 The link between mitochondrial metabolism and pigment production in interpopulation crosses of copepods
Powers MJ, Martz LD, Weaver RJ, Burton RS, Hill GE; Auburn University, University of California San Diego, University of Texas at Austin
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<td>Lantana camara also uses lipids to make metallic blue fruit: a</td>
<td>Sinnott-Armstrong MA, Smith SD, Vignolini S</td>
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**Session 10**

**Complementary to S8: The Biology of Sticky: Adhesive Silk, Fiber, and Glue Biomaterials Across Eukaryota**  
*Chair: Sarah Stellwagen*

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<td>Ecomorphological correlates of the adhesive setae and setal fields</td>
<td>Garner AM, Wilson MC, Wright C, Russell AP, Dhinojwala A, Niewiarowski PH; University of Akron, University of Calgary</td>
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<td>of Jamaican anoles</td>
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<td>Stick to it: Comparisons of passive adhesion in waterfall-climbing</td>
<td>Palecek-McClung AM, Schoenfuss HL, Blob RW, Clemson University, Saint Cloud State University</td>
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<td>fishes on challenging substrates</td>
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<td>Cling performance and contact area in European Hydromantes (</td>
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<td>Speleomantes) salamanders</td>
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<td>3D imaging of the lizard adhesive system via photogrammetry</td>
<td>Hagey TJ, Pillai R, Riedel J, Schwarzkopf L, Mississippi University for Women, James Cook University</td>
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<td>Visualisation and ionic control of adhesive release in prey capture</td>
<td>Mercers GOT, Pickering M</td>
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<td>of the ctenophore Pleurobrachia pileus</td>
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**Session 11**

**Complementary to S9: Sending and Receiving Signals: Endocrine Modulation of Social Communication**  
*Chair: Julie Butler*

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<td>Reproductive state modulates retinal sensitivity to light in female</td>
<td>Leslie CE, Rosencrans RF, Walkowski W, Gordon WC, Bazan NG, Ryan MJ, Farris HE, University of Texas Austin, University of Alabama Birmingham, LSUHSC - New Orleans</td>
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<td>‘I’m open to it’: African giant pouched rat females signal</td>
<td>Freeman AR, Lo B, Choudhry A, Singh B, Ophir AG, Cornell University, Thomas Jefferson High School for Science and Technology</td>
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<td>reproductive availability to potential mates and competitors via</td>
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<td>altered signal composition but not via behavior</td>
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<td>Social transmission of queen estradiol levels in eusocial naked</td>
<td>Edwards PD, Mastromonaco G, Holmes MM, University of Toronto Mississauga, Toronto Zoo</td>
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<td>Sex-specific gene expression in Xenopus laevis laryngeal muscle</td>
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<td>Bukovich IMG, Richard SA, Tillman EA, Jayamohan S, Humphrey JS, Carrington PE, Bruce WE, Kluever BM, Avery ML, Parker MR, James Madison University, USDA APHIS NWRC, Gainesville, FL, USDA APHIS NWRC, Gainesville, FL, USDA APHIS NWRC, Gainesville, FL, USDA APHIS NWRC, Gainesville, FL</td>
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**Session 12**

**Complementary to S10: Metachronal Coordination of Multiple Appendages for Swimming and Pumping I**  
*Chair: Margaret Byron*

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### Session 13

**Complementary to S10: Metachronal Coordination of Multiple Appendages for Swimming and Pumping II**
Chair: Margaret Byron

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### Session 14

**Complementary to S11: Biology’s Best Friend: Bridging Disciplinary Gaps to Advance Canine Science I**
Chair: Heather Smith

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### Session 15

**Complementary to S11: Biology’s Best Friend: Bridging Disciplinary Gaps to Advance Canine Science II**
Chair: Alexandra Protopopova

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<td>Quantifying canine activity using collar-based accelerometers: a cut-point free approach</td>
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15-3  The role of companion animal scientists in anticipating and adapting to the fallout of climate change  
Protopopova A; University of British Columbia

15-4  "Who’s a smart boy?" Qualitative variation in the ability of dogs to learning object names  
Dror S, Miklósi A, Temesi A, Sommese A, Fugazza C; Eotvos Lorand University

15-5  Acoustics of dogs’ interspecific voice discrimination ability  
Gábor A, Kaszóds N, Faragó T, Pérez Fraga P, Lovas M, Andics A; Department of Ethology, ELTE

15-6  Social context influences resting physiology in wolves and dogs  
Kortekaas K, Jean-Joseph HG, Kotschal K; University of Vienna, University of Veterinary Medicine

15-7  Circannual time budget of equally raised wolves and dogs  
Jean-Joseph HG, Wacker K, Kotschal K; University of Vienna, University of Veterinary Medicine, Ludwig-Maximilian-University of Munich

15-8  A molecular perspective on the evolution of behavior in dogs  
Lord KA, Li X, Karlsson EK; University of Massachusetts Medical School, The Broad Institute of MIT and Harvard

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**Session 16**

**Complementary to S12: Manakin Genomics: Comparative Studies of Evolution and Behavior in a Unique Clade of Birds**  
Chair: Blake Jones

16-1  A telomeric perspective on the (anti-)aging phenotype of male wire-tailed manakins (Pipra flicauda)  
Vernasco BJ, Dakin R, Major AD, Hausmann MF, Ryder TB, Moore IT; Washington State University, Carleton University, Bucknell University, Bird Conservancy of the Rockies, Virginia Tech

16-2  Male-male coalitions and aggression in two species of manakins  
Alfonso CA, Moore IT; Virginia Tech

16-3  More than meets the eye: high-speed video reveals aerobic performance and the production of mechanical sounds in mating displays  
Boyle WA, Bodony DJ, Shogren EH, Nguyen L, Day EB; Kansas State University

16-4  Reciprocity is a pathway to social network stability  
Clunis P, Ryder TB, Dakin R; Carleton University, Bird Conservancy of the Rockies

16-5  Delayed plumage maturation in manakins: a review on its patterns and functions  
Schaedler LM, Taylor L, Anciães M; Instituto Nacional de Pesquisas da Amazônia, Yale University

16-6  Gene expression in neuroendocrine tissues of a cooperatively lekking bird, the wire-tailed manakin  
Bolton P E, Balakrishnan CN, Ryder T B, Dakin R, Moore I T, Hortan B M; East Carolina University, Smithsonian Institution, Virginia Tech, Millersville University

16-7  Genetic but not phenotypic differentiation is determined by geographic and climatic distances in the blue-crowned manakin  
Paulo P, Teófilo FH, Ferreira C, Moncrieff AE, Bandeira LN, Núñez-Penichet C, Bosholt M, Machado AF, Peçanha WT, Hrbeck T, Kaefer IL, Anciães M; Instituto Nacional de Pesquisas da Amazônia, Louisiana State University, University of Kansas, Universidade Federal do Rio Grande do Sul, Universidade Federal do Amazonas

16-8  Evolution of visual perception in response to dietary shift and sexual selection  
Driver RJ, White ND, Balakrishnan CN; East Carolina University, National Eye Institute

16-9  Testosterone-mediated behavior shapes social networks in wire-tailed manakins  
Dakin R, Moore IT, Hortan BM, Vernasco BJ, Ryder TB; Carleton University, Virginia Tech, Millersville University, Washington State University, Bird Conservancy of the Rockies

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**Session 17**

**Adaptation**  
Chair: Justin Havird

17-1  The specialists’ guide to the novel niche—How shifts in aggression, feeding behavior, and mate preference contribute to scale- and snail-eating in pupfishes  
St. John ME, Martin CH; University of California - Berkeley

17-2  Using integrative biology to infer adaptation from comparisons of two (or a few) species  
Cox CL, Logan ML; Florida International University, University of Nevada Reno, Georgia Southern University

17-3  Nanopore amplicon sequencing reveals molecular convergence and local adaptation of rhodopsin in Great Lakes salmonids  
Eaton KM, Bernal MA, Backenstose NJC, Yule DL, Krabbenhoff TJ; University at Buffalo, Auburn University, US Geological Survey
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<td>Significance of microbially-liberated urea-nitrogen in pregnant and lactating arctic ground squirrels</td>
<td>Sadowska J, Medlock S, Carlson KM, Buck CL, Duddleston KN; University of Białystok, University of Alaska, Northern Arizona University</td>
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<td>Effect of sprint training on Insulin-like Growth Factor 1 and Insulin-like Growth Factor 2 expression in green anoles (Anolis carolinensis)</td>
<td>Marks JR, Lailvaux SP, Beatty AE, Schwartz TS; University of New Orleans, Auburn University</td>
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<td>Weller HI, Schwartz ST, Karan E, Lord NP; Brown University, University of California Los Angeles, Louisiana State University</td>
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<td>Hall JM, Mitchell TS, Thawley CJ, Stroud JT, Warner DA; Auburn University, University of Minnesota, Neumann University, Washington University</td>
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<td>Selection (or lack thereof) on mitochondrial genes in animals: tales from bivalves, electric fishes, snakes, and elephants</td>
<td>Havird JC, Maeda G, Zwonitzer K; University of Texas at Austin</td>
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### Session 18

**Aggregations & Migrations**

*Chair: Valentina Di Santo*

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<td>Nguyen C, Ozkan-Aydin Y, Bhamla MS, Peleg O; University of Colorado Boulder, Georgia Institute of Technology, Santa Fe Institute</td>
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<td>Ozkan Aydin Y, Goldman D, Bhamla S*; Georgia Tech</td>
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<td>Internal structure of honey bee swarms</td>
<td>Shishkov O, Nave GK, Peleg O; University of Colorado Boulder</td>
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<td>Using dead reckoning to identify fine scale movements of navigating zebra in Botswana, Africa</td>
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**Animal Communication**

*Chair: Fernanda Duque*

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<td>Age-related stereotypy in song of grasshopper sparrows</td>
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19-9 Amplitude patterns in woodpecker drumming
Rutter AR, Roberts TJ; Brown University

19-10 A rallid ballad: Correlates of communal signaling in the rails (Rallidae), a model system for studies of avian duets
Goldberg DL, Sadd BM, Capparella AP; Illinois State University

19-11 Can you sing that again? Assessing wide-scale vocal adjustment in urban songbirds
Johnson JR, Piland NC; University of California Davis, University of Chicago

19-12 Toxic, unpalatable and aposematic butterflies respond to specialist predatory bird calls
Potolar S, Westerman EL; University of Arkansas

19-13 Acoustic variation across social contexts in neotropical singing mice (S. teguina)
Giglio EM, Campbell P, Phelps SM; University of Texas at Austin, University of California at Riverside

Session 20

Anthropogenic and Urban influence on Behavior I
Chair: Sara Lipshutz

20-1 Large scale deregulation of gene expression by artificial light at night in the common toads
Touzot M, Lefebure T, Lengagne T, Secondi J, Duchamp C, Mondy N; Lyon 1 University

20-2 Behavioral and transcriptomic responses to sublethal thermal stress in zebra finches
Lipshutz SE, Howell CR, Buechlein AM, Rusch DB, Derryberry EP, Rosvall KA; Indiana University Bloomington, University of Tennessee Knoxville

20-3 A widely used mito-toxic fungicide negatively affects honey bee (Apis mellifera) hemolymph protein and vitellogenin levels
Fisher II A, DeGrandi-Hoffman G, Smith BH, Fewell JH, Harrison JF; Arizona State University, USDA-ARS

20-4 Anthropogenic effects on European starling nestlings growth and cholesterol
Linkous CR, Guindre-Parker S; Kennesaw State University

20-5 Parenting in the city: Does urbanization influence avian incubation behavior?
Hope SF, Hopkins WA, Angelier F; Centre d’Etudes Biologiques de Chizé, Virginia Tech

20-6 The sensory impacts of climate change: Bathymetric shifts and visually-mediated interactions in aquatic species
Caves EM, Johnsen S; University of Exeter, Duke University

20-7 Environmentally relevant atrazine exposure causes chemosensory deficits, DNA damage and changes in cell morphology
Belanger RM, Cile KG, Abdulelah SA; University of Detroit Mercy

20-8 What about large waste? Effects of plastic bags on behavior of zebrafish
Suarez-Rodriguez MSR, Tufarelli AT, Suryampola PSS, Martins EPM; Arizona State University

Session 21

Anthropogenic and Urban influence on Behavior II
Chair: Sydney Hope

21-1 It’s getting hot in here: The effects of temperature on behavioral allocation in songbirds
Messerly Kl, Coomes CM, Derryberry EP; University of Tennessee - Knoxville

21-2 Turning up the lights: Ocean acidification may increase light intensity of secretory bioluminescent signaling
Iwanicki T, DeTurk H, Porter ML; University of Hawai‘i at Manoa

21-3 The role of ionotropic receptors in behavioural alterations at elevated CO2 in a cephalopod
Thomas JT, Spady BL, Munday PL, Watson S-A; James Cook University, Museum of Tropical Queensland

21-4 Effects of bisphenol-A on the morphology and survival of larvae of the sand dollar Dendraster excentricus (Echinodermata, Echinoidea)
Darin EA; California State University Long Beach, Cabrillo Marine Aquarium

21-5 Urbanization affects individual behavior and cognition in Gambusa affinis
Perez A, Gabor C, Asbury A; Texas State University

21-6 Effects of boat motor sound on bluegill sunfish (Lepomis macrochirus) nesting behavior
Hall LM, Mensinger AF; University of Minnesota-Duluth

21-7 Opening the black box of bird-window collisions: passive field recording and experiments in laboratory
Samuels B, MacDougall-Shackleton S, Fenton B; University of Western Ontario, University of Western Ontario

21-8 Is spatial navigation in echolocating bats affected by pesticides?
Sandoval Herrera NL, Faure PA, Welch Jr. K; University of Toronto, McMaster University
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21-9  The ramifications of prolonged co-exposure to heat and pesticide conglomerate in swimming behaviors of common goldfish (Carassius auratus)  
Lacy B, Rivera M, Estrada L, Rahman M; University of Texas Rio Grande Valley, Brownsville TX

#### Session 22

**Biological Materials: (Ultra)Structure & Function I**  
Chair: Molly Gabler-Smith

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<td>Fight or flight: tradeoffs between mechanical and behavioral defenses in bivalve shell shape</td>
<td>Johnson EH; Paleontological Research Institution</td>
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<td>High spatial resolution mapping of the mucosal proteome of the gills of Crassostrea virginica: implication in particle processing</td>
<td>Pales Espinosa E, Allam B; Stony Brook University</td>
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<td>Mighty fine spines: trade-offs in puncture performance among spiny cartilaginous fishes</td>
<td>Kennedy KN, Hall KC, Cohen KE, Donatelli CM, Kruppert S, Kolmann MA; University of California Berkeley, University of Washington, Friday Harbor Labs, University of Ottawa, University of Michigan</td>
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<td>High resolution measurements of billfish skin roughness</td>
<td>Stewart MT, Wainwright DK, Nikora VI, Cameron SM, Thunert M, Stoesser T; University of Aberdeen, Yale University Peabody Museum of Natural History, ThorLabs, University College London</td>
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<td>Variable roughness of shark skin inspired surface impacts bacterial migration rates</td>
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<td>22-9</td>
<td>Shark dermal denticles: novel patterns on branchial skin</td>
<td>Gabler-Smith MK, Wainwright DK, Wong GA, Lauder GV, Harvard University, Yale University</td>
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<td>The surfaces of sharks and bony fishes: a comparison of scale structure and function</td>
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#### Session 23

**Biological Materials: (Ultra)Structure & Function II**  
Chair: Dara Orbach

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<td>Scaling of secretory cells and cell products with body size in hagfishes</td>
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<td>That’s not how it works: Particle aggregation in the viscous environment of the epibranchial organ</td>
<td>Evans AJ, Cohen KE, Summers AP, Kolmann MA, Egan JP, Hernandez LP; George Washington University, University of Washington, University of Michigan, Western Michigan University</td>
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<td>How the vombatus ursinus forms cubic feces, with an application to the feces of terrestrial mammals</td>
<td>Magondu B, Cervantes G, Lee A, Kaminski C, Yang P, Carver S, Hu D; Georgia Institute of Technology, University of Tasmania</td>
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<td>Peeing one drop at a time: How sharpshooter insects use superpropulsion to launch their fluid excreta and why</td>
<td>Chalita EJ, Acharya R, Krugner R, Bhamla S; Georgia Institute of Technology, United States Department of Agriculture</td>
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<td>Moth-catching by spiders: the spreading behavior of capture glue depends on the morphology of moth scales</td>
<td>Diaz C, Aaron E, Long JH; Vassar College, Colby College</td>
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<td>Mobility power flow: How click beetles transmit and dissipate mechanical power</td>
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23-11 Elephant Trunks expand in volume when reaching for distant objects  
Boyle M, Schulz A, Hu D; Georgia Tech

23-12 Wrinkles and folds enable stretching of elephant trunk skin  
Fourney E, Sukhwani A, Schulz A, Hu D; Georgia Tech

Session 24

Biomimetics & Robotics  
Chair: Robert Brocklehurst

24-1 Function in evolutionary biology and biomimetics: moving past the philosophical conundrum  
Snell-Rood EC, Smirnoff D; University of Minnesota

24-2 An untethered remora-inspired suckerfish robot: locomotor effects of the disc pad, undulatory body, and pectoral fins  
Wang S, Zhao W, Wainwright DK, Xu H, Li L, Sun W, Wen L; Beihang University, Yale University

24-3 The biomimetic remora disc with independent compartment enables an aerial-aquatic quadrotor robot perching to diverse complex surfaces  
Li L, Wang S, Chen B, Song S, Zhao W, Wen L; Beihang University

24-4 Using a biologically mimicking climbing robot to explore the performance landscape of climbing in lizards  
Clemente CJ, Schultz JS, Beck HK, Haagensen T, Proost T; University of the Sunshine Coast, Hochschule Bremen

24-6 Tuna robotics: measuring body pressure, thrust forces, and work during linear acceleration  
Thandiackal R, White C, Bart-Smith H, Lauder G*; Harvard University, University of Virginia

24-7 Robophysical models clarify the effects of body depth on fish maneuverability  
Howe SP, Bryant K, Duff A, Astley HC; University of Akron

24-8 Performance tradeoffs in anguilliform swimming via viscoelastic modulation  
Poez L, Melo K, Ijspeert A, EPFL, KM-RoBoTa Sarl

24-9 Passive environmental navigation via mechanical interactions in a novel snake robophysical model  
Maisonneuve MC, Schiebel PE, Díaz K, Goldman DI; Georgia Institute of Technology, Harvard

24-10 A sensorized robophysical model to study snake locomotion in complex 3-D terrain  
Ramesh D, Fu Q, Wang K, Othayoth R, Li C; Johns Hopkins University

24-11 Advantages of limb-body coordination and passive body structures in a myriapod robophysical model  
Ozkan-Aydin Y, Aydin E, Chong B, Goldman DI; Georgia Tech

24-12 Minimal robophysical model for multi-flagellate propulsion  
Díaz K, Robinson TL*, Ozkan-Aydin Y, Goldman DI, Wan K Y; Georgia Tech, University of Exeter

Session 25

Bone Structure: Ecology & Phylogeny  
Chair: Emily Lessner

25-1 The microarchitecture and mechanical properties of cetacean vertebral trabecular bone  
Ingle DN, Porter ME; Texas A&M University at Galveston, Florida Atlantic University

25-2 Evolution of bone cortical compactness in slow arboreal mammals  
Affiari F, Nyakatura JA, Amson E; Institut für Biologie, Leibniz-Institut für Evolutions- und Biodiversitätsforschung

25-3 Bone plasticity in arboreal mammals: Material and mechanical properties of sloth limb bones  
Mossor AM, Young JW, Butcher MT; NEOMED, Youngstown State University

25-4 Differing effects of size and lifestyle on bone structure in mammals  
Amson E, Bibi F; Museum fur Naturkunde - Leibniz-Institut fur Evolutions- und Biodiversitätsforschung

25-5 Changes in limb bone neutral axis orientation during climbing in iguanas  
Munteanu VD, Diamond KM, Blob RW, Clemson University, Seattle Children’s Research Institute

25-6 Adventures inside shrew vertebrae: trabecular bone morphology and regionalization in Soricidae  
Smith SM, Angielczyk KD; Field Museum of Natural History, Negauuwe Integrative Research Center

25-7 Diversification of internal vertebral morphology of actinopterygian fishes along the benthic-pelagic habitat axis  
Baxter DL., Tytell ED; Tufts University

25-8 Characterizing the effects of increased muscle load on the flat scleral ossicles of Danio rerio  
McInnis SJL, Franz-Odendaal TA; Saint Mary's University, Mount Saint Vincent University

25-9 Effects of captivity on the bone microstructure of xenarthrous vertebrae  
Zack EH, Smith SM, Angielczyk KD; University of Chicago, Field Museum of Natural History
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25-10 Limb bone mineral density and morphology affected by more than just body mass in domestic turkeys
Betterton LM, Shirk MT, Pirtle JM, Rohlf P, Stover KK*; WVSOM, Aviagen Turkeys Inc.

25-11 Fusion reinforces metatarsals and facilitates larger body sizes in jerboas (Dipodidae)
Villacís Núñez CN, Cooper KL, Moore TY; University of Michigan, University of California San Diego

25-12 Postcranial skeletal pneumaticity in Accipitriformes
Gutherz SB, O’Connor PM; Ohio University

25-13 Trying to understand bird bone? You’ll need reinforcements!
Chase HT, Tobalske BW; University of Montana

Session 26

Cellular and Molecular Physiology
Chair: Wendy Hood

26-1 Gene regulatory roles of DNA methylation during transgenerational plasticity in the sea urchin Strongylocentrotus purpuratus
Bogan SN, Strader ME, Hofmann GE; University of California Santa Barbara, Auburn University

26-2 Molecular responses to catastrophic molting in a marine mammal
Keith A, Khudyakov J, Codde S, Vierra C, Crocker D; University of the Pacific, Inventory & Monitoring Program, Sonoma State University

26-3 Seal endothelial cells mount a rapid and sustained response to hypoxia
Allen KN, Luong D, Vázquez-Medina JP; University of California Berkeley

26-4 Direct reprogramming of dermal fibroblasts derived from Northern elephant seals into muscle cells
Lam EK, Torres-Velarde JM, Allen KN, Crocker DE, Vázquez-Medina JP; University of California Berkeley, Sonoma State University

26-5 Effect of temperature on heart rate for Phaenicia sericata and Drosophila melanogaster with altered expression of the TRPα1 receptors
Marguerite NT, Bernard J, Harrison DA, Harris D, Cooper RL; University of Kentucky

26-6 Insectahemoglobins: Transcriptomes reveal expression of hemoglobins throughout Insecta
Herhold HW, Davis SR, Grimaldi DA; American Museum of Natural History

26-8 Cold stimulated cytoskeletal arrest in western painted turtle hepatocytes
Hood WR; Auburn University

26-9 Life history, condition dependency, and mitochondrial performance
Yap KN, Yamada KYH, Zikeli SL, Zhang Y, Zhang Y, Kavazis AN, Gladden LB, Roberts MD, Kiaris H, Hood WR; Auburn University, University of Memphis, University of South Carolina

26-10 Individual variation in cellular unfolded protein response, respiratory capacity, and stress tolerance in deer mice (Peromyscus maniculatus)
Yost CM, Gnoose MA, Yang JL, Utsumi KL; University of Wyoming, Mississippi State University, University of Southern California, University of Kansas

26-11 Expression of markers associated with carbon monoxide signaling in a deep-diving mammal
Boël M, Roussel D, Voituron Y; Lyon 1 University

26-12 A three-quarter reduction of muscular metabolism in mammals: A universal mitochondrial threshold for reactive oxygen species release?
Boël M, Roussel D, Voituron Y; Lyon 1 University

Session 27

Climate Change and Species Interactions
Chair: Dillon Monroe

27-1 Exposure to warmer water, but not pond drying as tadpoles contributes to decreased survival when exposed to fire ants
Monroe DM, Offermann G, Gabor CR; Texas State University

27-2 The influence of conspecifics in thermal preference in tree lizards (Urosaurus ornatus)
Goerge TM, Miles DB; Ohio University

27-3 Climate change and ecological interactions: How vegetation cover affect the performance of desert lizards?
Stark G, Levy O; Tel Aviv University

27-4 Field and behavioral analysis of microhabitat preference in two species of Plethodontid salamanders in the Southern Appalachian Mountains
Chapman TL, Bidwell JR; East Tennessee State University

27-5 Social network analysis of two sympatric lizard species long-nosed leopard lizards (Gambelia wislizenii) and Western whiptails (Aspidoscelis tigris)
Yost CM, Gnoose MA, Yang JL, Utsumi KL; University of Wyoming, Mississippi State University, University of Southern California, University of Kansas
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<td>Mroue-Ruiz FH, Schramm-Urrutia Y, Pacheco-Sandoval A, Giffard-Mena I, Abadia-Cardoso A, Chong-Robles J, Lago-Lestón A; Universidad Autónoma de Baja California, Centro de Investigación Científica y de Educación Superior de Ensenada</td>
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29-5  Assigning rural and urban origin to burrowing owls (Athene cunicularia) using traditionally omitted genomic data  
Zaragoza G, Fitak RR, Robson C; University of Central Florida

29-6  Deeply altered genome architecture in the iconic endoparasitic flowering plant Rafflesiaaceae  
Cai L, Arnold B, Xi Z, Khost D, Patel N, Hartmann C, Manickam S, Sasirat S, Nikolov LA, Mathews S, Sackton T, Davis CC; Harvard University, Sichuan University, University of Connecticut, University of Malaya, Queen Sirikit Botanic Garden, University of California Los Angeles, Louisiana State University

29-7  Differential gene expression in an invasive ascidian as a response to temperature  
Shipman BM, Ernst DA, Dijkstra JA, Westerman EL; University of Arkansas, University of Texas Dallas, University of New Hampshire

29-8  No vagina, one vagina, or multiple vaginas? An integrative study of Pseudaxine trachuri (Monogenea, Gastrocotylidae) leads to a better understanding of the systematics of Pseudaxine and related genera  
Bouguerche C, Tazerouti F, Delphine G, Justine JL; Université des Sciences et de la Technologie Houari Boumediene, Muséum National d’Histoire Natuerele

29-9  Evolution of DNA methylation in Cnidaria  
Zhang P, Jacobs D; University of California Los Angeles

29-10 The Acoelomorphan circadian clock reveals a critical point at which the PER/CRY heterodimer evolved as the negative regulator in Animalia  
Stanton DS, Hurlbert JC, Smith JP; University of Florida, Winthrop University

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Comparative, Environmental & Behavioral Endocrinology  
Chair: Carolyn Bauer

30-1 Preparation, departure, and flight: review of evidence for corticosterone’s roles in avian migration  
Bauer CM, Watts HE; Swarthmore College, Washington State University

30-2 Variation in androgen receptor sequence corresponds to variation in androgen responsiveness across two ghost knifefish species  
Proffitt MR, Smith GT; Indiana University

30-3 Associations between multiple physiological mechanisms within an individual  
McMahon EK, Youatt E, Cavigelli S; Pennsylvania State University

30-4 Hair cortisol for non-invasive health evaluation in the big brown bat, Eptesicus fuscus  
Jorgensen MA, Hews DK; Indiana State University

30-5 Telomere length explains interindividual variation in physiological and behavioral responses to experimentally-induced declines in local food availability in free-living seabirds  

30-6 The role of testosterone in regulating the movement behaviours of juvenile migrant songbirds  
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30-8 Thinking hard: Measuring physiological and neuroendocrine responses to problem-solving challenges in a captive avian social system  
Myers DC, Davis JE; Radford University

30-9 Adrenal melatonin 1a receptor (Mel4aR) signaling regulates territorial aggression in male Siberian hamsters (Phodopus sungorus)  
Munley KM, Dutta S, Jasnow AM, Demas GE; Indiana University, Kent State University

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Chair: Melissa Bernhard

31-1 Water quality determinants of the density of zooplankton subsidies from polymictic reservoirs to streams  
Ruhl NA, Ruggiero DA, Iuliuucci SC, Rollo FA, Grove MW, Richmond CE; Rowan University

31-2 Can eDNA be used to estimate biomass? A Case Study for Using Carcinus maenas  
Danziger AM, Frederich M; University of New England

31-3 Testing the role of hormone-driven chemical signals in Burmese python trailing behavior  
Nazarian LA, Bukovich IMG, Curylow AF, Josimovich JJ, Robinson CJ, Nafus MG, Yackel Adams AA, Parker MR; James Madison University, USGS Ft. Collins Science Center

31-4 Environmental DNA detection method from soil samples for Eastern Indigo snakes (Drymarchon couperi)  
Galbraith E, Santamaria C, Hoffman M, Gainsbury A; University of South Florida, Orianne Center for Indigo Conservation
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### Session 32

**Coral Reef Biology**

**Chair:** Marie Strader

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<td>Rippe JP, Moreland KN, Baumann JH, Aichelman HE, Castillo KD, Davies SW, Matz MV; University of Texas at Austin, Bowdoin College, Boston University, University of North Carolina at Chapel Hill</td>
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### Session 33

**Coral Reefs and Climate Change**

**Chair:** Colleen Bove

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33-5 Effects of land-based sources of pollution on coral thermodurality
Naugle M, Grossman J, Logan C; California State University

33-6 Effects of divergent temperature stress on microbial communities in Oculina arbuscula
Weldon JK, Rivera HE, Davies SW; Boston University

33-7 Symbiotic state influences transcriptional responses of facultatively symbiotic corals in response to thermal challenges
Wuitchik DM, Michalsen HE, Atherton KF, Kriefall NG, Tramonte CA, Davies SW; Boston University, Boston College

33-8 Do high heat resistant corals have lower recovery rates from bleaching?
Walker NS, Palumbi SR; Stanford University, Hopkins Marine Station

33-9 Shallow hypoxia on diverse tropical reef systems is an underestimated threat for marine ectotherms
Lucy SM, Haskett E, Collin R; Smithsonian Tropical Research Institute

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Chair: Bernard Rees

34-1 Metabolism of small groups of fire ants workers scale isometrically
Komilian K, Ko H, Waters J, Hu D; Georgia Institute of Technology, Providence College

34-2 Evaluating methods to determine maximum oxygen consumption by Gulf killifish, Fundulus grandis
Mullen SC, Knecht KJ, Rees BB; University of New Orleans

34-3 Individual variation in standard and maximum metabolic rate correlates with gill morphology and cardiac bioenergetics
Rees BB, Reemeyer JE, Irving BA; University of New Orleans, McGill University, Louisiana State University

34-4 Active and resting metabolic rate scaling relationships in fishes across ecologies, salinity, and body shapes
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34-5 Inferring whole-organism metabolic rate from red blood cells? Yes, in non-stressed birds
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34-6 All in? No effect of meal size on postprandial metabolic rates in Children’s pythons
Bow HF, Campbell TM, Gonzales ES, Michels LG, Schwartz SR, Liwanag HEM, Strand CR; Cal Poly State U

34-7 Oxygen consumption during embryonic development in the oviparous snake, Pantherophis guttatus
Gallardo CR, Stewart JR, Bidwell JR; East Tennessee State University

34-8 Selective breeding for voluntary exercise partially supports the aerobic capacity model for the evolution of endothermy
Schwartz NL, McNamara MP, Rashid JO, Garland Jr T; University of California Riverside

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Chair: Robert Fitak

35-1 Behavior of the encapsulated embryos of little skates, Leucoraja erinacea
McShaffrey C, Forbes E, Long JH; Vassar College

35-2 Developmental environment has lasting effects on amphibian behavior and thermal physiology
Ohmer MEB, Hammond TT, Switzer S, Paciotta E, Coscia J, Richards-Zawacki CL; Washington University in St. Louis, University of Pittsburgh

35-3 The effects of short- and long-term environmental enrichment on exploratory behaviors in Trinidadian guppies (Poecilia reticulata)
Iffert RO, Stein LR; University of Oklahoma, Colorado State University

35-4 Embryonic environmental cues alter behavioral responsiveness but not performance in larval fathead minnow (Pimephales promelas)
Crowder C, Ward J; Ball State University

35-5 Behavioral development and the emergence of adult phenotype in a highly social fish
Solomon-Lane TK, Wallace KJ, Butler RM, Hofmann HA; Pittenger, Scripps, and Claremont McKenna Colleges, University of Texas at Austin, University of Chicago

35-6 Cognitive biomechanical decisions to negotiate unstable branches in fox squirrels
Ruopp R, Wang L, Lee S, Full R; University of California Berkeley

35-7 Development of the O2 sensing system in an amphibious fish
Cochrane PV, Jonz MG, Wright PA; University of Guelph, University of Ottawa
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*Chair: Samantha Price*

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**Eco-Evo-Devo & Life-History Transitions**  
*Chair: Jessica Goodheart*

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**Chair: Tristan Stayton**

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#### Ecomorphology II
**Chair: Kate Riordan**

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<td>Bringing fossils back to life: 3D cranial reconstructions of the highly flattened remains of Thalattosauroinformes</td>
<td>Bostiaans D, Herbst EC, Scheyer TM; University of Zurich Switzerland</td>
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<td>Hodge JR, Friedman ST, Wainwright PC, Price SA; Clemson University, Yale University, University of California Davis</td>
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<td>Biology-guided neural network for fish trait discovery</td>
<td>Maruf MA, Elhamoud M, Mandke PK, Karpatne A; Virginia Polytechnic Institute and State University</td>
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<td>39-9</td>
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<td>Three-dimensional shape analysis with no landmarks: Insights from marine mammal vaginas</td>
<td>Orbach DN, Brassey CA, Gardiner JD, Brennan PL, R, Texas A&amp;M University-Corpus Christi, Manchester Metropolitan University, University of Liverpool, Mount Holyoke College</td>
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**Session 40**

**Ecomorphology III**  
*Chair: Jenny Gumm*

**40-1** Thermal biomechanics

**40-2** The morphology and thermal function of sea otter pelts across ontogeny

**40-3** Tied to the tide: developmental differences in sculpin species

**40-4** Turbot boosted: rapid and mosaic patterns of shape evolution in the flatfish skull

**40-5** It's complicated: Examining convergent evolution of craniofacial morphologies in apteronotid and mormyrid electric fishes

**40-6** Growth rates and morphology of wild, refuge and lab derived Devils Hole pupfish (Cyprinodon diabolis)

**40-7** Morphological based relationships of the Molidae family supported by molecular phylogeny and 3D geometric morphometrics

**40-8** Ontogenetic change in performance: do innovations constrain performance?

**40-9** Effects of free versus tethered food presentation on axolotl strike velocity

**Session 41**

**Education**  
*Chair: Aaron Olsen*

**41-1** Translating fish skull science into a product: My first year launching an employee-owned animal anatomy and mechanics bio-design company

**41-2** Coconuts not included: Merging art with real data to animate bird flight

**41-3** Transforming the undergraduate curriculum – engaging first year students in authentic research experiences

**41-4** The effect of learning space management on student engagement

**41-5** Teaching during a pandemic: observations of students’ reactions to different teaching formats

**41-6** Four years of community-engaged learning in a summer undergraduate research program: successes and lessons learned

**41-7** Royal Scholars: An NSF S-STEM program to support science identity in low-income STEM students in Pennsylvania

**41-8** Exploring the nature and process of science with abnormal frogs

**41-9** Developing LGBTQIA+ inclusive biology content and classrooms

**41-10** Can we teach the learning objectives of an animal physiology lab online?

*Contributors:*

- Olberding JP, Deban SM, University of California Irvine, University of South Florida
- Riordan KC, Levin E, Thometz NM, Batac F, Liwanag HEM; California Polytechnic State University, University of San Francisco, California Department of Fish and Wildlife
- West J J, Evans K M; Rice University
- Evans KM, Watson S, Friedman M; Rice University, New Mexico Tech University, University of Michigan
- Ford KL, Bernt MJ, Peterson R, Albert JS; University of Louisiana at Lafayette, American Museum of Natural History, George Washington University
- Gumm JM, Stanton MR, Feuerbacher OG; US Fish and Wildlife Service
- Biondi AA, Kellogg JE, Ruane S, Amplo HE, Crawford CH, Flammang BE; New Jersey Institute of Technology, Rutgers University
- Schoenfuss HL, Diamond KM, Lagarde R, Blob RW, St. Cloud State University, Seattle Children’s Research Institute, Université de Perpignan Via Domitia, Clemson University
- Panessiti C E, Albert A, Konow N; University of Massachusetts Lowell
- Olsen AM; Brown University
- White BJ, Jackson BE; Longwood University
- Cohen RE, Land AM, Martensen BF, Sharlin DS, Smith BA; Minnesota State University
- Steffenson MM, Lucas L; St. Edward’s University
- Kissane KC; Trinidad State Junior College
- Woodley SK; Duquesne University
- Voltzow J, Karpiaik CP, Mulhall D, Muir S; University of Scranton
- Sanders BC, Ruhl N; Rowan University
- Sharpe SL; Kansas State University
- Harrison JF, Henry JR, Ostwald M, Glass JR; Arizona State University
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### Session 42

#### Endocrine Stress I
**Chair:** Jenny Ouyang

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<td>Elephant seal muscle cells adapt to sustained glucocorticoid exposure by shifting their metabolic phenotype</td>
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### Session 43

#### Endocrine Stress II
**Chair:** Jennifer Grindstaff

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<td>Üveges B, Kalina C, Szabó K, Móricz ÁM, Gabor CR, Hetyey A, Bókony V, Plant Protection Institute, Centre for Agricultural Research (PPI-CAR), University of Debrecen, Texas State University</td>
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<td>Mathematical modeling reveals the speed of endocrine flexibility constrains baseline and stress-induced glucocorticoid levels</td>
<td>Luttbeg B, Beaty LE, Ambardar M, Grindstaff JL*; Oklahoma State University, Penn State Erie, Fort Hays State University</td>
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43-6 Temperature-induced priming of the glucose response to subsequent challenges
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43-7 What happens when the stressor ends? A study of corticosterone in wild Antarctic seabirds
Angelier F; Centre d'Etudes Biologiques de Chizé

43-8 Dynamic Bayesian network models of Arabidopsis thaliana transcriptome time series data reveals possible role for HyPRPs in systemic acquired resistance
Filzen RC, Banday Z, Greenberg JT; University of Chicago

43-9 The effects of paternal deprivation on stress-induced corticosterone levels of zebra finch offspring
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Session 44

Endocrinology: Reproduction, Growth & Development
Chair: Stephen Ferguson

44-1 Can exposure to methylmercury affect songbirds’ seasonal response to spring photoperiod?
Bottini CLJ, MacDougall-Shackleton SA; University of Western Ontario

44-2 Male-derived copulatory plugs enhance implantation success in Mus musculus
Lough-Stevens M, Ghione C, Uness M, Hobbs A, Sweeney C, Dean MD; University of Southern California

44-3 Quantification of urinary sex steroids in the big brown bat (Eptesicus fuscus)
Greville LJ, Bueno LM, Pollock T, Faure PA; McMaster University, University of São Paulo

44-4 Fasting inhibits GH stimulation of IGF-1 synthesis pathways in the liver of gopher rockfish (Sebastes carnatus)
Bersin TB, Cordova KL, Journey ML, Beckman BR, Lema SC; Cal Poly San Luis Obispo, NOAA Fisheries

44-5 Decoupling the effects of thermal and hormonal stimuli on intron retention in a species with temperature-dependent sex determination
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44-6 Incubation behavior differences in urban and rural house wrens, Troglodytes aedon
Heppner JJ, Ouyang JQ; University of Nevada Reno

44-7 The effects of ethinylestradiol on estrogen-regulated neurogenic pathway in adult zebrafish (Danio rerio)
Campbell M, Alderman S, Van Der Kraak G; Trent University, University of Guelph

44-8 Influence of testosterone on pre- and post-copulatory dimensions of male-male competition in the red-sided garter snake, Thamnophis sirtalis parietalis
Bukovich IMG, Friesen CR, Parker MR; James Madison University, University of Wallingong

44-9 A breeding-like transition occurs prior to changes in environmental conditions in a lizard species
Too CY, Cohen RE; Minnesota State University

44-10 How caterpillars assess size: The role of the TGF-beta/Activin ligand Myoglianin in triggering metamorphosis

44-11 Can mating behaviors be maintained in the face of elevated prolactin levels driving parental care? Revisiting the anti-gonadal effect
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Energetics
Chair: David Swanson

45-1 Food for thought: What happens to fructose in the ruby-throated hummingbird?
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45-2 The zombification and revival of purple sea urchins (Strongylocentrotus purpuratus) in response to food availability
Dolinar DP, Edwards MS; San Diego State University

45-3 Thermoregulatory tactics and water balance of flying metander Centris caesalpiniae males
Johnson MG, Glass JR, Harrison JF; Arizona State University

45-4 High resolution heart rate data reveal novel energy saving strategy in temperate-zone bats
Keicher L, Shipley JR, Komar E, Schaeffer PJ, Dechmann DKN; Max Planck Institute of Animal Behavior, Polish Academy of Sciences, Miami University

45-5 Lipid composition of bumble bees and their pollen diets: bees are (mostly) what they eat
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<td>Does the high-energy aerial insectivore lifestyle of swallows produce thermogenic side effects?</td>
<td>Zhang Y, Yap KN, David KT, Swanson DL*</td>
<td>University of Memphis, Auburn University, University of South Dakota</td>
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#### Environmental Effects on Physiology

**Chair:** Nicholas Teets

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<td>Understanding how fiber-induced increases in gut size help to maintain optimal digestion in rodents</td>
<td>Peraita Martinez KY, Trevelline BK, Martinez-Mota R, Dearing MD, Derting T, Pasch B, Kohl KD, University of Pittsburgh, Cornell University, University of Utah, Murray State University, Northern Arizona University</td>
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### Session 47

#### Evo-Devo: Deep Homology

**Chair:** Nicole Webster

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47-5 Molecular organization of rotifer neurogenesis: not a worm and not a fly

47-6 Gene duplication and co-option in the evolution and development of the squid eye

47-7 A universal power law for the growth and form of teeth, claws, horns, thorns, beaks, and shells

47-8 Apolar mode of gastrulation leads to the formation of polarized larva in a marine hydroid, Dynamena pumila

Session 49

Evolution of Behavior
Chair: Dale Stevens

49-1 Evolution of temperature preference in the blind cavefish Astyanax mexicanus

49-2 Evolution of egg laying behavior in a critically imperiled freshwater gastropod family (Cerithioidea: Pleuroceridae)

49-3 Field observations provide biological context for interpreting laboratory data: The locomotory performance of Bluegill Sunfish (Lepomis macrochirus) as an example

49-5 Controlling for roost fidelity allows inference on the role of social preference in the organization of bat groups

49-6 Effect of habitat quality on aggression in convict cichlid pairs

49-7 Evolution of a mosquito’s hatching behavior to match its human-provided habitat

49-8 Understanding boldness variation among hybridizing black-capped and Carolina chickadees

49-9 Stickleback populations experiencing northern pike invasion show more among-population level variation than those without

49-10 Novel molecular analysis of inversion polymorphism of ZAL3 in white-throated sparrow reveals impacts on body condition and gene expression

49-11 Evidence for the independent evolution of visual perception during seafinding by hatchling leatherback sea turtles (Dermochelys coriacea)

49-12 Locomotor play behavior in selectively bred high runner mice

Session 50

Evolutionary Developmental Genetics
Chair: Andrew Thompson

50-1 Cytonuclear stoichiometry in the wake of genome duplication

50-2 Sweet genes are made of STYLISH – Members of the STYLISH gene family control both style and nectary development in Ranunculids

50-3 The genome of the bi-annual Rio pearlfish (Nematolebias whitei) informs the genetic regulation of diapause and environmentally-cued hatching in extreme environments
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#### Evolutionary Ecology

**Chair:** Sarah Davies

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<td>Demographic history of wild mandrills during periods of climatic change in Gabon</td>
<td>Weber A, Guibinga Mickala A, Ntie S, Mickala P, Lehmann D, Abernethy KA, Anthony N, University of New Orleans, Université des Sciences et Techniques de Masuku des Sciences et Techniques de Masuku, Agence National des Parcs Nationaux, University of Stirling, CENAREST</td>
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### Session 52

#### Evolutionary Morphology

**Chair:** David Grossnickle

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<td>Grossnickle DM, Brightly WH, Law CJ, Pevsner SK, Roston RA, Stanchak KE, Weaver LN, University of Washington, University of Bristol</td>
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<td>Inter- and intraspecific variation in Artibeus demonstrates size and shape partitioning among species</td>
<td>Hedrick BP; Louisiana State University Health Sciences Center</td>
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<td>52-4</td>
<td>ALPACA: a new and general framework for automated landmarking of 3D biological structures</td>
<td>Porto A, Rolfe SM, Maga AM; Seattle Children’s Research Institute, Friday Harbor Laboratories, University of Washington</td>
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<td>52-5</td>
<td>Morphological evolution of the primate hyoid apparatus</td>
<td>Lawrence AB, Hammond AS, Ward CV; University of Missouri, American Museum of Natural History, New York Consortium in Evolutionary Primatology</td>
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<td>52-6</td>
<td>Acetabular orientation and pelvic shape in hominins</td>
<td>Li P, Ross CF, Luo Z-X; University of Chicago</td>
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<td>Inside-out view in variational modularity of an actinopterygian using 3D geometric morphometrics</td>
<td>Vanhaesebroucke Q, Larouche Q, Cloutier R; Université du Québec à Rimouski, Rice University</td>
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<td>The macrostructural anatomy and functional morphology of dentrochirotid sea cucumber’s (Echinodermata) calcareous rings</td>
<td>Souto C, Martins L; Smithsonian Institution, Museu de Zoologia, Universidade de São Paulo</td>
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<td>Metacarpus evolution in non-avian dinosaurs: a 2d morphometrics perspective</td>
<td>Leite JV, Barrett PM, Goswami A; Natural History Museum, University College London</td>
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<td>Potential constraint and release driven by ancestral terrestrial posture in land-to-sea transitions: Insights from forelimbs across four land-to-sea amniote clades</td>
<td>Formoso KK, Habib MB; University of Southern California, Natural History Museum of Los Angeles County</td>
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<td>52-11</td>
<td>Causes and consequences of morphological integration in the hyperkinetic snake skull</td>
<td>Rhoda DP, Segall M, Polly PD, Raxworthy C; University of Chicago, American Museum of Natural History, Indiana University</td>
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<td>52-12</td>
<td>Automated landmarking captures complex shapes in armored catfish jaws</td>
<td>Block CR, Armbuster JW; Auburn University</td>
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<td>52-13</td>
<td>Charisma: An R tool to automatically determine discrete color classes for high-throughput color pattern analysis</td>
<td>Schwartz ST, Tsai WLE, Karan EA, Alfaro ME; University of California Los Angeles</td>
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### Session 53

#### Evolutionary Physiology

**Chair:** Anusha Shankar

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<td>Hodinka BL, Williams TD; Simon Fraser University</td>
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<td>Variation in developmental trajectories associated with facultative pre-fledging mass recession in a common songbird</td>
<td>Allen JM, Hodinka BL, Leonard KM, Williams TD; Simon Fraser University</td>
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<td>The genomic basis of local thermal adaptation in a montane insect</td>
<td>Smeds EA, Dahlhoff EP, Rank NE; Sonoma State University, Santa Clara University</td>
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<td>Energy budgets to explain allometry: lessons from flying ninja hummingbirds</td>
<td>Shankar A, Davaols LM, Powers DR, Graham CH; Cornell University, Stony Brook University, George Fox University, Swiss Federal Institute WSL Birmensdorf Switzerland</td>
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<td>Revisiting the question of nucleated versus enucleated erythrocytes: A bird mammal comparison</td>
<td>Yap KN, Zhang Y; Auburn University, University of Memphis</td>
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<td>Divergent selection for basal metabolic rate in laboratory mice affected organ size rather than mitochondrial activity</td>
<td>Brzęk P, Rousseau D, Konarzewski M; University of Białystok, University of Lyon, France</td>
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<td>Metabolic recovery from exertion depends on the form of perturbation in lizards</td>
<td>Leibold DC, Valencia V, Gangloff EJ, Telemeco RS; California State University - Fresno, Ohio Wesleyan University</td>
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<td>A test of altitude-related variation in aerobic metabolism of Andean birds</td>
<td>Gutierrez-Pinto N, Londoño GA, Chappell MA, Storz JF; University of Nebraska-Lincoln, Universidad IICESI, University of California Riverside</td>
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<td>Conserved molecular responses to starvation in two Southern Ocean copepods</td>
<td>Berger CA, Steinberg DK, Tarrant AM; Woods Hole Oceanographic Institution, MIT-WHOI Joint Program in Oceanography/Applied Ocean Science &amp; Engineering, Virginia Institute of Marine Science</td>
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### Session 54

#### Fish Feeding I
### Contributed Talks

**Chair: Katrina Whitlow**

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<td>3D anatomical reconstruction of the feeding apparatus in Myxine using diceCT</td>
<td>Constantin ML, Farina SC, Gignac PM, Uyeno TA, Clark AJ; Howard University, Oklahoma State University, Valdosta State University, College of Charleston</td>
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<td>54-2</td>
<td>Come and spaghetti It: Morphology and feeding of the quillfish, Ptilichthys goodiei</td>
<td>Pinion AK, Cohen KE, Donatelli CM, Kruppert S, Summers AP; Texas A&amp;M University, Friday Harbor Labs, University of Washington, University of Ottawa</td>
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<td>Turning liquid into vapor: Knifefish’s powerful suction-feeding</td>
<td>Ortega-Jimenez VM, Sanford PC, Kennesaw State University</td>
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<td>Feeding at the air-water interface: how prey position influences suction and ram in largemouth bass</td>
<td>Herbert AM, Higham TE; University of California Riverside</td>
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<td>Cranial kinesis in actinopterygian suction feeding: mechanical correlates of prey motion in Polypterus bichir</td>
<td>Whitlow KR, Ross CF, Gidmark NJ, Westneat MW; University of Chicago, Knox College</td>
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<td>54-6</td>
<td>Contributions of hypaxial and sternohyoid muscles to hyoid depression in bichirs</td>
<td>Rozen J, Rull M, Spence M, Konow N; University of Massachusetts Lowell</td>
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<td>54-8</td>
<td>A novel behavior upsets the adaptive peaks hypothesis in metamorphic frogs</td>
<td>Kinsey CT, Blob RW; Clemson University</td>
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### Session 55

**Fish Feeding II**

**Chair: Todd Clardy**

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<td>The predentary bone and its role in feeding in billfishes</td>
<td>Habegger ML, Bright J; University of North Florida, University of Hull</td>
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<td>Ontogeny of the feeding apparatus of the white croaker, Genyonemus lineatus (Sciaenidae)</td>
<td>Clardy TR, Deary AL; Natural History Museum of Los Angeles County, Alaska Fisheries Science Center, NOAA</td>
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<td>morphometrics and biomechanics of the three-dimensional four-bar linkage systems in wrasses (family: Labridae)</td>
<td>Gartner SM, Evans K; Westneat MW; University of Chicago, Rice University</td>
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<td>Double-jointed biting of the serrasalmid sp. Piaractus brachypomus</td>
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<td>The morphology of gills and the associated vessels of two larval amphibians, Dicamptodon tenebrosus and Ascaphus truei, and the lungfish Lepidosiren paradoxa</td>
<td>Orr KP, Reiss JO; Humboldt State University</td>
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<td>The Gizzard of Oz: mucus and motors and grit, oh my! A comparative look at gizzards in fishes</td>
<td>Pas KM, Kolmann MA, Donatelli C, Cohen KE, Egan J, Hernandez LP; George Washington University, University of Michigan, University of Ottawa, University of Washington, Friday Harbor Laboratories, Western Michigan University</td>
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<td>55-9</td>
<td>The fate of tooth replacement in Pacific Lingcod (Ophiodon elongatus) with pulse-chase experiments</td>
<td>Carr EM, Cohen KE, Summers AP; University of South Florida, Friday Harbor Labs, University of Washington</td>
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**Flight Dynamics & Mechanics**

**Chair: Yang Ding**

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<td>Force production and thoracic vibrations during defensive buzzing in carpenter bees (Xylocopa: apidae)</td>
<td>Jankauski MA, Casey C, Busby K, Buchmann S; Montana State University, University of Arizona</td>
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<td>Preliminary analysis of the aerodynamic responses of a red-tailed hawk traversing a vertical gust</td>
<td>Swiney PA, Hedrick TL, Gosdin LR, Bellah JR, Hopkins AW, Raghov V; Auburn University, University of North Carolina at Chapel Hill</td>
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<td>Evolutionary diversification of aerial control in the genus Anolis</td>
<td>Sathe EA, Dudley R; University of California, Berkeley</td>
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<td>Hummingbird load lifting performance not predicted by top speed in a wind tunnel</td>
<td>Najar N, Hernandez L, Clark C; University of California Riverside, University of Aberdeen</td>
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56-6  Escape maneuvers in calliope hummingbirds with visual feedback removed at varied timings
      Anwar MZ, Agrawal S, Cheng B, Tobalske BW, Luo H; Penn State University, University of Montana, Missoula, MT

56-7  The influence of lateral and frontal optic flow on flight control in Anna’s hummingbirds
      Baliga VB, Dokin R, Atshuler DL; University of British Columbia, Carleton University

56-8  Functional modeling of hummingbird musculoskeletal system via optimization-based synthesis of wing skeletal model, motion kinematics and muscle forces
      Agrawal S, Anwar Z, Song J, Hedrick T, Luo H, Tobalske B, Cheng B; Penn State, Royal Veterinary College, University of London, University of North Carolina at Chapel Hill, Vanderbilt University, University of Montana

56-9  Does load bearing constrain avian wing morphology?
      Rader JA, Waldrop LD, Hedrick TL; UNC Chapel Hill, Chapman University

56-10 Aerodynamics and energetics of raptors: a comparative analysis between an owl and a hawk
       Krishnan K, Gurka R; Coastal Carolina University

56-11 Power requirements for flapping flight with heavy and highly articulated wings
       Fan XZ, Swartz S, Breuer K; Brown University, Brown University

56-12 Evidence for a proximal-distal gradient in muscle responses to a wind gust perturbation in the Egyptian fruit bat
       Rowley KM, Morris A, Bortoni A, Young I, Boerma D, Breuer K, Swartz SM; Brown University, American Museum of Natural History

**Session 57**

**Foraging Behavior and Predator/Prey**

**Chair:** Kathryn Feller

57-1  Effects of acute temperature change on the feeding behaviors of Gymnothorax mordax
       Moretto WI, Stahl AK, Mehta RS; University of California Santa Cruz

57-2  Use it or lose it: The impact of prolonged darkness and air exposure on the visual system of an amphibious fish
       Rossi G, Labbé D, Wright P; University of Guelph

57-3  Brain size evolution precedes innovations in foraging strategy among woodpeckers
       Cárdenas-Posada G, Iwaniuk AN, Fuxjager MJ; Brown University Providence, Wake Forest University, University of Lethbridge, Brown University

57-4  Butterflyfish effect: The relationship and influence of four-eye butterflyfish on corals infected with stony coral tissue loss disease
       Noonan KR, Childress MJ; Clemson University

57-6  Mapping spatiotemporal changes of North American beaver (L. Castor canadensis) damming complexes
       Kennedy J, Chen C, Mahadevan L, Nagpal R; Harvard University School of Engineering and Applied Sciences, Harvard College

57-7  Prey choices and behavior of water mite predators of mosquito larvae from nearshore habitats of the Laurentian Great Lakes
       Vasquez A A, Walker X N, Ram J L, Miller C J; Wayne State University

57-8  Predator-avoidance response in larval black-bellied salamanders (Desmognathus quadramaculatus) to predator cues from native and nonnative salmonoids
       Dempsey BL, Bidwell JR; East Tennessee State University

57-9  Field experiments uncover variable anti-predator behaviors used by spotted lanternfly nymphs
       Kane SA, Bien T*, Hsieh ST, Haverford College, Temple University

57-10 Effectiveness of Cyprinodon bovinus pupfish territorial defense against Gambusia nobilis egg predation: a tale of two endangered fishes
       Snekser JL, Ashe TM, Itzkowitz M; Canisius College, LIU Post, Lehigh University

57-11 Attack of the killer copepod
       Wagner G, Morgan N, Yen J; Georgia Tech

**Session 58**

**Foraging Behavior**

**Chair:** Kathryn Feller

58-1  Mass variation pattern differences among temperate hibernating bats
       Balzer EW, Grottoli A, Broders H; University of Waterloo

58-2  Follow the fracas: Global patterns of variation in disturbance foraging behavior of birds
       Pollock HS, Hauber ME, Strejc B, Torwater CE; UIUC, University of Wyoming

58-3  Prey size selection and visual acuity in toe-biters (Belostomatidae)
       Feller KD, Mierow T, Gonzalez-Bellido PT; Union College, University of Minnesota
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<td>Preference for colored nectar in Phelsuma laticauda</td>
<td>Chiari Y, Moreno N, Roy R, Kostanecki A, Brockman S, Holl C, Solhaug EM, Minami A, Hampton M, Bee M, Hegeman A, Carter C; George Mason University, University of Minnesota</td>
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<td>The presence of others may shape the economic decision making of a food-storing arboreal squirrel</td>
<td>Robin AN, Nonacs P; University of California Los Angeles</td>
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<td>Feeding preferences of Pugettia gracilis (Graceful Kelp Crab)</td>
<td>Johnson KH, Dobkowski KA; Bates College</td>
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<td>Generational variation in nutrient regulation for an outbreaking herbivore</td>
<td>Le Gall M, Cease AJ; Arizona State University</td>
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<td>Does learning style affect performance and plasticity in shoaling fish?</td>
<td>O’Reilly L, Dalesman S, Akanyeti O; Aberystwyth University</td>
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### Session 59

**Global Change and Population Ecology**

*Chair: Emily Roberts*

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<td>Direct sunlight reduces the cost of keeping altricial avian offspring warm</td>
<td>Mainwaring MC, Martin TE, Wolf BO, Tobalske BW; University of Montana, University of New Mexico</td>
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<td>Noise as a potential mechanism underlying the effects of urbanization on the avian gut microbiome</td>
<td>Berlow M, Derryberry E, Woda H; University of Tennessee Knoxville, Auburn University</td>
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<td>The effects of predicted activity time on population-level measures of productivity in squamates: a comparative analysis</td>
<td>Neel LK, Fornshell D, Angilletta MJ; Arizona State University</td>
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<td>Potential of thermal tolerance plasticity as a coping mechanism with global warming in amphibians</td>
<td>Ruthsatz K, Dausmann KH, Peck MA, Glos J, Technical University of Braunschweig, University of Hamburg, Royal Netherlands Institute for Sea Research</td>
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<td>Snow modulates winter energy use and cold stress across an elevation gradient in a montane ectotherm</td>
<td>Roberts KT, Rank NE, Dahlhoff EP, Stillman JH, Williams CM; University of California Berkeley, Sonoma State University, Santa Clara University</td>
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<td>Consequences of pre-winter temperatures for diapausing pupae</td>
<td>Nielsen ME, Lehmann P, Gotthard K; Stockholm University</td>
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<td>59-7</td>
<td>Heritability of critical thermal maximum temperature in Fundulus heteroclitus</td>
<td>Carrasquillo AL, Crawford DL, Oleksiak MF; University of Miami</td>
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<td>59-8</td>
<td>Assessing environmental tolerance of Mercenaria mercenaria along the east coast of the United States</td>
<td>Himes AR, Rivest EB, McDowell JR, Reece KS, Snyder RA; Virginia Institute of Marine Science, William &amp; Mary</td>
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<td>Simulated ocean and aerial warming have opposing effects on the growth of the barnacle, B. glandula: An energy budget model approach</td>
<td>Roberts EA, Gilman SE, Claremont McKenna College, Scripps College</td>
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<td>Effects of rising temperatures on physiological functions, protein expression, and cell death in an Echinoid species</td>
<td>Johnstone JB, Rahman MS, Texas A &amp; M, University of Texas Rio Grande Valley</td>
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### Session 60

**Gut Microbiomes**

*Chair: Tosha Kelly*

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<td>Reduction of the adult gut microbiome decreases wheel-running behavior in mice selectively bred for high voluntary wheel running</td>
<td>McNamara MP, Cadney MD, Castro AA, Hillis DA, Kallini KM, Macbeth JC, Schmll MP, Schwartz NL, Hsiao A, Garland T; Univ of California, Riverside</td>
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<td>Effects of early-life exposure to adult feces and natural substrate on the survival, phenotype, and gut microbiome of Western Fence Lizards</td>
<td>Underhill D, Putnam N, Valencia V, Van Loar TA, Telemeoco RS; California State University Fresno, University of California Davis</td>
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<td>No guts about it: captivity, but not neophobia phenotype, affects cloacal microbiome of house sparrows</td>
<td>Kelly TR, Vinson AV, Lattin CR; Louisiana State University</td>
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<td>How the interaction between host and gut microbiota promotes threespine stickleback’s adaptation to distinct trophic niches</td>
<td>Härer A, Rudman SM, Rennison DJ; University of California, Washington State University</td>
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<td>60-5</td>
<td>Defining the origin of the prenatal gut microbiome in the house mouse</td>
<td>Gardiner SA, Campbell P; University of California Riverside</td>
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<td>Contribution of the gut microbiome to toxin tolerance in mushroom feeding Drosophila</td>
<td>Giambrone SA, Beveridge J, Haynes L, Fish O, Lose B, Reed L, Scott Chielo C, University of Alabama, Appalachian State University</td>
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<td>Live yeasts accelerate Drosophila melanogaster larval development</td>
<td>Jiménez-Padilla Y, Lachance M-A, Sinclair BJ, Western University</td>
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<td>Unraveling the predictive role of temperature in the gut microbiome of an abundant marine invertebrate</td>
<td>Ketchum RN, Smith EG, Vaughan GO, McParland D, Al-Mansoori N, Burt JA, Reitzel AM, University of North Carolina at Charlotte, NYUAD</td>
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### Session 62

**Hosts, parasites & pathogens: ecology and evolution**

**Chair:** Dana Hawley

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<td>Does female songbird odor vary by blood parasite identity or parasite load?</td>
<td>Talbott KT, Soini HO, Novotny MV, Ketterson ED, Indiana University, Indiana University</td>
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<td>When you eat matters: The effects of feeding frequency on tadpole growth and susceptibility to enemies</td>
<td>Verdi R, Tredo S, Hua J, Binghamton University</td>
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<td>Replicated evolution in the threespine stickleback (Gasterosteus aculeatus) – Schistocephalus solidus host-parasite System</td>
<td>Wohleben AM, Steinel N, Baker JA, Foster SA, Clark University, UMass Lowell</td>
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<td>Resistance to ectoparasitic mites yields metabolic trade-offs in fruit flies</td>
<td>Benoit JB, Bose J, Talbott H, Lewis DA, Polak M, University of Cincinnati</td>
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<td>Thermal mismatch in an insect host-parasitoid-endsymbiont system: causes and consequences</td>
<td>Malinski KH, Kingsolver JG, Willett CS, University of North Carolina, Chapel Hill</td>
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<td>Investigating the disease ecology of Ranaviruses (Family Iridoviridae) in ectothermic vertebrates of southern China</td>
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<td>Chytrid fungi transcriptomic signatures indicate different infection strategies in newts</td>
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<td>Koch RW, Shannon RP, Detwiler JT, Bolek MG, Oklahoma State University, University of Manitoba</td>
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<td>Examining skin microbiome of Trinidadian guppy and ectoparasite infection dynamics</td>
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### Session 63

**Immune-based Trade-offs**

**Chair:** Eve Robinson

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<td>Immunological response to leg autotomy in the wolf spider Tigrosa helluo</td>
<td>Valenti AL, Garcia M, Vargas R, Steffenson M, St. Edward's University</td>
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<td>Ranchod PN, Weier D, Steffenson M, St. Edward's University</td>
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63-5 Refining assay recipes to measure immunological responses
Garcia M, Fotinos E, Steffenson M; St. Edward's University

63-6 Evaluation of the trade-off between molt and innate immunity in the domestic chicken (Gallus gallus domesticus)
DeRogatis AM, Kissing KC; University of California Davis

63-7 Effects of simulated climate warming on the development of immune defenses in juvenile leopard frogs
Saenz V, Rollins-Smith L, Hall EM, Reinert L, Ohmer ME, Richards-Zawacki C; University of Pittsburgh, Vanderbilt University

63-8 Immunological and health correlates of avian malaria infection and resilience in the Hawaii Amakihi (Hemignathus virens)
Names G, Schultz E, Kissing K; University of California Davis, Wittenberg University

63-9 Sex-based trade-offs in the innate and acquired immune systems of Sternotherus minor
Lopez-Perez JE, Goessling JM, Meylan PA; Southeastern Louisiana University, Eckerd College

63-10 Mating enhances immune function of Drosophila melanogaster populations against bacterial pathogens
Bansal N, Sit B, Singh A, Hegde T, Dutta R, Prasad NG; University of Nebraska-Lincoln, IISER Mohali

Session 64

Immunity
Chair: Vania Regina de Assis

64-1 Differential gene expression among house finch populations that differ in tolerance to Mycoplasma gallisepticum
Henschen AE, Dalloul RA, Hawley DM, Adelman JS; University of Memphis, Virginia Tech, University of Georgia

64-2 Immune gene expression covaries with gut microbiome composition in stickleback
Fuess LE, den Haan S, Ling F, Weber J, Steinel NC, Bolnick DI; Texas State University, Central European University, Northwest A&F University, University of Wisconsin-Madison, University of Massachusetts Lowell, University of Connecticut

64-3 The expansion and loss of pattern recognition receptors across the phylum Cnidaria
Emery M, Dimos B, Mydlarz L; University of Texas at Arlington

64-4 Body size shapes immune cell proportions in birds and non-volant mammals, but not bats
Cornelius Ruhs E, Becker DJ, Oakey SJ, Drake HF, Ogunsoina O, Fenton MB, Simmons NB, Martin LB, Downs CJ; University of South Florida, Indiana University, Western University, American Museum of Natural History, SUNY College of Environmental Science and Forestry

64-5 Heterospecific competitors and seasonality can affect host physiology and behavior, key determinants of disease transmission
Eieetheriou A, Kuenzi AJ, Luis AD; University of Montana Missoula, Montana Tech of the University of Montana

64-6 Maternal disease history shapes how offspring respond to infection
Love AC, Kodali J, Grisham K, DuRant SE; University of Arkansas, Oklahoma State University

64-7 Ectoparasites impact on stress and immune response in Florida invasive cane toads (Rhinella marina)
Assis VR, Titon Jr B, Gomes FR, Ward CK, Mendonça MT; University of Sao Paulo, Auburn University

64-8 Relationships between thermal preference, parasites, and antibodies in the red-eared slider turtle
Smail SJ, Stuart V, Zimmerman LM*; Millikin University

64-9 Protective effects of intact ocular microbiomes in house finches are unrepeateable and not dependent on pathogen dose
Weitzman CL, Rostama B, Belden L, May M, Hawley DM; Virginia Tech, University of New England

Session 65

Impact of Climate Change on Physiology
Chair: Helen Chmura

65-1 Ontogenetic behavior of a tropical shark under future ocean acidification scenarios
Villanueva I, Di Santo V, Stockholm University

65-2 Sub-lethal effects from global environmental stressors on the physiology of Crassostrea virginica during the larval stage and settlement process
Schatz A, McDowell J, Rivest EB; Virginia Institute of Marine Science, William & Mary

65-3 Temperature preference and aerobic scope in Zebrasoma flavescens and the response to rising sea temperatures
van Hall ES, Korsmeyer KE; Hawaii Pacific University

65-4 Different drivers, common mechanism: The distribution of a reef fish is restricted by local scale oxygen and temperature limits on aerobic metabolism
Duncan Ml, James NC, Potts WM, Bates AE; Stanford University, South African Institute for Aquatic Biodiversity, Rhodes University, Memorial University
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65-5 Population-specific variability in the thermal performance of Fraser River Chinook salmon
Van Wert JC, Hendriks BJ, Ekstrom A, Patterson DA, Cooke SJ, Hinch SG, Eilsson EJ; University of California Santa Barbara, University of British Columbia, University of Gothenburg, Simon Fraser University, Carleton University

65-6 Incubation temperature and maternal effects on thermal physiology in Ambystoma mexicanum
Spranger RR, Sinervo BR; University of California Santa Cruz

65-7 Does body size correspond to environmental temperature in reptiles over geologic time scales?
Elsheid S; University of California Berkeley

65-8 Assessing the functional consequences of climate change: tissue-specific responses to heat in a wild bird
Woodruff MJ, Rosvall KA; Indiana University Bloomington

65-9 Soil freeze date and onset of sub-zero heterothermy in hibernating arctic ground squirrels track climate change in Arctic Alaska
Chmura HE, Burrell G, Buck CL, Barnes BM, Williams CT; University of Alaska Fairbanks, Northern Arizona University

65-10 Timing and severity of stressful temperature exposures influence egg development and hatching success in multiple Ixodid ticks
Ajayi OM, Oyen KJ, Benoit JB; University of Cincinnati

65-11 Sensitivity of thermal tolerance to precipitation and humidity in a high-latitude click beetle
Riddell EA, Mutanen M, Ghalambor CK; Iowa State University, University of Oulu, Colorado State University

65-12 Widow Wars: Testing the Mechanisms Underlying Invasion Success of a Globally Invasive Spider
Aragon Traverso JH, Melian AD, Sanabria EA, Quiroga LB, Espinoza RE; Instituto de Ciencias Básicas, Facultad de Filosofía Humanidades y Artes, Universidad Nacional de San Juan, California State University, Universidad Nacional de Cuyo, Consejo Nacional de Investigaciones Científicas y Técnicas

Session 66

Insect Wing Structure-Function
Chair: Nick Burnett

66-1 Shooting the gap: how bees protect their wings in windy, dynamic obstacle courses
Burnett NP, Badger MA, Combres M; University of California Davis

66-2 Dimensional analysis reveals limits on peak efficiency of flapping wing flight due to structural damping
Lynch J, Gau J, Sponberg S, Gravish N; University of California San Diego, Georgia Institute of Technology

66-3 Numerical simulation of high-fidelity dragonfly wings for "Fly-by-Feel"
Maeda M, Walker SM, Fabian JM, Swanson I, Lin HT, Bomphrey RJ; Royal Veterinary College, University of Leeds, Flinders University, HHMI Janelia Research Campus, Imperial College London

66-4 Reconstructing full-field flapping wing dynamics from sparse measurements
Johns W, Davis L, Jankauski M; Montana State University

66-5 The evolution of wing shape and movement in bombyxoid moths reveals two distinct strategies for agile flight
Aiello BR, Sikandar UB, Minoguchi H, Kimball KC, Hamilton CA, Kawahara MY, Sponberg S; Georgia Institute of Technology, University of Idaho, Florida Museum of Natural History

66-6 Influence of flexural rigidity on force production in flapping wings
Reade JE, Schwab RK, Jankauski MA; Montana State University

66-7 Finite element analyses of flapping wings meets inertial sensing
Mamo AH, Weber AI, Mohren TL, Babael M, Daniel TL; University of Washington, Carnegie Mellon University

66-8 Whole-wing microtomographic imaging of grasshopper wings
Salcedo MK, Shevchenko PD, Socha JJ; Virginia Tech, Argonne National Laboratory

66-9 A model for multi-agent group motion inspired by insect visuomotor feedback
Billah MA, Faruque IA; Oklahoma State University

66-10 Sticky flapper: three-dimensional flapping flight with bristled wings
Kasouji VT, Santhanakrishnan A; Oklahoma State University

66-11 Acceleration-reaction forces in high-frequency flapping insect wings, a systematic numerical study
van Veen WG, van Leeuwen JL, Mejias FT; Wageningen University & Research

66-12 Wing flexibility of cicadas during takeoff: A pandemic story
Socha JJ, Pulliam JN; Salcedo MK, Hernandez AM, Jackson BE; Virginia Tech, Harvard University, Longwood University

Session 67

Larval Ecology
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Chair: Jonathan Allen

67-1 A hierarchy of sensory cues control larval settlement in the actinula larvae of Ectopleura crocea (Hydrozoa)  
Birch S, Plachetzki D; University of New Hampshire, Durham

67-2 Larval stage, temperature, and phytoplankton patches affect sea star (Pisaster ochraceus) swimming behavior  
Leveque-Eichhorn L, Grunbaum D, George SB; University California Berkeley, Georgia Southern University

67-3 Larval cloning in brittlestars  
Allen JD; William and Mary

67-4 Plasticity in egg size of the tropical marine polychaete Hydroides elegans  
Genovese CB, Moran AM, Jewell M, Marko P; University of Hawaii at Manoa

67-5 Will carpenter bee (Xylocopa californica) nest temperatures exceed larval CTmax?  
Busby MK, Davidowitz G, Bronstein JL; University of Arizona

67-8 Maternal environment drives larval rockfish gene expression patterns  
Baker JB, Soksa KV, Kashef NS, Stafford DM, Sogard SM, Hamilton SL, Logan CA; Moss Landing Marine Laboratories, CSU Monterey Bay, Marine Science Institute UCSC, NMFS South West Fisheries Science Center

Session 68

Life History and Mating Systems  
Chair: David Delaney

68-2 “Males” that look “male” and “females” that look like “hermaphrodites”: Evolution of sexual systems in Australian nightshades  
Martine CT, McDonnell AJ; Bucknell University, Chicago Botanic Garden

68-3 Fecundity and self-compatibility variation among lineages and across ontogeny in a self-fertilizing fish  
Gresham JD, Earley RL; Emory University, University of Alabama

68-4 Age predicts risky investment better than residual reproductive value in a long-lived vertebrate  
Delaney DM, Hoekstra LA, Janzen FJ; University of Colorado Boulder, Oklahoma State University, Kellogg Biological Station

68-5 Maternal effects throughout development in fishes inhabiting extreme environments  
Coffin JL, Onnen J, Tobler M; Kansas State University

68-6 Resource acquisition, allocation, and energy production change in tandem through development to support flight or reproduction in wing-dimorphic crickets  
Treidel LA, Williams CM; UC Berkeley

68-8 Mate choice vs mate preference: Color-assortative mating pattern in a polymorphic poison frog  
Yang Y, Richards-Zawacki CL; Washington University, University of Pittsburgh

68-9 Powering a punch: Male-biased sexual dimorphism in human fist-propelling performance  
Morris JS, Link J, Martin JC, Carrier DR; Wofford College, University of Utah

68-10 Rapid evolution of sperm midpiece size across the animal tree of life  
Kahrl AF; Stockholm University

68-11 Beyond the binary: sexual variation in threespine stickleback (Gasterosteus aculeatus L.)  
Schutz H, Jammickzy HA, Anderson RJ, Warwick EG, Barry TN; Pacific Lutheran University, University of Calgary, University of Notre Dame, University of Lethbridge

68-12 Pseudogenized amelogenin reveals early tooth loss in the evolution of true toads  
Abramyan J, Shaheen J; University of Michigan - Dearborn

Session 69

Life in Moving Fluids I  
Chair: Kakani Katija

69-1 Sense-induced flow: Challenging Vogel’s current induced flow hypothesis with in situ experiments on a deep glass sponge reef  
Matveev E, Kahn AS, Aragones Suarez P, Guillias KC, Yahel G, Leys SP; University of Alberta, Moss Landing Marine Labs, San Jose State University, Ruppin Academic Institute

69-2 Soft corals vibrating under flow to improve food capture?  
Boudina M, Gosselin FP, Etienne S; Polytechnique Montreal

69-4 The effects of external flow on the feeding currents of sessile microorganisms  
Pepper RE, Riley EE, Baron M, Hurot T, Tor Nielsen L, Koehl MAR, Kierboe T, Andersen A; University of Puget Sound, Technical University of Denmark, Ecole Normale Superieure Paris-Saclay, Ecole Polytechnique, University of California Berkeley
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69-5 The effect of wavelength in seal whisker undulations
Lyons KM, Heck K, Ferco O, Haddock WA, Col RB, Martin WN, Murphy CT, Franck JA; University of Wisconsin-Madison, Portland State University, Brown University, US Navy

69-6 Swimming of the mosquito larva: principles and tricks of locomotion at intermediate Reynolds numbers
Jin B, Luo H, Ding Y*; Beijing Computational Science Research Center, Vanderbilt University

69-7 ViscoSenso: The role of multiple sensory modalities in steady swimming
Hainer JC, Maki H, Lutek K, Znotinas KR, Standen EM; University of Ottawa

69-8 EyeRIS (Remote Imaging System): A novel, in situ lightfield imaging system that enables time-resolved three-dimensional visualizations of particles and animals in the deep sea
Katija K, Roberts PLD, Daniels J, Henthorn R, Klimov D, Ruhl H, Sherman AD; Monterey Bay Aquarium Research Institute

Session 70
Life in Moving Fluids II
Chair: Karakas

70-1 How kelp in drag lose their ruffles: Environmental cues, growth kinematics, and mechanical constraints
Koehl MAR, Silk WK; University of California Berkeley, University of California Davis

70-2 Shell shape and size defines the swimming and sinking characteristics of pelagic snails
Karakas F, Maas AE, Murphy DW; University of South Florida, Bermuda Institute of Ocean Sciences

70-3 Why so many fins? A first look at how Polypterus senegalus use their finlets
Wolf Z, Lauder GV; Harvard University

70-4 Fish locomotion: reconstructing fish midline kinematics from multiple inertial measurement units
White CF, Lauder GV; Harvard University

70-6 Control surface-body size relationships in baleen whale species
Adams DA, Bierlich KC, Dale J, Johnston DW, Goldbogen JA, Friedlaender AS, Segre P, Blob RW, Price SA; Clemson University, Duke University, Stanford University, University of California Santa Cruz

70-7 Minimum drag on a three-dimensional North Atlantic right whale model via neutral trim pose
Wu C, Howle LE, Nowacek DP; Duke University

70-8 Impact force of high diving of animals (dolphins, penguins, frogs) and humans
Pandey A, Yuki J, Chang B, Fish FE, Jung S*; Cornell University, Clark University, West Chester University

70-9 Estimating whole-body kinematics of swimming bottlenose dolphins
Antoniak G, Xargay E, Barton K, Popa B-I, Shorter KA; University of Michigan Ann Arbor, CSTAR Pte Ltd Singapore

70-10 A data driven approach for estimating hydrodynamic drag of bottlenose dolphins

Session 71
Limb Biomechanics
Chair: Andrew George

71-1 Strategies of single arm foraging in Octopus rubescens in the absence of visual feedback
Sivitilli DM, Weertman WL, Busch EL, Ullmann JF, Smith JR, Gire DH; University of Washington, Alaska Pacific University, Yale University

71-2 Hindlimb skeletal anatomy and kinematics vary with swimming behavior in ducks
Taylor-Burt KR, Biewener AA; Franklin & Marshall, Harvard U

71-3 Intermetatarsal mobility in the American alligator
Turner ML, Gatesy SM; Brown University

71-4 Three-dimensional kinematic analyses reveal asymmetries in Xanthichthys auromarginatus (Balistidae) median fin biomechanics during steady balistiform swimming
George AB, Westneat MW; Field Museum of Natural History, University of Chicago

71-5 Flipping frogfish fins: Using XROMM to study frogfish pectoral fins during locomotion
Amplo HE, Flammang BE, Camp C; Rutgers University-Newark, NJIT, University of Liverpool

71-6 Effects of tendon-network mechanisms on avian terrestrial locomotion
Bribiesca-Contreras F, Daley MA, Bodri-Spröwitz A; Max Planck Institute for Intelligent Systems, University of California Irvine

71-7 Investigating chukar ontogeny can shed light on flight evolution and form-function relationships
Klein SM, Chase HT, Tobalske BW; University of Montana Missoula

71-8 Determinants of maximum wrist extension in humans and chimpanzees
Rainbow MJ, Mack ZM, Lee ECS, Orr CM; Queen’s University, University of Colorado
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<td>3D glenohumeral range-of-motion in living and fossil primates, predicted in silico from skeletal morphology</td>
<td>Lee ECS, Young NM, Rainbow MJ; Queen’s University, University of California San Francisco</td>
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### Session 72

#### Locomotion: Body Stiffness & Posture

**Chair:** Robert Cieri

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<td>Akanyeti O, Fetherstonhaugh S, Aberystwyth University</td>
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<td>Toussaint SLD, Youtatos D, Nyakatura JA; Humboldt University of Berlin, Aristotle University of Thessaloniki</td>
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<td>Wiseman ALA, Bishop RJ, Demuth OE, Cuff AR, Michel KB, Hutchinson JR*; Royal Veterinary College</td>
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<td>Ex vivo 3D measurements of shoulder mobility and muscle moment arms in sprawling and upright amniotes</td>
<td>Fahn-Lai P, Regnault S, Biewener AA, Pierce SE; Harvard University, Harvard University and University of Surrey</td>
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<td>Ontogenetic changes in limb kinematics, forces, and joint moments in American alligators</td>
<td>Iijima M, Munteanu VD, Kinsey CT, Elsey RM, Blob RW; Clemson University, Louisiana Department of Wildlife and Fisheries</td>
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### Session 73

#### Locomotion: Challenges & Obstacles

**Chair:** Chen Li

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<td>Chen Y, DeJong JT, Jaeger RA, Martinez A*; University of California Davis, California Department of Water Resources</td>
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Naylor ER, Higham TE; University of California Riverside

73-9  The role of basilisk lizard toe fringes in effective water running  
Bagheri H, Huang Z, Lentink D, Marvi H; Arizona State University, Stanford University

73-10 Discovering simple mechanical models from motion data: A novel representation shown in ground righting geckos  
McInroe BW, Baryshnikov YM, Koditschek DE, Full RJ; University of California, University of Illinois, University of Pennsylvania

73-11 Kinematics of running across hard and granular surfaces in specialist and generalist lizards  
Tucker EL, Mantilla DC, Hsieh ST; Temple University

73-12 Enhancing legged robot navigation of rough terrain via use of a tail  
Soto D, Goldman DI; Georgia Institute of Technology

73-13 Legged locomotion at low Reynolds numbers: limitations on insects and microrobots  
St. Pierre R, Bergbreiter S; University at Buffalo, Carnegie Mellon University

Session 74

Locomotion: Climbing & Complex Terrain  
Chair: Hosain Bagheri

74-1  Juvenile pandas use head motion to maintain balance during climbing  
Zhao W, Ayala J, Schulz A, Rong H, McGowan C, Hu D; Georgia Tech, Chengdu Research Base of Giant Panda Breeding, University of Idaho

74-2  Acrobatic archosaurs: kinematic comparisons of climbing behaviors in turtles and alligators  
Greenslit NW, Erskine OM*, Iijima M, Blob RW, Palecek AM; Clemson University

74-3  Climbing strategies of cicadas across vertical ‘gaps’ of low friction  
Pulliam JN, Salcedo MK, Weiss TM, Hernandez AM, Socha JJ; Virginia Tech, Harvard University

74-4  A small squirrel (Tamiops swinhoei) sheds light on the complex biomechanical adaptations to fast arboreal locomotion  
Wolfer J, Michel J, Aschenbach T, Nyakatura JA; Humboldt-Universität zu Berlin

74-5  Body size influences transition to dynamic gap crossing movements in Australian tree snakes  
Graham M, Clemente CJ, Socha JJ; Virginia Tech, University of the Sunshine Coast

74-6  Centipede locomotion on bumpy terrain  
Erickson E, Diaz K, Carruthers A, Ozkan-Aydin Y, Chong B, Goldman DI; Georgia Tech

74-7  Snakes traversing complex 3-D terrain  
Fu Q, Astley HC, Li C; Johns Hopkins University, University of Akron

74-8  C. elegans maneuvering strategies in heterogeneous environments  
Diaz K, Chong B, Ding JL, Lu H, Goldman DI; Georgia Tech

74-9  Tiger salamanders (Ambystoma tigrinum) increase foot contact surface area on challenging substrates during terrestrial locomotion  
Vega CM, Ashley-Ross MA; Wake Forest University

74-10  Stochastic dynamics model statistically predicts beam obstacle traversal  
Zheng B, Xuan Q, Li C; Johns Hopkins University

74-11  An energy landscape based dynamic model to simulate locomotion in complex 3-D terrain  
Xuan Q, Li C; Johns Hopkins University

Session 75

Locomotion: Gaits & Gait Changes  
Chair: SLD Toussaint

75-1  The water to land transition, submerged: How octopuses and other animals integrate movement on substrate and in water to locomote in aquatic environments  
Hale ME, Paletta MG; University of Chicago

75-3  Biomechanical energetics of terrestrial locomotion: California sea lion vs. northern elephant seal  
Kerr SJ, Nicastro AJ, Zeligs J, Skrovan S, Fish FE; West Chester University, Moss Landing Marine Labs

75-4  Fin motion patterns in swimming stingrays  
Tumminelli AN, Bartalik IK; Old Dominion University

75-5  Muscle power production during intermittent swimming in bluegill  
Coughlin DJ, Santarcangelo K, Wilcock EB, Ellerby DJ; Widener University, Wellesley College

75-6  Locomotor spectra in basal vertebrates  
Struble MK, Gibb AC; Northern Arizona University
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<td>A reduced ‘pelvic step’ partially explains short stride length during human bipedalism</td>
<td>Thompson NE, Rubinstein D, Parrella-O’Donnell W, Brett M, Demes B, Larson SG, O’Neill MC; NYIT College of Osteopathic Medicine, Lancaster General Hospital, Stony Brook University, Midwestern University</td>
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<td>Caecilian harbor a distinctive microbiome: Ichthyophis bannanicus (Amphibia, Gymnophiona) and anuran larvae compared</td>
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<td>Parental care drives microbiome transmission in oviparous skin-feeding caecilians</td>
<td>Kouete MT, Bletz MC, LaBumbard B, Woodhams DC, Blackburn DC; University of Florida, UMass</td>
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<td>Interactions between oyster physiology and microbiome are influenced by seasonal baselines and water manipulations</td>
<td>Rivest EB, Song B, Audemard C, Carnegie RB; Virginia Institute of Marine Science, William &amp; Mary</td>
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<td>Pass me the microbes, please! Bearded fireworms source part of their microbiome from bleached and healthy corals and vice versa</td>
<td>Grimes CJ, Labonté JM, Lopez JV, Schulze A; Texas A&amp;M University at Galveston, Nova Southeastern University</td>
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<td>Do bumble bees cultivate yeast to augment protein in the larval diet?</td>
<td>Waybright SA, Dillon ME; University of Wyoming</td>
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<td>Steck M, Sung JY, Outomura D, Maddison WP, Morehouse N, Porter ML; University of Hawai‘i at Mānoa, University of Cincinnati, University of British Columbia</td>
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<td>Boggs TE, Gross JB; University of Cincinnati</td>
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<td>How much convergence exists in vision-related genes of independently evolved eyes in Cnidaria?</td>
<td>Macias-Muñoz A, Picciani N, Murad R, Mortazzavi A, Oakley TH; University of California Santa Barbara, University of California Irvine</td>
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<td>Genomic analysis of Actinopterygian hypoxia-inducible factor alpha reveals “missing ohnologs”</td>
<td>Townley IK, Rees BB; Saint George’s School, University of New Orleans</td>
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<td>Spillane JL, MacManes MD, Plochetzkzi DC; University of New Hampshire</td>
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<td>Barreira SN, Nguyen AD, Moreland RT, Baxevanis AD; NHGRI/NIH</td>
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<td>The visual genes associated with eye reduction and loss in bat flies (Streblidae, Nycteribidae)</td>
<td>Atkins ML, Dittmar K, Dick C, Lutz HL, Speer KA, Davis SR, Aardema ML, Porter ML; University of Hawai‘i at Mānoa, National Science Foundation, Western Kentucky University, Field Museum of Natural History, Smithsonian Institution, American Museum of Natural History, Montclair State University</td>
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#### Session 78

**Movement, Migration and Dispersal Behaviors I**
Chair: Ben Vernasco

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#### Session 79

**Movement, Migration and Dispersal Behaviors II**
Chair: Ben Vernasco

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<td>Kuruvilla M, Berdahl A, Dell A, Knout J; University of Washington, National Great Rivers Research and Education Center, Saint Louis University</td>
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<td>Vijayan S, Somanathan H; Indian Institute of Science Education and Research Thiruvananthapuram</td>
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<td>Analysis of environment dependent locomotion of bottlenose dolphins using Mask R-CNN</td>
<td>Zhang Z, Zhang D, Gabaldon J, West N, Barton K, Shorter KA; University of Michigan Ann Arbor, Dolphin Quest</td>
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#### Session 80

**Muscle-Tendon Structure-Function**
Chair: Brooke Christensen

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<td>Elastic energy storage across speeds during steady state hopping of desert kangaroo rats (Dipodomys deserti)</td>
<td>Christensen BA, Schwaner MJ, Lin DC, McGowan CP; University of Idaho, Moscow, Washington State University</td>
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<td>Restricting jumping during growth does not alter energy storage capacity</td>
<td>Cox SM, DeBoef A, Salzana MQ, Katugam K, Piazza SJ, Rubenson J; University of California Irvine, Pennsylvania State University</td>
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<td>In-vivo muscle-tendon unit length-change for the mouse soleus and tibialis anterior</td>
<td>Shah K, Hardiman E, Shehaj A, Konow N; University of Massachusetts Lowell</td>
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**80-6** A little damping goes a long way
Heim S, Millard M, Le Mouel C, Badri-Spröwitz A; Max Planck Institute for Intelligent Systems, University of Heidelberg, University of Münster

**80-7** Architectural elasticity in pennate muscle
Petersen JC, Eng CM, Marsh RL, Azizi E, Roberts TJ; Brown University, University of California Irvine

**80-8** Impact of whole-muscle shear and fascicle curvature on architectural gear ratio
Brainerd EL, Jimenez YE, Weller HJ; Brown University

**80-9** Open-source software for modeling biological latch mediated spring actuated systems
Cook A, Pandhigunta K, Didcock RL, Castro JT, Acevedo MA, Walker A, Acharya R, Crofts SB, Bhamla MS, Anderson PSL, Patek SN, Ilton M; Harvey Mudd College, Georgia Institute of Technology, University of Illinois at Urbana-Champaign, Duke University

**80-10** Functional morphology and biomechanics of trap-jaw ants in the Daceton genus group
Gibson JC, Suarez AV; University of Illinois at Urbana-Champaign

**80-11** Strike kinematics of the araneoid trap jaw spider Pararchaea alba
Kallal RJ, Wood HM; National Museum of Natural History, Smithsonian Institution

**80-12** A new muscle model including a titin element
Jeong SW, Rice NA, Daley MA, Nishikawa KC; Northern Arizona University, University of California Irvine

### Session 81

**Neuroanatomy and Neurobiology**
Chair: Emily Peele

#### 81-1
Morphology and neuroanatomy of the femoral chordotonal organ in the Oleander hawkmoth, Daphnis nerii
Virdi S, Sane SP; Tata Institute of Fundamental Research

#### 81-2
Intraspecific variation in the avian sensory system and an assessment of minimal sample size for comparative studies
Martin M, Iwaniuk AN, Logue D; University of Lethbridge

#### 81-3
Ontogenetic trends in the endocranial flexure of archosaurs
King JL, Rayfield EJ, Benton MJ; University of Bristol

#### 81-4
Comparative neuromorphology and function of Purkinje cells in geckos, mice, and chickens
Liu YL, Bradley S, Patel AV, Bailey CDC, Vickaryous MK; University of Guelph

#### 81-5
Oculomotor nuclei size reflects behavior in nocturnal and diurnal raptors
Cunha F, Gutiérrez-Ibáñez C, Wylie DR, Iwaniuk AN; University of Lethbridge, University of Alberta

#### 81-6
Ontogenetic shifts in the nervous system of the sockeye salmon, Oncorhynchus nerka
Rheinsmith S, Quinn T, Yopak K; University of North Carolina Wilmington, University of Washington

#### 81-7
Older and Wiser? Ontogenetic shifts in brain size and brain organization in the Atlantic sharpnose shark, Rhizoprionodon terraevovae
Laforest KV, Peele EE*, Yopak KE; University of North Carolina Wilmington

#### 81-8
Injury-mediated neurogenesis in the brain of the leopard gecko (Eublepharis macularius)
Austin LE, Graham C, Vickaryous MK; University of Guelph

#### 81-9
Investigating the role of the transcription factor Cut in the lens secreting Semper cells of insect compound eyes
Rathore S, Meece M, Cook T, Buschbeck E; University of Cincinnati, Wayne State University

#### 81-10
Comparative oxytocin and vasopressin neurocircuitry in relation to mating system in Eulemur
Sharma A, Grebe NM, Freeman SM, Bales KL, Patisaul HB, Drea CM; Duke University, University of California Davis, North Carolina State University

### Session 82

**Neuroethology**
Chair: Andrew Gordus

#### 82-1
Constitutive gene expression differs in three brain regions important for cognition in neophobic and non-neophobic house sparrows (Passer domesticus)
Lattin CR, Johnson KM, Kelly TR; Louisiana State University, California Polytechnic State University

#### 82-2
Conserved neural circuitry for frog vocalizations
Yamaguchi A, Peltier M; University of Utah

#### 82-3
Neural expression of two immediate early genes do not differ in response to novel objects in neophobic and non-neophobic house sparrows (Passer domesticus)
Kimball MG, Kelly TR, Stansberry KR, Lattin CR; Louisiana State University
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82-4 A common fungicide, Pristine®, impairs olfactory associative learning in honey bees (Apis mellifera)  
DesJardins NS, Fisher AL, Harrison JF, Smith BH; Arizona State University

82-5 Characterization of visually-guided behaviors by the nudibranch, Berghia stephanieae  
Quinlan PD, Cho AK, Katz PS; University of Massachusetts

82-6 Untangling the web of behaviors used in spider orb weaving  
Gordus A, Corver A, Wilkerson N, Miller J; Johns Hopkins University

82-7 Axial touch sensation and its effects on motor output and swimming behavior in larval zebrafish  
Menelaou E, Katz HR, Hale ME; University of Chicago, Marine Biological Laboratory

82-8 Spike timing changes between power muscles in pitch and roll turns of a hawk moth, M. sexta  
Putney J, Sponberg S; Georgia Tech

82-9 Neural regulation of tadpole aggression  
McKinney JE, Ludington S, O'Connell LA; Stanford University

82-10 Characterizing vertebrate odor space  
Zung JL, McBride CS; Princeton University

82-12 Neural correlates of vertebrate affiliative evolution  
Nowicki JP, Sailer LS, Ophir AG, Gardner MG, Coker DC, O'Connell LA; Stanford University, Cornell University, Flinders University, King Abdullah University of Science and Technology

Session 83

Osmoregulation
Chair: Michelle Monette

83-1 Gill transcriptomic response to seawater is altered by acute stress in Atlantic salmon smolts  
Monette MY, Velotta JP; Western Connecticut State University, University of Denver

83-2 A data-independent acquisition (DIA) assay library for quantitation of environmental effects on the kidney proteome of Oreochromis niloticus  
Root L, Cnaani A, Campo A, MacNiven L, Kultz D; University of California Davis, Agricultural Research Organization

83-3 Functional expression of insect Na+-dependent cation-chloride cotransporters in Sf9 cells  
Duong PC, Holmes HL, Piermarini PM, Romera MF, Gillen CM; Kenyon College, Mayo Clinic, Ohio State University

83-4 Physiological plasticity of the mayfly, N. triangulifer, in response to salinity stress in freshwater ecosystems  
Orr SE, Buchwalter DB; North Carolina State University

83-5 Effects of diet on aquaporin abundance in the disease-vector mosquito, Aedes aegypti  
Picinic BN, Paluzzi JP, Donini A; York University

83-6 Physiological effects of salinity stress in wild American alligators (Alligator mississippiensis)  
Faulkner PC, Elsey R, Hola D, Petersen LH; Texas A&M University at Galveston, Louisiana Department of Wildlife and Fisheries

83-7 How does an amphibious fish osmoregulate without gills?  
Ridgway MR, Tunnah L, Bernier NJ, Wright PA; University of Guelph

Session 84

Parental Care
Chair: Ivana Schoepf

84-1 Do females work harder? Sexual differences in parental care in the Little swift (Apus affinis), a monomorphic species  
Bloch I, Troupin D, Sapir N; University of Haifa

84-2 Maternal care increases with the presence of extra pair offspring in wild song sparrows  
Lane SJ, Brewer VB, VanDiest IJ, Linkous CR, Mabry KE, Sewall KB; Virginia Tech, Oregon State University, Kennesaw State University, New Mexico State University

84-3 Why do mothers care? Assessing the benefits of female–neonate associations in a viviparous lizard from the Argentine Puna  
Valdecantos S, Wenner SM, Robertson JM, Espinoza MH, Lobo Terán C, Espinoza RE*; Universidad Nacional de Salta and Consejo Nacional de Investigaciones Científicas y Técnicas, California State University Northridge, Valley International Preparatory High School, Universidad Nacional de Salta

84-4 Sex and strife: parental cooperation in a songbird species with flexible biparental care  
Enns JL, Purdey L, Stojkovic L, Williams TD; Simon Fraser University

84-5 Negotiations over offspring care: a test of alternative hypotheses in the clown anemonefish  
Barbasch TA, Branconi R, Francis R, Paccaro M, Srinivasan M, Jones GP, Buston PM; Boston University, James Cook University

84-6 Experimental evidence of haemosporidian infection effects on maternal care behavior in a wild passerine  
Schoepf I, Olson S, Moore IT, Bonier F; Queen's University, Virginia Tech

84-8 The interplay between sperm-mediated and care-mediated paternal effects in threespined sticklebacks  
Hellmann JK, Carlson ER, Bell AM; University of Dayton, University of Illinois
Contributed Talks

84-9 Angry birds: the personality of parental aggression and its fitness consequences in an island passerine
Suckow N, Pollock HS, Kastner M, Hauber ME, Rogers HS; UIUC, Iowa State University, Iowa State University

84-10 Noisy neighbors: how do human activity and habitat disturbance impact the nest site selection of tree swallows and eastern bluebirds?
Howerin HM, Faatz SL, Moore IT, Hernandez J; Radford University, Virginia Tech

84-11 Heterospecific but not conspecific parasitism delays fledging in host prothonotary warblers
Scharf HM, Stenstrom KH, Hauber ME, Schelsky WM; University of Illinois at Urbana-Champaign

84-12 Early post-natal maternal effects on voluntary physical activity, exercise physiology, and associated traits in mice
Cadney MD, Schwartz NL, Schmill MP, Castro AA, McNamara MP, Hills DA, Garland TJR; University of California Riverside

84-13 Chickadees increase provisioning effort to compensate for poor prey quality during the nesting period
Senécal S, Rivo JC, O’Connor RS, Nazois C, Vézina F; Université du Québec à Rimouski

Session 85

Phenotypic Plasticity
Chair: Kate Augustine

85-1 Evolution and plasticity of thermal performance in 12 New Zealand stick insect species (Phasmatodea)
Augustine KE, Cubillos CA, Roberts HE, Sinclair BJ, Buckley TR; Manaaki Whenua, Western University

85-2 Symbiosis in the time of climate change: Bleaching of Exaiptasia pallida in response to concurrent warming and acidification
Romanovich LA, Rade RG, Fetcher N, Voltzow J; University of New England, England University of Scranton, Wilkes University

85-3 Thermal tolerances of the Caribbean sea urchins Eucidaris tribuloides, Echinometra lividis, and Echinometra lucunter (Echinodermata: Echinoidea). Potential impacts of climate change
Collins-Jencarelli C, Green L, Hranitz J, Venn C, Klinger T; Bloomsburg University

85-4 Variation in the evolution and expression of phenotypically plastic structures
Miller K, Fuentes P, O’Brien DM, Angelini DR; Colby College

85-5 Is phenotypic plasticity a common driver of shell shape variation in freshwater gastropods?
Whelan NV; United States Fish and Wildlife Service, Auburn University

85-6 Morphological plasticity, not social behavior, may maintain diet breadth in leaf-footed bugs
Zlotnik S, Allen PE, Miller CW; University of Florida, Council on International Education Exchange

85-7 Gene-environment interactions shape transcriptomic and organishal responses to combined ethanol and temperature environments in the fruit fly Drosophila melanogaster
El-Shesheny IA, Matoo OB, O’Brien K, Meiklejohn CD, Montooth KL, University of Nebraska-Lincoln, Tanta University, University of Nebraska-Lincoln, Ohio State University

85-8 Transcriptional responses to thermal and oxygen stress in a montane leaf beetle
Elmore JW, Stillman JH, Dahlhoff EP, Rank NE; Sonoma State University, Santa Clara University, University of California Berkeley, San Francisco State University

85-9 Adaptive plasticity as an indirect fitness benefit of mate choice in variable environments
Kelly PW, Pfennig DW, Pfennig KS; University of North Carolina at Chapel Hill

Session 86

Photosynthesis, Respiration, and Ventilation
Chair: Jon Harrison

86-1 Leaf anatomical evolution in three origins of CAM photosynthesis
Leiblich A, Heyduk K*, Edwards E; University of Hawai‘i, Yale University

86-2 Time scales of mixing in an imperforate scleractinian coelenteron
Williams SD, Patterson MR; Mote Marine Laboratory, Northeastern University, Boston

86-3 How to be a giant: hypermetric scaling of leg tracheal systems in cockroaches and scarab beetles suggests oxygen transport to the legs limits maximal insect size
Harrison JF, Wagner JM, Alavazian V, Dulle J, Klok CJ, Weed M, Munoz E, Vandenbrooks JM, Fezzaa K, Socha JJ; Arizona State University, Argonne National Labs, Virginia Tech

86-4 Clade-specific metabolic allometries in the non-avian reptiles
Giancarli SM, Dunham AE, O’Connor MP; Drexel University, University of Pennsylvania

86-5 Development of apneustic breathing in Weddell seal (Leptonychotes weddellii) pups
Fiskum EM, Pearson LE, Weitzner EL, Petch S, Rotelle J, Schroth-Glanz M, Glanz H, Liwanag HEM; California Polytechnic State University, San Luis Obispo, Montana State University
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<td>Anatomy, ontogeny, and evolution of the respiratory system in Alligator mississippiensis and Struthio camelus</td>
<td>Schachner ER, Hedrick BP, Richbourg HA, Hutchinson JR, Farmer CG; Louisiana State University, University of California San Francisco, Royal Veterinary College, University of London, University of Utah</td>
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<td>86-8</td>
<td>Experimental morphology of the alligator diaphragm</td>
<td>Young BA, Greer S, Cramberg M; Kirksville College of Osteopathic Medicine</td>
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### Session 87

**Phylogenetics**  
Chair: Jesus Ballesteros

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<td>Field DJ, Benito J, Chen A, Jagt J, Ksepka DT; University of Cambridge, Natural History Museum Maastricht, Bruce Museum</td>
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<td>Evaluating the use of ultraconserved elements to determine species boundaries and population structure in the octocoral genus Alcyonium</td>
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<td>Molecular systematics and phylogeography of the blue monkey, Cercopithecus mitis, in Central and East Africa</td>
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<td>BUSCO-based phylogenomics resolves major cephalopod clades and placement of new pygmy lab models</td>
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<td>Phylogeny and biogeography of the New Zealand mite harvestman genus Rakaia, based on ultraconserved elements (UCEs)</td>
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### Session 88

**Physiology of Immunity and Reproduction**  
Chair: Charles "Matt" Watson

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<td>Farming fecund crickets: fruitful female fertility from feeding crickets royal jelly</td>
<td>Muzzatti MJ, MacMillan HA, Bertram SM; Carleton University</td>
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<td>First collection and characterization of semen in a West Indian manatee (Trichechus manatus)</td>
<td>Cowart JR, Collins DM, Mignucci-Giannoni AA, Alejandro-Zayas T, Rivera-Guzman AL, Larkin IV; University of Florida, Inter American University of Puerto Rico</td>
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88-7 Molecular basis for copulatory plug in garter snakes  
Ghione CR, Coradini A, Ehrenreich I, Dean M; University of Southern California

88-8 Temperature, oxygen, and the origins of viviparity  
Watson CM, Cox CL; Midwestern State University, Florida International University

88-9 Behavioural adaptations in egg laying ancestors facilitate evolutionary transitions to live birth  
Pettersen AK, Cornwalls CK, Uller T, Feiner N, Noble DWA, While GM; Lund University, Australian National University, University of Tasmania

88-10 Do thermal fluctuations affect gene expression differently than constant conditions?  
Breitenbach AT, Paitz RT, Bowden RM; Illinois State University

**Session 89**

**Plasticity, Epigenetics, Stress, and Novelty**  
*Chair: Eric Gangloff*

89-1 The role of plasticity in facilitating colonization of novel environments  
Barts N, Nieves N, Trojan S, Arias-Rodriguez L, Kelley J, Tobler M; Kansas State University, Washington State University, Universidad Juarez Autonoma de Tabasco

89-2 The creative role(s) of stress in evolution: from co-option to novelty  
Hanson HE, Wang C, Zimmer C, Schrey AW, Liebl AL, Ravinet M, Jiang RHY, Maddox JD, Martin LB; University of South Florida, Georgia Southern University, University of South Dakota, University of Nottingham, Field Museum of Natural History, Universidad Cientifica del Peru, American Public University System

89-3 Epigenetic potential in house sparrow (Passer domesticus) introductions  
Spears S, Koyoumdjian L, Pettit C, Aubret F, Gangloff EJ; Ohio Wesleyan University, Station d’Ecologie Theorique et Experimentale du CNRS

89-4 Plasticity in thermoregulatory behavior and performance in response to hyperoxia in a high-elevation specialist lizard, Iberolacerta bonnali  
Gangloff EJ, Bodensteiner BL, Koyoumdjian L, Munoz MM, Aubret F, Ohio Wesleyan University, Yale University, Station d’Ecologie Theorique et Experimentale du CNRS

89-5 Adaptation and plasticity in the multivariate thermal phenotype of common wall lizards  
Floreste FR, Ferreira LF, Titon Jr B, Titon SCM, Muxel SM, Gomes FR, Assis VR; University of Sao Paulo, Santo Andre Foundation University Center

89-6 Temporal variation of cytokine gene expression during the inflammatory response in toads  
Rosso AA, Logan ML, McMillan WO, Cox CL; Georgia Southern University, University of Nevada Reno, Smithsonian Tropical Research Institute, Florida International University

89-7 Both gene expression and physiology respond plasticity to thermal stress in a tropical forest lizard  
Stadtmauer DJ, Wagner GP; Yale University

89-8 How to exhibit "positive tolerance": Lessons from the mammalian uterus  
Logan ML, Cox CL; University of Nevada Reno, Florida International University

89-9 Genetic constraints, gene expression plasticity, and the importance of extreme weather events in the evolutionary response to climate change  
Logan ML, Cox CL; University of Nevada Reno, Florida International University

**Session 90**

**Pollution and Ecotoxicology**  
*Chair: Michael Bertram*

90-1 Disruption of male mating strategies in a chemically compromised environment  
Bertram MG, Tomkins P, Saaristo M, Martin JM, Michelangeli M, Tomkins RB, Wong BBM; Swedish University of Agricultural Sciences, Monash University, University of California Davis, Department of Environment, Land, Water and Planning (DELWP)

90-2 Potential impacts of lithium mining on vulnerable species and ecosystems  
Poterniti MC, Davis JE; Radford University

90-3 Physiological and genetic effects of deepwater horizon oil and dispersant on a developing marine sponge model (Cinachyrella sp)  
Desplat Y, Warner JF, Smith E, Vijayan N, Blackwelder P, Lopez JV; Nova Southeastern University, University of North Carolina at Wilmington

90-4 Fluoxetine impacts behaviors of non-target organisms in acidified ocean  
Lo HKA, Chua VA*, Chan KYK; Hong Kong University of Science and Technology, Swarthmore College
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<td>Effects of different roadway deicing salts on host-parasite interactions: the importance of salt type</td>
<td>Buss N, Nelson KN, Hua J, Relyea RA; Binghamton University, Rensselaer Polytechnic Institute</td>
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<td>Effect of anthropogenic sodium on chemical defense and coloration in monarch butterflies</td>
<td>Kobiela ME, Zambre A, Snell-Rood EC, Agrawal AA; University of Nebraska Lincoln, University of Minnesota Twin Cities, Cornell University</td>
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<td>Effects of road salt and its alternatives on freshwater invertebrates</td>
<td>Stander RM, Cahill AE, Albion College</td>
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<td>Analysis of microplastic pollution on three Texas state park beaches</td>
<td>Hayden MJ, Wicksten MK, Texas A&amp;M University</td>
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<td>Environmentally relevant pesticide cocktail and heat stress co-exposure affect osmoregulation and antioxidant system of goldfish gill and kidney</td>
<td>Lacy B, Rivera M, Rahman MS, Rahman MS; University of Texas Rio Grande Valley</td>
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<td>Parasitoid wasp community dynamics in vineyards following insecticide application</td>
<td>Schindler BY, Gavish-Regev E, Keasar T; University of Haifa, Hebrew University of Jerusalem</td>
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<td>Nighttime atmospheric oxidation of floral scent impacts the ability of hawkmoths to locate a floral scent source</td>
<td>Chan JK, Thornton JA, Riffell JA; University of Washington</td>
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**Population Genetics and Phylogeography**  
*Chair: Misha Matz*

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<td>Williams TM, Antoine AO, Martine CT; Bucknell University</td>
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<td>Genetic consequences of coral range expansion</td>
<td>Fifer JF, Yamakita T, Yasuda N, Davies SW, Boston University, Japan Agency for Marine-Earth Science and Technology, University of Miyazaki</td>
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<td>Genetic markers associated with hard clam resistance to QPX disease</td>
<td>Farhat S, Tonguy A, Espinosa EP, Guo X, Boulet I, Smolowitz R, Murphy D, Rivara GJ, Allam B; Stony Brook University, Sorbonne Université, Rutgers University, Roger Williams University, Cape Cod Cooperative Extension, Cornell Cooperative Extension</td>
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<td>A tale of two morphs: Phylogeography of Neopurcellia salmoni, with the first report of male polymorphism in the harvestman suborder Cyphophthalmi</td>
<td>Tardelli Canedo P, Baker CM, Morisawa R, Pessereau EJ, Boyer SL; Macalester College, Harvard University</td>
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<td>Using the effect of new mutations to better understand the genetic basis of thermal sensitivity</td>
<td>Miller CL, Dugand R, Franklin CE, McGuigan KM; University of Queensland</td>
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<td>Population connectivity of an endangered gastropod across the Mediterranean</td>
<td>Cunha TJ, Pavón A, Espinosa F, García-Gómez JC, Giribet G, de Medeiros B; Museum of Comparative Zoology, Harvard University, Smithsonian Tropical Research Institute, Universidad de Sevilla</td>
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<td>Mitochondrial effects on sex-specific aging and age-related phenotypes in a copepod without sex chromosomes</td>
<td>Flanagan BA, Li N, Edmands S; University of Southern California</td>
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<td>The effects of mitochondria on sex-specific transcriptomic responses to aging in the copepod Tigriopus californicus</td>
<td>Li N, Flanagan BA, Edmands S; University of Southern California Los Angeles</td>
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**Reproduction**  
*Chair: Jamie Cornelius*

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<td>Serrano-Rojas SJ, Pašukonis A; Stanford University</td>
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<td>Do female lizards choose nest sites based on the predictability of substrate moisture?</td>
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<td>Guell BA, Gomez EK, Warkentin KM; Boston University</td>
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<td>Francis RK, Catalano KA, Majoris JE, D’Alloia CC, Ruger T, Bogdanowicz S, Busto PM, Boston University, Rutgers University, King Abdullah University, University of New Brunswick, University of Exeter, Cornell University</td>
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<td>Greenway EV, Miller CW; University of Florida</td>
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<td>A pheromone antagonist deters female sea lamprey from more senescent mates</td>
<td>Buchinger TJ, Fissette SD, Bussy U, Li K, Huerta B, Buchinger EG, Brant CO, Johnson NS, Li W, Michigan State University, US Geological Survey Hammond Bay Biological Station</td>
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<td>Laroche RAS, Weinersmith K, Angeloni LM, Wiegmann DD, Egan SP; Rice University, Colorado State University, Bowling Green State University</td>
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**Sensory Biology and Neuroethology**

*Chair: Amanda Franklin*

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<td>Gage S, Aiello BA, Sharma V, Sprayberry J, Sponberg S; Georgia Tech, Muhlenburg College</td>
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<td>The sensory space of the threespine stickleback</td>
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<td>Associating functional morphology of the lumbosacral organ and locomotion modalities in avians</td>
<td>Kamska V, Contreras FB, Daley M, Badri-Spröwitz A; MPI for Intelligent Systems, University of California Irvine</td>
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<td>Behavioral effects to heat in larval Drosophila with and without TRPA1 receptors in sensory neurons and the medicinal blow fly (Phaenicia sericata)</td>
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<td>Mirror camouflage: Busting the myth</td>
<td>Franklin AM, Rankin KJ, Ospina-Rozo L, Medina I, Garcia JE, Dong CM, Ng L, Wang L-Y, Aulsebrook AE, Stuart-Fox D; University of Melbourne, RMIT University</td>
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<td>Ecological predictors of eye size in deep-sea shrimp</td>
<td>Schweikert LE, Thomas KN, Moreno VM, Casaubon A, Golightly C, Brocken-Grissam HD, Florida International University, Natural History Museum, Florida Institute of Technology, Tennessee Technological University</td>
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<td>The effect of habitat on visual sensitivity across animal phyla</td>
<td>Murphy MJ, Westerman EL; University of Arkansas</td>
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<td>Distinguishing between additive and epigenetic effects in light absorbance of mutant retinochromes</td>
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<td>Ernst DA, Westerman EL; University of Arkansas</td>
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<td>Population coding of visual motion detection and control of avoidance behaviours in locusts</td>
<td>Zhang S, Gray JR; University of Saskatchewan</td>
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<td>Escape flight performances of night-active malaria mosquitoes: the role of visual and airflow cues of an approaching object</td>
<td>Cribellier A, Spitzen J, Straw AD, van Leeuwen JL, Muijres FT; Wageningen University, Freiburg University</td>
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<td>93-12</td>
<td>The innate floral template of a generalist pollinator</td>
<td>Mishra A; National Center for Biological Science</td>
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### Sensory Biology I

**Chair: Alexandra Kingston**

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<td>Fabian ST, Zhou R, Lin HT, Imperial College</td>
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<td>Drosophila melanogaster increase steering errors when relying on restricted-area optic flow fields</td>
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<td>Tradeoffs in spatial integration of optic flow for visual velocity estimation in flying insects</td>
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<td>Halteres increase takeoff speed in calyptratae</td>
<td>Jordan KA, Yarger AM, Fox JL; Case Western Reserve University</td>
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<td>Developing a mechanical model for intraspinal mechanosensing in avians</td>
<td>Mo A, Kamsko V, Contreras FB, Daley M, Bodt-Sprovitz A; MPI for Intelligent Systems, University of California Irvine</td>
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<td>The wobbly compass needle: are the peculiarities of magnetic orientation behavior partially explained by low signal relative to noise?</td>
<td>Johnsen S, Lohmann KL, Warrant EJ, Duke University, University of North Carolina at Chapel Hill, Lund University</td>
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<td>A snapping shrimp has the fastest vision of any aquatic animal</td>
<td>Kingston ACN, Chappell DR, Speiser DI; University of Tulsa, University of South Carolina</td>
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<td>The sensory apparatus of dragonfly wings: sensor distribution and morphologies</td>
<td>Uhrhan MJ, Fabian JM, Siwanowicz I, Lin HT, Imperial College, Finders University, HHMI Janelia Research Campus</td>
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<td>Neural encoding and structural properties interact to determine optimal placement of sparse, spiking sensors on an insect wing</td>
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<td>Using finite element analysis to investigate the role of the swim bladder in directional hearing by the plainfin midshipman (Porichthys notatus)</td>
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<td>Flexibility of reflexes: How Johnston's organs modulate the antennal set-point in flying hawkmoths</td>
<td>Natesan D, Dave SD, Saxena N, Sane SP, National Centre for Biological Sciences, KTH Royal Institute of Technology, Case Western Reserve University</td>
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<td>94-12</td>
<td>Bumblebees land by adjusting the set-point of optical expansion rate in a stepwise manner</td>
<td>Gayal P, Cribellier A, Croon G, Lankheet M, Leeuwen J, Pieters R, Muijres F, Wageningen University and Research, Delft University of Technology</td>
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### Sensory Biology II

**Chair: Elias Lunsford**

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<td>Parkinson RH, Kessler S, Miriyala A, Wright GA; University of Oxford, University of Lausanne, University of Oxford</td>
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<td>Opsin expression during development in Gonodactylaceus falcatus: Investigating the role of ultraviolet sensitivity in stomatopod larvae</td>
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<td>Deciphering the mechanistic links between larval ecology and host-seeking behavior in mosquitos</td>
<td>Chandrasegaran K, Vinauger C; Virginia Tech</td>
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<td>Evolution of eye loss shapes lateral line sensitivity of blind cavefish during swimming: new insights from neurophysiology</td>
<td>Lunsford ET, Keene AC, Liao JC; University of Florida Gainesville, Whitney Laboratory for Marine Bioscience, Florida Atlantic University</td>
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<td>Auditory threshold differences in recently diverged cave populations of the Mexican tetra Astyanax mexicanus</td>
<td>Enriquez MS, Swanson N, McGaugh SE, Gluesenkamp A, Mensinger AF; University of Minnesota, San Antonio Zoo</td>
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<td>95-8</td>
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<td>Thomas KN, Gower DJ, Streicher JW, Bell RC, Fujita MK, Schott RK, Douglas RH; Natural History Museum, California Academy of Science, National Museum of Natural History, Smithsonian Institution, University of Texas at Arlington, York University, University of London</td>
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<td>Schott RK, Bell RC, Ellis LR, Thomas KN, Streicher JW, Gower DJ, Fujita MK, York University, National Museum of Natural History, California Academy of Sciences, Cornell University, Natural History Museum, University of Texas Arlington</td>
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<td>Studying a black box: investigating processing of a receptorless sense</td>
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#### Sensory Ecology
**Chair: Mark Hauber**

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<td>Symbiotic magnetic sensing in animals: evidence from metagenomics</td>
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<td>Electroreception in amphiuma salamanders</td>
<td>Keathley CM, Moon BR, University of Louisiana at Lafayette</td>
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<td>Magnetoreception and the radio sun</td>
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<td>Lens morphology is influenced by ecology in frogs and toads (Amphibia: Anura)</td>
<td>Mitra AT, Womack MC, Gower DJ, Clark B, Streicher JW, Bell RC, Schott RK, Fujita MK, Thomas KN, University College London, Natural History Museum, Utah State University, California Academy of Sciences, York University, University of Texas</td>
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<td>Romero-Diaz C, Xu C, Campos SM, Kusumi K, Hews DK, Martins EP, Arizona State University, Georgia State University, Indiana State University</td>
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### Session 97

#### Sensory Structure-Function
**Chair: Kathryn Stanchak**

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<td>Sánchez-Martínez PM, Daza JD*, Hoyos JM, Pontificia Universidad Javeriana, Sam Houston State University</td>
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<td>Marcé-Nogué J, Liu J, Universitat Rovira i Virgili, Institut Català de Paleontologia Miquel Crusafont, University of California Berkeley, University at Buffalo</td>
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97-5  a 3d finite element model for sound transmission in an amphibian middle ear  Fleming RC, Hoke KL; Colorado State University

97-6  Rapid recoil of filiform insect antennae  McCarter MG, Loudon C; University of California Irvine

97-7  An overview and definition of cirri in fishes  Geldof DL, Summers AP, Cohen KE; University of Washington, Friday Harbor Labs

97-8  The best of both worlds: regional specialization in the mechanosensory system of the silverjaw minnow, Ericymba buccata  Jones AE, Conway KW, Webb JW; University of Rhode Island, Texas A&M University

97-9  Immunohistochemical exploration of hypothesized mechanosensory features in the avian lumbosacral spinal cord  Stanchak KE, Miller KE, Lumsden EW, Davis CG, Brunton BW, Perkel DJ; University of Washington, California Polytechnic State University

97-10  Ecomorphology and morphological diversity of trigeminal nerve-mediated somatosensation in sauropsids  Lessner EJ, Holliday CM; University of Missouri

97-11  Using diceCT to quantify in situ olfactory rosette morphology among elasmobranchs  Clark AE, Meredith TL, Porter ME; Florida Atlantic University

97-12  Morphology of the larval olfactory organ in the Koh Tao Island caecilian (Ichthyophis kohtaoensis)  Zhao A, Iyer N, Kim E, Reiser M; Janelia

97-13  An outside-in comparative study of visual systems in the Drosophila melanogaster subgroup  Shrimpton SJ, Streicher JW, Gower DJ, Bell RC, Fujita MK, Schott RK, Thomas KN; Natural History Museum, University College London, California Academy of Sciences, National Museum of Natural History, Smithsonian Institution, University of Texas at Arlington, York University

Session 98

Skull & Jaw Functional Morphology & Evolution  
Chair: Kelsey Stilson

98-1  Bird brains, jaw muscles, and the origin of avian cranial kinesis  Wilken AT, Sellers KC, Cost IN, Middleton KM, Witmer LM, Holliday CM; University of Chicago, University of Missouri, Albright College, Ohio University

98-2  How woodpeckers manage to retract their beak quickly after it got stuck in wood  Van Wassenbergh S, Pauly E, Abourachid A; University of Antwerp, Museum National D'Histoire Naturelle

98-3  Under pressure: the relationship between cranial shape and in vivo maximal burrowing force in caecilians (Gymnophiona)  Lowie A, Herrel A, De Kegel B, Wilkinson M, Measey GJ, O'Reilly JC, Kley N, Gaucher P, Brecko J, Kleinteich T, Adrianea D; Ghent University, MNHN, NHM, Stellenbosch University, Ohio University, Stony Brook University, CNRS, RBINS, Kiel University

98-4  Morphological adaptations of the skull and teeth in kingsnakes (Serpentes: Colubridae) for skink predation  Zobek CM, D'Amore D, Dillman CB; Cornell University, Daemen College

98-5  Morphological variation of cranial elements in the western massasauga (Sistrurus tergeminus)  Jacisin JJ, Fielder C, Hibbitts TJ, Ryberg WA, Walkup DK, Meik JM, Lawing AM; Texas A&M University, Tarleton State University

98-7  Theoretical functional morphology reveals morphological evolution of the first jaws tracks a Pareto optimal front  Deakin WJ, Anderson PSL, den Boer W, Hill JJ, Rucklin M, Donoghue PVC, Rayfield EJ; University of Bristol, University of Illinois Urbana-Champaign, Swedish Museum of Natural History, Smithsonian Institution, Naturals Biodiversity Center

98-8  Myology of the Reptilia  Holliday CM, Wilken AT, Sullivan SP, Sellers KC, Cost IN, Middleton KM; University of Missouri, University of Chicago, Albright College

98-9  Skull shape, muscle orientation, and joint loading in a biomechanical transformation: Evolution of the suchian skull  Sellers KC, Clark JM, Middleton KM, Holliday CA; University of Missouri, George Washington University

98-10  Finite element modeling the effect of symphyseal tissue properties and the intramandibular joint on Tyrannosaurus rex mandibular biomechanics  Fortner JD, Wilken AT, Sellers KC, Cost IN, Holliday CM; University of Missouri - Columbia, University of Chicago, Albright College

98-11  Cranial shape variation in minks: Separating two highly similar species  Gálvez-López E, Cox PG; University of York

98-12  Reticulated pythons roll their hemimandibles and splay their quadrates to engulf enormous prey  Capano JG, Kaczmarek EB, Lomax JJ, Turner ML, Brainerd EL, Ryerson WG; Brown University, Saint Anselm College
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**Social Behavior I**  
*Chair: Erica Westerman*

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**Social Behavior II**  
*Chair: David Murphy*

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**Species Distributions in the Anthropocene**  
*Chair: Natalie Hamilton*

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101-4 Predicting range shifts under future climate conditions in threatened species using the Townsend’s big-eared bat, Corynorhinus townsendii townsendii (Cooper, 1837), as an example organism
Hamilton NM, Pence A, Morrison ML; Texas A&M University

101-5 What drives range size variation: Effects of morphology on range size in the Musteloidea
Slibeck BB; Columbia University

101-6 Ground truthing microclimate models: Can we use large-scale macroclimate to predict temperatures organisms experience in the soil?
Garzella CS, Dillon ME; University of Wyoming

101-7 Climate warming expected to alter thermal performance and trigger range shift in outbreaking South American locusts

101-8 Latitudinal pattern in microevolution rates of thermal tolerance of marine organisms
Ye M, Collin R, Chan KYK; Swarthmore College, Smithsonian Tropical Research Institute

101-9 Are populations of the salamander Bolitoglossa altamazonica declining at low elevations due to rising temperatures?
Medina-Baez OA, Aponte-Gutiérrez AF, Veselka AJ, Watling JI; John Carroll University, Universidad Nacional de Colombia

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Spines & Sutures
Chair: AL Camp

102-1 Vertebral column bending and intervertebral space shape in fishes
Abu-Bader L, Summers AP, Kruppert S, Donatelli CM; College of William and Mary, University of Washington Friday Harbor Laboratories

102-2 From head to tail, embryo to adult: the life cycle of the notochord of Atlantic salmon, Salmo salar

102-3 Rainbow trout use 3D vertebral flexion during suction feeding
Camp AL; University of Liverpool

102-4 Range-of-motion in dorsal vertebra of ancient tetrapods
Carter AM, Johnson EH, Hsieh S-T, Dodson P; University of Pennsylvania, Cornell University, Temple University

102-5 Analysing form and function of the cervicothoracic transition in cetartiodactyly confirms the ‘functional elongation hypothesis’ of the giraffe neck
Nyakatura JA, Muller MA, Merten L, Böhrer C; Humboldt Universität zu Berlin, Muséum National d’Histoire Naturelle

102-6 Sutural structure in a telescopied skull: the maxillo-frontal suture in Tursiops truncatus
Roston RA, Miranda AJ, McLeiian WA, Pabst DA, Hilton MJ, Roth VL; University of Washington, Duke University, UNC Wilmington

102-8 Finite-element modeling of fossil taxa: how close is close enough? Sensitivity analyses on the skull of Megapnosaurus
Button DJ, Porro LB, Barrett PM; Natural History Museum, University College London

102-9 A bone of contention – The search for wormians in squamates
Laver RJ, Hunziker J, Bauer AM, Daza JD; Australian National University, Sam Houston State University, Villanova University

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Structure-Function of Habitat Transitions
Chair: H Dutel

103-1 Ancestral state reconstruction of amphibious species within the order cyprinodontiformes
Bagby MW, Ross MA, Giammona F; Wake Forest University

103-2 Do environmental gradients elicit behavioural gradients in an amphibious fish
Lutek K, Foster KL, Znotinas KR, Standen EM; University of Ottawa, Bail State University, Department of Fisheries and Oceans Canada

103-3 Functional evolution of the skull during the fish-tetrapod transition: insight from living vertebrates
Dutel H, Porro LB, Fabre A-C, Martin-Silverstone E, Berks H, Fagan MJ, Rayfield EJ; University of Bristol, University College London, Natural History Museum, University of Hull

103-4 Building a tetrapod: skull topology across the water-to-land transition
Rawson JRG, Esteve-Altava B, Porro LB, Dutel H, Rayfield EJ; University of Bristol, Pompeu Fabra University, University College London

103-5 Kinematic comparisons between mudskipper fins and salamander limbs during terrestrial locomotion
Quigley ZM, Blob RW, Kawano SM; George Washington University, Clemson University
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<td>Spence M, Rizwan M, Rull M, Konow N</td>
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### Session 104

**Suckling, Swallowing & Chewing**

*Chair: François Gould*

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<td>Mayerl CJ, Steer KE, Chava AM, Bond LE, Edmonds CE, Gould FDH, Stricklen BM, Hieronymous TL, Vinyard CJ, German RZ</td>
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<td>Heterogeneity of variance partitioning between kinematics and electromyography (EMG) of swallowing following nerve lesion in pigs</td>
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<td>Ohio University Heritage College of Osteopathic Medicine, Center for Research and Interdisciplinarity Paris, University of Michigan School of Dentistry</td>
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<td>Sucking and lapping in mammals: a false dichotomy?</td>
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### Session 105

**Swimming: Maneuvering & Stability**

*Chair: Freddie Ortiz*

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<td>Pectoral fin kinematics and electromyography in Karman gaiting trout</td>
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### Session 106

#### Symbiosis and Immunity

*Chair: Hanny Rivera*

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#### Temperature and Metabolism

*Chair: Andrea Rummel*

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<td>Rummel AD, Swartz SM, Marsh RL; Brown University</td>
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<td>Interactive effects of air temperature and density on flight physiology of honey bees</td>
<td>Glass JR, Harrison JF; Arizona State University</td>
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<td>Temperature, nutrition and life history among New Zealand stick insects</td>
<td>Cubillos CA, Augustine KE, Sinclair BJ, Buckley TR; University of Auckland, Landcare Research, Western University</td>
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107-10 Comparison of temperature preference and metabolic thermal sensitivity between two juvenile coastal shark species  
Skelton ZR, Wegner NC, Prinzing TS, Hastings PA; University of California San Diego, National Oceanic and Atmospheric Administration, Simon Fraser University

107-11 The biophysical basis of thermal tolerance in fish eggs  
Martin BM, Dudley PN, Kashef NS, Stafford DM, Reeder WJ, Tonina D, Del Rio AM, Foor JS, Danner EM; University of Amsterdam, UC Santa Cruz, University of Idaho, UC Davis, USFW, NOAA

Session 108

Thermobiology  
Chair: Melissa May

108-1 Tissue-specific regulation of diapause in the Asian longhorned beetle, Anoplophora glabripennis  
Torson AS, Roe AD, Doucet D, Sinclair BJ; University of Western Ontario, Natural Resources Canada

108-2 Rapid gain and slow loss of heat tolerance in Mytilus californianus reflects an adaptive response to timing of heat stress events in the field  
Moyen NE, Crane RL, Somero GN, Denny MW; Stanford University

108-3 Proteomic signatures of California mussels acclimated to varying emersion temperatures and algal rations  
May MA, Tomanek L; Florida Gulf Coast University

108-4 Testing for trans-generational effects of high temperature exposure in Manduca sexta  
Alston MA, Kingsolver JG, Willett CS; University of North Carolina at Chapel Hill

108-5 Computer assisted analysis to improve throughput and precision of knockdown time assays  
Perez-Galvez FR, Awde D, McCabe EA, Teets NM; University of Kentucky

108-6 A simple and dynamic thermal gradient device for measuring thermal performance in small ectotherms  
Ritchie MW, Dawson JW, MacMillan HA; Carleton University

108-7 Ability of RCH to protect against physiological damage from sublethal chilling in Drosophila melanogaster  
Unfried LN, Teets NM; University of Kentucky

108-8 Sensitivity of tardigrades (Hypsibius exemplaris) to ecologically relevant cold  
Lyons AM, Roberts KT, Byassee P, Williams CM; University of California Berkeley

108-9 Ice-binding proteins and freeze tolerance in the bay mussel (Mytilus trossulus)  
Box ICH, Marshall KE; University of British Columbia

108-10 Invaders sourced from islands: thermal matching, potential or plasticity?  
Claunch NM, Goodman CM, Reed RN, Romagosa CM, Taylor EN; University of Florida, University of South Florida, United States Geological Survey, California Polytechnic State University

108-11 Genetic variation in phenotypic plasticity of thermal limits in Drosophila melanogaster  
Awde DN, Teets NM; University of Kentucky

Session 109

Thermoregulation  
Chair: Danielle Levesque

109-1 Thermoregulatory properties of bank voles affected by age and artificial selection  
Grosiak M, Koteja P, Bauchinger U, Sadowska ET, Jagiellonian University, Institute of Environmental Sciences

109-2 Age-related differences in core body temperature and oxidative stress under limited food availability  
Zagkle E, Grosiak M, Bauchinger U, Sadowska ET; Jagiellonian University

109-3 Delayed spring conditions force Arctic snow buntings to maintain winter thermogenic capacity while breeding  
Le Pogam A, Drolet J, Young K G, Régimbald L, Roy G, Robitaille F, Laplante M-P, Berteaux D, Tam A, McRae C, Love OP, Vezina F; Université du Québec à Rimouski, University of Western Ontario, Department of National Defence, University of Windsor

109-4 Thermoregulatory phenotypes in mammals: the missing link between basal metabolism and life history?  
Levesque DL; University of Maine

109-5 Ruby-throated hummingbirds (Archilochus colubris) abandon an energy emergency torpor strategy when they fatten for migration in late summer  
Eberts ER, Guglielmo CG, Welch KC; University of Toronto at Scarborough, University of Western Ontario

109-6 Physiological and behavioral flexibility in heat budget-management during hovering in hummingbirds  
Powers DR, Lapsansky AB, Tobalske BW; George Fox University, University of Montana

109-7 Development of thermoregulatory capability in Weddell seal pups  
Pearson LE, Weitzner EL, Tomanek L, Liwanag HEM; California Polytechnic State University
Session 110

(Un)Correlated Evolution
Chair: Leigha Lynch

110-1 Climbing behavior and skeletal anatomy of the salt marsh harvest mouse
Woldt K, Sustaita D, Pratt RB; California State University

110-2 On the coevolution of mammae number and litter size
Stewart TA, Yoo I, Upham NS; University of Chicago, Arizona State University

110-3 Evolutionary analysis of SARS-CoV-2: Is haplotype variation linked to mortality?
Fraser CJ, Butler MA; University of Hawai‘i at Manoa

110-4 Environmental factors shaping visible and near-infrared light manipulation in Christmas beetles
Ospina-Rozo L, Stuart-Fox D; University of Melbourne

110-5 Carnivoran relative brain volume does not correlate with environmental and dietary variation
Lynch LM, Allen KL; Midwestern University Glendale, Washington University in St. Louis School of Medicine

110-6 Tight evolutionary rate correlations between mammalian mitochondrial- and nuclear-encoded aerobic respiration proteins
Weaver RJ, Havird JC; University of Texas at Austin

110-7 The odd un-couple: Hypoxia tolerance uncorrelated with acid tolerance in populations of Tigriopus californicus
Deconinck AD, Willett CS; University of North Carolina at Chapel Hill

110-8 A mouthful of fry and eggs: does mouth-brooding influence head and body shape evolution in cichlid fishes?

110-9 Shared acoustic allometry in the largest and smallest known birds
Eliason CM, Reder T, Laverde-R O, Goller F, Clarke JA; Field Museum of Natural History, Midwestern University, Pontificia Universidad Javeriana, University of Utah, University of Texas Austin

110-10 Evolution of fruit scent in neotropical pepper plants: a test of the dispersal syndrome hypothesis
Santano SE, Kaliszewska ZA, Leiser-Miller L, Lauterbur ME, Arbour JH, Davalos LM, Riffell JA; University of Washington, University of Arizona, Middle Tennessee State University, State University of New York at Stony Brook

110-11 The nocturnal letter-winged kite (Elanus scriptus) and diurnal birds of prey: visual anatomy differences are not like night and day
Keirnan AR, Weisbecker V, Iwaniuk AN; Flinders University, University Lethbridge

Session 111

Vertebrate Evo-Devo
Chair: Matt Rockman

111-1 Defining regulators of endochondral growth in cichlid skull evolution
Johnson SL, Heubel BP, Breiden CA, Long A, Schilling TF, Le Pabic P*, University of North Carolina Wilmington, University of Delaware, University of California Irvine

111-2 Placode induction and patterning cues in the embryonic chicken scleral ossicle system
Giffin JL, Franz-Odendaal TA; Mount Saint Vincent University

111-3 The evolutionary change of morphogenesis of dinosaur-type femoral head
Egawa S, Bishop PJ, Pintore R, Griffin CT, Tsai HP, Botelho JF, Smith-Paredes D, Kuratani S, Norell MA, Nesbitt SJ, Hutchinson JR, Bhullar BAS; Yale Peabody Museum, RIKEN BDR, Royal Veterinary College, Virginia Tech, Missouri State University, Yale Peabody Museum, Pontificia Universidad Católica, American Museum of Natural History

111-4 Influence of brain-skull interactions in the evolution of the amphibian skull
MacKenzie EM, McKinnell I, Maddin H; Carleton University

111-5 Pharmaceutical inhibition of BMP signaling pathway severely disrupts cartilage morphology during zebrafish larval development
Zinck NW, Jeradi S, Franz-Odendaal TA; Dalhousie University, Mount Saint Vincent University

111-6 The many faces of evolution: heterochronic developmental mechanisms for adaptive radiations
Abzhanov A; Imperial College London

111-7 Odyssey of strange fish: Investigating ‘ancient fish’ genomes and development to illuminate vertebrate evolution
Braasch I, Spotted Gar Genome Consortium, Bowfin Genome Consortium; Michigan State University
Contributed Posters

All contributed talks and posters for SICB 2021 were pre-recorded and uploaded the SICB Pathable platform. They are available “on demand” to registered attendees from Jan 3-Feb 28.

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Poster 2  DEE Best Student Paper: Huey Award
Poster 3  DNNSB Best Student Paper
Poster 4  DVM Best Student Paper: Karel F. Liem Award
Poster 5  Adaptation: Physiology, Morphology and Behavior
Poster 6  Animal Communication
Poster 7  Biomaterials, Adhesion, Sensing, and Internal Flows
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**DCE Best Student Paper: Lynn Riddiford Award**  
Chair: Kathleen Hunt

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<td>Seasonal distribution of arginine vasotocin in the forebrain of male red-sided garter snakes</td>
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<td>Multi-year progesterone profiles during pregnancy in baleen of humpback whales (Megaptera novaeangliae)</td>
<td>Lowe CL, Hunt KE, Rogers MC, Robbins J, Neilson J, Gabriele C, Teerlink S, Seton R, Buck CL, Northern Arizona University, George Mason University, Smithsonian-Mason School of Conservation, Alaska Fisheries Science Center Auke Bay Laboratories, NOAA Fisheries, Center for Coastal Studies, Glacier Bay National Park, Protected Resources Division, National Oceanographic and Atmospheric Administration, College of the Atlantic</td>
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**DEE Best Student Paper: Huey Award**  
Chair: Cameron Ghalambor

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<td>Moore J, Bock S, Bertucci E, Bae J, Parrott B; Benedict College, University of Georgia, Augusta University</td>
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**DNNSB Best Student Paper**  
Chair: Michael Baltzley

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**DVM Best Student Paper: Karel F. Liem Award**
*Chair: Rick Blob*

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<td>The versatile skulls of herbivorous fishes: the functional morphology of pacu and piranhas jaws and teeth</td>
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<td>Predicting primate hip function based on bony morphology using path analysis</td>
<td>Aguilar LK, Collins CE, Hammond AS; American Museum of Natural History, Harvard University, Sacramento State University, New York Consortium of Evolutionary Primatology (NYCEP)</td>
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<td>Smaller, smaller, and smaller</td>
<td>Heide OA, Perez CA, Herrera-Martinez A, Thomas R, Daza JD; Sam Houston State University, University of Missouri, University of Puerto Rico</td>
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### Poster 5

**Adaptation: Physiology, Morphology and Behavior**
*Chair: Frances Banier*

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<td>Lower heart rates for ribbed mussels in exposed areas of a salt marsh at Tybee Island, Georgia</td>
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<td>Temperature changes during oogenesis impact the offspring size of a tropical slipper limpet</td>
<td>Ly SH, Collin R; Northeastern University, Smithsonian Tropical Research Institute</td>
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<td>Energy use during the development of two species of Antarctic sea spider</td>
<td>Toh MWA, Lobert GT, Moran AL; University of Hawai‘i at Mānoa</td>
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<td>Experimental evaluation of Abarenicola pacifica burrowing behavior: implication for Zostera marina restoration and expansion success using seeds</td>
<td>Crow RS, Dethier M, Wyllie-Echeverria S; University of Virginia, Friday Harbor Laboratories, University of Washington</td>
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<td>P5-9</td>
<td>Temperature and oxygen tolerance limits of an aquatic insect depend strongly on water flow</td>
<td>Frakes JI, Burrell JH, Shah AA, Woods HA; University Montana</td>
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<td>Does basal cold tolerance constrain plasticity in individual Drosophila?</td>
<td>O’Neill EA, Davis HE, MacMillan HA; Carleton University</td>
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<td>Does a prolonged exposure to low pH water and low food quality affect juvenile Dungeness crab behavior?</td>
<td>Hayes HG, Street E, Manos SA, Thompson N, Schram JB, Galloway AWE; University of Oregon, Oregon Institute of Marine Biology, North Bend High School</td>
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<td>Hatching delays in extreme salinities in the intertidal copepod Tigriopus californicus</td>
<td>Bock AK, Burton RS; University of California San Diego</td>
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**Animal Communication**
*Chair: Tina Barbasch*

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<td>Song variation and diversity in grasshopper sparrows of the Caribbean</td>
<td>Warfield J, Dalai A, Hill R, Kaiser SA, Lohr B; University of Maryland Baltimore County, Cornell University</td>
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<td>Grasshopper sparrow warble song: Syllable classification and quantification</td>
<td>Hill RA, Lohr B; University of Maryland Baltimore County</td>
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P6-3 Dominance rank, age, and parasitism predict male vervet monkey (Chlorocebus pygerythrus) genital skin colouration
Snyder KP, Greenberg D, Mastromonaco G, Schoof VAM; York University, McGill University, Toronto Zoo, York University

P6-4 Association of cap plumage color, cap size, and physiological traits in White-breasted Nuthatches (Sitta carolinensis)
Artimo LE, Wilcoxen TE; Millikin University

P6-5 Modeling evolution of firefly-like signal vocabularies during species radiation
Nguyen C, Huang J, Peleg O; University of Colorado Boulder, Santa Fe Institute

P6-6 Unique fluorochrome increases social attraction in crested auklets (Aethia cristatella) and reveals a link to ecology
Douglas HD, Ermakov I, Gellemann W; University of Alaska Fairbanks, Grambling State University, University of Utah

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Biomaterials, Adhesion, Sensing, and Internal Flows
Chair: Lindsay Waldrop

P7-1 Flexible armor: overlap and microstructure of poacher (Agonidae) armor
Brainard CR, Summers D, Cohen KE, Kruppert S, Summers AP, Kolmann MA; UMBC, Harvard University, University of Washington, University of Michigan

P7-2 Are spider egg sacs extra hydrophobic?
Karkosiak KQ, Coonfield AJ, Edinweera CU, Maksuta DD, Blockidge TA; University of Akron

P7-3 Body and armor stiffness of the spearnose poacher Agonopsis vulsa (Actinopterygii; Agonidae)
Jackson BJ, Naughton L, Donatelli C, Porter M, Summers A, Kruppert S; Idaho State University, Bucknell University, Friday Harbor Laboratories, Florida Atlantic University, University of Washington

P7-4 Anisotropic structural and mechanical properties of shark skin
Hagood ME, Porter ME; Florida Atlantic University

P7-5 Mineral architecture in cartilaginous shark vertebrae
Knaub J, Heerdeneg I, Ruddy B, Ingle D, Porter ME; Florida Atlantic University, Texas A&M University Galveston

P7-6 Circulatory resistivity increases costs of circulatory transport in peristaltic systems
Kim B, Orlovic I, Yee R, He Y, Waldrop LD; Chapman University, University of North Texas

P7-7 Sex-specific variation in the structure and mechanical properties of shark skin
Alexander JRS, Hagood ME, Porter ME; Florida Atlantic University

P7-8 A histological study of the blue-dashed rockskipper (Blenniella peripherthalamus)
Buo C, Garner AM, Londraville RL; University of Akron

P7-9 Geometric morphometrics of climbing kinematics in waterfall climbing goby fishes
Griner JG, Palecek AM, Diamond KM, Schoenfuss HL, Blob RW; Clemson University, Seattle Children’s Research Institute, St. Cloud State University

P7-10 Odor capture by hair arrays in multiple configurations
Yang S, Dao A, Nyugen-Phuoc K, He Y, Waldrop LD; Chapman University, University of North Texas

P7-11 Efficient localization of weakly electric fish with an electrode array
Bhat A, Madhav M, Jayakumar R, Cowan N, Fortune E; Carnegie Mellon University, Johns Hopkins University, New Jersey Institute of Technology

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Character Evolution and Development
Chair: Mackenzie Gerringer

P8-1 Light it up! Cuticular fluorescence in arachnids may be more common than previously thought
Hochberg R, Le A, Mendez L, Shelley S, Lauder D; University of Massachusetts Lowell, Lauder Histology, NY

P8-2 Phenotypic impacts of warming environments: Morphological differentiation in a Death Valley pupfish parallels plastic developmental response to high temperature
Cleveland CS, Del Core AA, Lema SC; Cal Poly San Luis Obispo

P8-4 Proteomic and developmental studies of aplacophoran sclerites to study the origins of molluscan mineralized structures
Yap-Chiongco MK, Kocot KM; University of Alabama, Alabama Museum of Natural History

P8-5 Cephalopod photophores: Estimating the origins of complex convergent traits
Vincent BA, Lou ES, Ramamurthy SV, Oakley TH; University of California Santa Barbara

P8-6 Classification of unknown deep-sea snailfishes through morphological and genetic evidence
Woodworth B, Fregosi L, Suplicz S, Palmeri J, Gerringer ME; State University of New York at Geneseo
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### Poster 9

**Comparative Genomics and Proteomics**  
*Chair: Robert Haney*

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<td>Farhat S, Tonguy A, Allam B, Stony Brook University, Sorbonne Université</td>
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<td>Mesrop LM, Goodheart JA, Minsky G, Oakley TH, University of California Santa Barbara, University of California San Diego</td>
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<td>Lau ES, Vamey RM, Oakley TH, University of California Santa Barbara, University of Alabama</td>
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<td>Seman B, Ryan JF, Santagata S, Long Island University, University of Florida</td>
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<td>Keating SE, Pinto B, Gamble T, Marquette University</td>
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### Poster 10

**Comparative Morphology**  
*Chair: Kelly Diamond*

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<td>Guruvadoo AR, Miller CW, Forthman M, University of Florida, California Department of Food and Agriculture</td>
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### Complementary to S5: An Evolutionary Tail: Evo-devo, Structure, and Function of Post-anal Appendages

**Chair:** Janneke Schwaner

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**Chair:** Stacy Farina

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**Chair:** Kathy Gillen

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**Endocrinology 2**  
*Chair: Brian Walker*

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**Evolutionary Developmental Genetics**  
*Chair: Karen Crawford*

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**Evolutionary Ecology**  
*Chair: Nick Barts*

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**Evolutionary Morphology**

Chair: Anthony Lapsanky

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**Evolutionary Physiology**

Chair: James Harper

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<tr>
<td>P20-1</td>
<td>A remarkably consistent life history trait with a remarkably inconsistent developmental basis: lack of evolutionary conservation of transcriptomic trajectories during tephritid fly diapause</td>
<td>Gadey L, Dowe EJ, Powell TH, Nguyen A, Papadopoulos NT, Hahn DA, Ragland GJ, University of Colorado Denver, University of Otago, Binghamton University, University of Florida, University of Thessaly</td>
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P20-3  A spectrum of sleep, shallow torpor, and deep torpor in hummingbirds  
Shankar A, Cisneros INH, Thompson S, Graham CH, Powers DR; Cornell University, Stony Brook University, George Fox University, Swiss Federal Research Institute WSL

P20-4  Food availability alters stress resistance in speckled cockroaches (Nauphoeta cinerea)  
Abril JT, Gaviria MA, Harper JM; Sam Houston State University

P20-5  Size matters: body size is correlated with longevity in speckled cockroaches (nauphoeta cinerea)  
Badwan S, Harper JM; Sam Houston State University

P20-6  The powerhouse of the cell has the power to influence mtDNA mutations  
Maclaine KD, Stebbings KA, Havird JC; University of Texas at Austin

P20-7  Decline in haematocrit with increasing age in zebra finch (Taeniopygia guttata)  
Coughlan K, Sadowska ET, Bauchinger U; Jagiellonian University, Nencki Institute of Experimental Biology PAS

P20-8  Uncoupling proteins as a physiological defense mechanism in Drosophila  
Sum J, Montooth KL, Motoo OB, DeWitt H; University of Nebraska-Lincoln

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**Feeding Biomechanics**  
Chair: Jonathan Cowart

P21-1  Relationship between diet and gill raker morphology in Surfperches (Embiotocidae)  
Akinrinade AO, Jensen JS; University of Washington Bothell

P21-2  Differences in the histological composition of piranha and pacu lips are consequences of prey manipulation tactics  
Cohen KE, Kamann MA; Friday Harbor Labs, University of Washington, University of Michigan

P21-3  Feeding upside down: Hydrodynamics of filter-feeding in flamingos  
Ortega-Jimenez VM, Seleb BR, Wilson LG, Mendelson JR, Bhama S; Georgia Institute of Technology, Zoo Atlanta

P21-4  Feeding currents of upside-down jellyfish: role of oral arm structure  
George N, Gaddam MG, Santhanakrishnan A; Oklahoma State University

P21-5  Ubiquitous yet inconspicuous: quantifying trophic impact of a widespread oceanic comb jelly (Ctenophore)  
Potter B, Corrales-Ugalde M, Townsend JP, Collin SP, Sutherland KR, Costello JH, Gemmell BJ; University of South Florida, University of Oregon, Providence College, Roger Williams University

P21-6  How to eat a boxed lunch - crabs feeding on armored poachers  
Trainor S, Donatelli CM, Kolmann MA, Summers AP, Summers OS*, Kruppert S; Rice University, University of Ottawa, University of Michigan, University of Washington, Friday Harbor Labs

P21-7  The impact of automated milk delivery on infant feeding performance  
Steer KE, Edmonds CE, Gould FDH, Adjerid K, Bond LE, German RZ, Mayerl CJ; NEOMED, Rowan School of Osteopathic Medicine

P21-8  Sexual dimorphism in chameleon feeding  
Bagana M, Donas N*; University of San Diego

P21-9  Fin-triguing fish: functional equivalency of jaw morphologies of fin- and scale-feeding piranhas'  
MacLeod LM, Racy JM, Summers AP, Kolmann MA; University of Washington, University of Washington, Friday Harbor Labs, University of Michigan Museum of Paleontology

P21-10  Experimentally decoding the forces of butterflyfish on anchored prey  
Romero JA, Wainwright P, Stuart H; UC Berkeley, UC Davis

P21-11  Jaw morphology in Poecilia reticulata does not differ in high- and low-predation environments  
Khoriaty M, Kane E; Bowdoin College, University of Louisiana at Lafayette

**Poster 22**

**Foraging Behavior**  
Chair: Amanda Puitiza

P22-1  Behavioral strategies of juveniles: Attraction to adult feeding cues  
Kleckner K, Zlotnik S, Miller CW; University of Florida

P22-2  Juveniles do not use adult feeding sites in the leaf-footed bug, Narnia femorata  
Ricker TA, Zlotnik S, Miller CW; University of Florida Gainesville

P22-3  Leaf choice by salmonfly nymphs (Pteronarcyis californica) in western Montana  
Hamant EL, Frakes JI, Woods HA; University Montana

P22-4  Exploring predictors of problem-solving and innovation ability in captive Asian elephants  
Puitiza A, Jacobson S, Synder R, Sheppard A, Plotnik J; CUNY Hunter College, CUNY Graduate Center, Oklahoma City Zoo and Botanical Garden, Rosamond Gifford Zoo
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### Poster 23

**Global Climate Change and Land-Use Change**  
Chair: Isaac VanDiest

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<td>Cosca CM, Turba R, Jacobs DK</td>
<td>University of California Los Angeles</td>
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<td>Flight speeds of hummingbirds during foraging and territory defense</td>
<td>Hanna R, Sustaita D, Hedrick T, Rico-Guevara A</td>
<td>University of Washington, California State University San Marcos, University of North Carolina</td>
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**Hosts, Pathogens, and Parasites**  
Chair: Joshua Benoit

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<td>Princeton High School, Princeton, NJ</td>
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<td>Estimation of prevalence and qPCR copy number of Ophidiomyces ophiodicolae and Snake Fungal Disease in a snake community in southern Illinois, with notes on detection methods</td>
<td>Smaga CR, Allender MC, Jiménez FA</td>
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**Hot and Cold**  
*Chair: Michael Finkler*

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<td>Reynolds JA, Bryant C; Ohio State University</td>
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<td>Microclimate and physiological plasticity interact to determine overheating risk of competing native and invasive Anolis lizards</td>
<td>Rej J, Deery S, Gunderson A; Tulane University</td>
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<td>Does ultraviolet light influence thermoregulation behavior in lizards?</td>
<td>Conley DA, Lattanzio MS, Christopher Newport University</td>
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<td>Finkler MS; Indiana University Kokomo</td>
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<td>Temperature effect on metabolism and muscle mechanics of Narragansett fishes</td>
<td>Florendo JS, Hatcher M, Irving D, Maia A; University of Washington, Rhode Island College</td>
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<td>P25-7</td>
<td>Effect of temperature on sperm motility and longevity in Anolis sagrei</td>
<td>Wang W; Gunderson A; Tulane university</td>
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<td>Vazquez OA, Rahman MS; University of Texas Rio Grande Valley</td>
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<td>Guilde E, Levesque D; University of Maine</td>
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<td>Maloney ME, Pomory CM; University of West Florida</td>
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<td>Ulrich M, Ebert D, Stillman JH; University of Basel, San Francisco State University, University of California</td>
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<td>P25-13</td>
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<td>Madelaire CB, Zena LA, Dillon D, Pereira D, Hunt K, Buck CL, Bicego KC, Gomes FR; Northern Arizona University, University of São Paulo, Sao Paulo State University</td>
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**Human Impacts on Behavior**  
*Chair: Jake Lasala*

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<td>Effects of urban land use on bird vocalizations</td>
<td>Krishnan AG, Meyers D, Long H, Foltz S, Reed College, Radford University</td>
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<td>Kaatz IM; SUNY ESF Syracuse NY</td>
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<td>Characterizing Coqui frogs in Phipps Conservatory and Botanical Gardens</td>
<td>Moore H J, Bischof K, McClelland S, Wheeler M, States S, Freeman P, Woodley S, Duquesne University, Phipps Conservatory and Botanical Gardens</td>
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### Immunity and Immune-based Trade-offs

**Chair: Carla Madeira**

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<td>Effects of immune challenge on immunological and endocrine parameters of Cururu toads (Rhinella icterica) in their natural habitat</td>
<td>Garcia Neto PG, Titon SCM, Assis VR, Muchel SM, Titon Jr B, Ferreira LF, Gomes FR, Fernandes PAC, University of Sao Paulo, Santo Andre Foundation University Center</td>
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<td>Body temperature is more important than seasonality and steroid levels in determining immunity in the hibernating tegu lizard</td>
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<td>Corticosterone transdermal application impact on toads (Rhinella icterica) phagocytosis</td>
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<td>Richards KM, Cline NW, Burgess EL, Brothers CJ, Walla Walla University, Burman University</td>
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### Macroevolution, Cladistics and Phylogenetics

**Chair: Sally Chang**

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Spiessberger EL, Betz O; Eberhard Karls Universität Tübingen

### P28-10
**From mud to meat: Employing phylogenetics and metabarcoding gut-content analyses to test evolutionary hypotheses of trophic transitions in a group of predatory annelids**

Mack JM, Martinsson S, Klint M, Erséus C, Bely AE; University of Maryland College Park, University of Gothenburg

### P28-11
**Tell me what you eat, I'll tell you what are! A study of a hyperparasite Cyclocotyla bellones (Monogenea, Platyhelminthes) using integrative taxonomy**

Bouguerche C, Tazerouti F, Delphine G, Justine JL; Université des Sciences et de la Technologie Houari Boumediene, Muséum National d’Histoire Naturelle

### Poster 29

#### Metabolism and Physiology I

**Chair: Guy Charmantier**

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### Poster 30

#### Metabolism and Physiology II

**Chair: Jane Khudyakov**

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<td>Ecophysiological tradeoffs in female red-eared sliders (Trachemys scripta)</td>
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<td>Neurohr JM, Simpson SK, Kinsey ST; UNCW</td>
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<td>Contributions of the titin ortholog, sallimus, to stress strain relationships in Drosophila larval body wall: work loop analysis of s1s knockdown and actomyosin interruption</td>
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Microbiome
Chair: Ken Field

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P31-2 Exposing frog embryos to bacterial isolates: Colonization order impacts structure of the tadpole microbiome
Jones KR, Belden LK, Hughey MC, Virginia Tech, Vassar College

P31-3 Captivity converges the microbiomes of diverse primate species
Wills M, Johnson M, Brunmeier E, Murphy T, Johnson T, Knights D, Clayton JB, Shields-Cutler RR, Macalester College, Como Zoo and Conservatory, University of Minnesota, University of Nebraska Omaha

P31-4 Microhabitats influence on the anti-fungal bacteria diversity of Plethodontid salamanders
Alomar N, Farallo V, Muñoz M, Longo A, University of Florida, University of Scranton, Yale University

P31-6 Phylogeny does not always rule the roost: High similarity in the fecal microbiome of obligate brood parasitic nestlings and their host nestmates
Rudzki EN, Antonson ND, Louder MIM, Schelsky WM, Hauber ME, Kohl KD, University Pittsburgh, University Illinois Urbana-Champaign

P31-7 The gut microbiome and host fitness: microbial links to nesting growth and survival in wild great tits
Somers S, Davidson G, Quinn J, University College Cork, University of Cambridge

P31-8 Effect of toxins on host microbiomes in an echinoderm keystone species as an indicator of ecosystem health
Brocco French KI, German DP, University of California Irvine

Poster 32

Movement, Migration and Dispersal
Chair: Clint Collins

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P32-2 Movement behavior in the sand dollar Mellita tenuis
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P32-3 Assessing telomeres as a potential marker of the cost of migration in red-winged blackbirds
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P32-4 Fuel reserves or fueling en route? Scouting Trip versus Wandering Search strategies for nomadic migrants
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P32-6 Age-related changes in the performance of female C57BL/6J mice during a battery of behavioral tests
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P33-3 Evaluating the effects of whole-body vibrations (WBV) on vertebrate bone development using zebrafish larvae as a model
Jeradi S, Franz-Odendaal TA; Mount Saint Vincent University

P33-4 Effect of protein origin on skeletal muscle physiological performance
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P33-5 Getting a grasp on the avian tendon locking mechanism
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**Chair: James Newcomb**

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*Chair: Luciana Gusmao*

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*Chair: Christoffer Johansson*

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*Chair: Armita Manafzadeh*

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