PRELIMINARY PROGRAM
The 13th International Congress of Vertebrate Morphology
2023 marks the 100th anniversary of Journal of Experimental Biology

We are celebrating this historical milestone throughout the year, with activities including:

- publishing a series of Centenary Articles documenting the past, present and future of comparative physiology and biomechanics
- interviewing journal editors about the next 100 years of experimental biology
- promoting early-career researchers and their research
- digitising the full archive of JEB content back to 1923
- celebrating with our community at society meetings
- providing greater funding opportunities to support researchers

Find out more at journals.biologists.com/jeb/pages/100 or scan the QR code below
2023 marks the 100th anniversary of Journal of Experimental Biology. We are celebrating this historical milestone throughout the year, with activities including:

- Publishing a series of Centenary Articles documenting the past, present, and future of comparative physiology and biomechanics.
- Interviewing journal editors about the next 100 years of experimental biology.
- Promoting early-career researchers and their research.
- Digitising the full archive of JEB content back to 1923.
- Celebrating with our community at society meetings.
- Providing greater funding opportunities to support researchers.

Find out more at journals.biologists.com/jeb/pages/100 or scan the QR code below.

CONTENTS

Administration ........................................... 5
Sponsors ................................................. 6
Previous Locations of ICVM ......................... 7
Program at-a-Glance ................................. 8
Program

  Friday, 28 July 2023 .................................. 10
  Saturday, 29 July 2023 ............................... 15
  Sunday, 30 July 2023 ................................. 20
  Monday, 31 July 2023 ................................. 25
  Tuesday, 1 August 2023 ............................. 31

Cairns Convention Centre Floor Plan ........... 36
High impact research from the Royal Society

The Royal Society’s journals publish research, review and evidence synthesis papers, opinion pieces, theme issues and Registered Reports. We are also preprint friendly and encourage direct submission from bioRxiv.

To browse content and for further information about how to submit your work please visit royalsociety.org/journals
ADMINISTRATION

ISVM OFFICERS, 2019-2023
President: Nadia Fröbisch (Germany)
President-Elect: John Hutchinson (UK)
Past President: Beth Brainerd (USA)
Secretary: Brooke Flammang (USA)
Treasurer: Dominique Adriaens (Belgium)

SCIENTIFIC PROGRAM COMMITTEE
Chair: Olga Panagiotopoulou (Australia)
John Nyakatura (Germany)
Andrea Taylor (USA)
Alistair Evans (Australia)
Alana Sharp (UK)
Russell Main (USA)
Marianne Porter (USA)
Tiana Kohlsdorf (Brazil)
Vera Weisbecker (Australia), Chair of Plenary Program
Dai Koyabu (Hong Kong)
Claire Terhune (USA)
Michael Berthaume (UK)
Emma Sherratt (Australia)
Anne Claire Fabre (Germany)
Adam Hartstone Rose (USA)

PROGRAM OFFICERS
Armita Manafzadeh (USA)
Tahlia Pollock (Australia)

ISVM EXECUTIVE COMMITTEE, 2019-2023
Julia Desojo (Argentina)
Anne-Claire Fabre (France)
Colleen G. Farmer (USA)
Anjali Goswami (UK)
Daisuke Koyabu (Hong Kong)
John Nyakatura (Germany)
Olga Panagiotopoulou (Australia)
Stephanie Pierce (USA)
Karen E. Sears (USA)
Vera Weisbecker (Australia)

NOMINATING COMMITTEE
Chair: Karen Sears (USA)
Anthony Herrel (France)
John Nyakatura (Germany)

EXHIBITORS AND SPONSORSHIP COMMITTEE*
Chair: Paul Gignac (USA)
Jaimi Gray (Australia)
Anthony Herrel (France)
* Note: this is an ad hoc committee appointed by the President
## Previous Locations of the International Congress of Vertebrate Morphology

<table>
<thead>
<tr>
<th>ICVM</th>
<th>Year</th>
<th>Location</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICVM-1</td>
<td>1983</td>
<td>Gießen, Germany (~300 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-2</td>
<td>1986</td>
<td>Vienna, Austria (~350 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-3</td>
<td>1989</td>
<td>Antwerp, Belgium (~430 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-4</td>
<td>1994</td>
<td>Chicago, Illinois, USA (~450 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-5</td>
<td>1997</td>
<td>Bristol, UK (~450 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-6</td>
<td>2001</td>
<td>Jena, Germany (~700 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-7</td>
<td>2004</td>
<td>Boca Raton, Florida, USA (~470 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-8</td>
<td>2007</td>
<td>Paris, France (~600 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-9</td>
<td>2010</td>
<td>Punta del Este, Uruguay (~315 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-10</td>
<td>2013</td>
<td>Barcelona, Spain (~450 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-11</td>
<td>2016</td>
<td>Washington, DC, USA (~600 participants)</td>
<td></td>
</tr>
<tr>
<td>ICVM-12</td>
<td>2019</td>
<td>Prague, Czech Republic</td>
<td></td>
</tr>
</tbody>
</table>
# PROGRAM AT-A-GLANCE

<table>
<thead>
<tr>
<th>TIME</th>
<th>Auditorium C</th>
<th>M2-M3</th>
<th>M4-M5</th>
<th>M6-M7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Friday, 28 July</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Session 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:30 AM – 10:00 AM</td>
<td></td>
<td>Session 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 AM – 11:30 AM</td>
<td>Session 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:30 AM – 1:30 PM</td>
<td></td>
<td></td>
<td></td>
<td>LUNCH</td>
</tr>
<tr>
<td>1:30 PM – 3:30 PM</td>
<td>Session 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:30 PM – 4:00 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 PM – 5:00 PM</td>
<td></td>
<td></td>
<td>Congress Welcome and ISVM Business Meeting: Auditorium C</td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:00 PM – 7:00 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Saturday, 29 July</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Session 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:30 AM – 10:00 AM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 AM – 11:30 AM</td>
<td>Session 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:30 AM – 1:30 PM</td>
<td></td>
<td></td>
<td></td>
<td>LUNCH</td>
</tr>
<tr>
<td>1:30 PM – 4:00 PM</td>
<td>Session 22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 PM – 5:00 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td></td>
<td></td>
<td>Plenary Lecture 2: Auditorium C</td>
<td></td>
</tr>
<tr>
<td><strong>Sunday, 30 July</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Session 27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:30 AM – 10:00 AM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 AM – 11:30 AM</td>
<td>Session 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:30 AM – 1:30 PM</td>
<td></td>
<td></td>
<td></td>
<td>LUNCH</td>
</tr>
<tr>
<td>1:30 PM – 4:00 PM</td>
<td>Session 34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 PM – 5:00 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td></td>
<td></td>
<td>Plenary Lecture 3: Auditorium C</td>
<td></td>
</tr>
</tbody>
</table>
All events take place at the Cairns Convention Centre unless otherwise noted.

<table>
<thead>
<tr>
<th>TIME</th>
<th>Auditorium C</th>
<th>M2-M3</th>
<th>M4-M5</th>
<th>M6-M7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday, 31 July</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Session 37</td>
<td>Session 36</td>
<td></td>
<td>Session 38</td>
</tr>
<tr>
<td>9:30 AM – 10:00 AM</td>
<td></td>
<td>TEA BREAK: Auditorium A/B/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 AM – 11:30 AM</td>
<td>Session 40</td>
<td>Session 39</td>
<td>Session 42</td>
<td>Session 41</td>
</tr>
<tr>
<td>11:30 AM – 1:30 PM</td>
<td></td>
<td>LUNCH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 PM – 4:00 PM</td>
<td>Session 43</td>
<td>Session 46</td>
<td>Session 45</td>
<td>Session 44</td>
</tr>
<tr>
<td>4:00 PM – 5:00 PM</td>
<td></td>
<td>TEA BREAK and Poster 3: Auditorium A/B/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td></td>
<td></td>
<td></td>
<td>Plenary Lecture 4: Auditorium C</td>
</tr>
<tr>
<td><strong>Tuesday, 1 August</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Session 47</td>
<td>Session 48</td>
<td></td>
<td>Session 49</td>
</tr>
<tr>
<td>9:30 AM – 10:00 AM</td>
<td></td>
<td>TEA BREAK: Auditorium A/B/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 AM – 11:30 AM</td>
<td>Session 50</td>
<td>Session 52</td>
<td></td>
<td>Session 51</td>
</tr>
<tr>
<td>11:30 AM – 1:30 PM</td>
<td></td>
<td>LUNCH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 PM – 4:00 PM</td>
<td>Session 55</td>
<td>Session 54</td>
<td></td>
<td>Session 53</td>
</tr>
<tr>
<td>4:00 PM – 5:00 PM</td>
<td></td>
<td>TEA BREAK and Poster 4: Auditorium A/B/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td></td>
<td></td>
<td></td>
<td>Plenary Lecture 5: Auditorium C</td>
</tr>
<tr>
<td>6:00 PM – 7:00 PM</td>
<td></td>
<td></td>
<td></td>
<td>CLOSING RECEPTION: City Terrace</td>
</tr>
</tbody>
</table>
## PROGRAM

All events take place at the Cairns Convention Centre unless otherwise noted.

### Friday, 28 July 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 1</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Feeding Frenzy</td>
<td>Auditorium C</td>
</tr>
<tr>
<td>8:00 am</td>
<td>1-1 Cranioidal traits predict feeding performance and dietary hardness in a community of Neotropical free-tailed bats (Chiroptera: Molossidae)</td>
<td>David Villalobos Chaves, Sharlene Santana; University of Washington</td>
</tr>
<tr>
<td>8:15 am</td>
<td>1-2 Mesosaurs went through an environmental and dietary shift throughout their ontogeny</td>
<td>Antoine Verrière, Jörg Fröbisch; Museum für Naturkunde</td>
</tr>
<tr>
<td>8:30 am</td>
<td>1-3 Extant functional and morphological traits used to predict dietary ecology in Cretaceous birds</td>
<td>Case Miller, Michael Pittman, Jen Bright; University of Hong Kong, University of Hull</td>
</tr>
<tr>
<td>8:45 am</td>
<td>1-4 Does metamorphosis foster the morphological evolution of feeding structures in Caudata?</td>
<td>Anne-Claire Fabre, Vivien Loughe, Julien Clavel, Gabriel Ferreira, Carla Bardua, Renaud Boïset, Nadia Fröbisch, Edward Stanley, Jeff Streicher, Vivien Bothe, David Blackburn, Celeste Pérez-Ben, Donald Davesne, Kathleen Dollman, Vincent Fernandez, Anthony Herrel, Anjali Goswami; NMBE/UniBe, Université Lyon, Eberhard Karls Universität Tübingen, NHM, CNRS, MN, Florida Museum of Natural History, University of Florida, Leibniz Institute for Evolution and Biodiversity Science, Museum für Naturkunde, ESF, European Synchrotron Radiation Facility, UMR7179 CNRS/MNHFN, The Natural History Museum London</td>
</tr>
<tr>
<td>9:00 am</td>
<td>1-5 Evolutionary shifts in the morphological diversity of turtle hyoid structures are subjected to feeding behaviour</td>
<td>Gabriel Cohen, Melina Jobbins, Dylan Bastiaans, Ingmar Wernberg, Marcelo Sánchez-Villagra; University of Zurich, University of Tübingen</td>
</tr>
<tr>
<td>9:15 am</td>
<td>1-6 Head Shape, Foraging Strategies, and Prey Selection in Two Sympatric Sea Turtle Species</td>
<td>Jeanette Wyneken, Michael Salmon, Tommy Catt, Don Mcleish, Alexander Gaos; Florida Atlantic University, Maui Ocean Center Marine Institute, Pacific Islands Fisheries Science Center</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 2</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>Mass Extinctions and Climate Change</td>
<td>M4-M5</td>
</tr>
<tr>
<td>8:00 am</td>
<td>2-1 Body size shifts in color polymorphic salamanders in response to climate change</td>
<td>Maggie Hantak; University of Dayton</td>
</tr>
<tr>
<td>8:15 am</td>
<td>2-2 Disentangling drivers on morphological change through time: Late Quaternary evolution of the endemic Eivissa (Ibiza) Wall Lizard</td>
<td>Stephanie Woodgate, Josep Alover, Ana Pérez-Cembranos, Valentin Pérez-Mellado, Johannes Müller; Museum für Naturkunde, Leibniz Institute for Evolution and Biodiversity Science, Institut Mediterrani d’Estudis Avançats (CSIC-UIB), Universidad de Salamanca</td>
</tr>
<tr>
<td>8:30 am</td>
<td>2-3 Dormaal lizards in Belgium – a rare window into the earliest Eocene ‘greenhouse world’</td>
<td>Andrzej Czerlanski, Juan Daza, Richard Smith, Aaron Bauer, Thierry Smith, Annekse Folie; Comenius University, Sam Houston State University, Royal Belgian Institute of Natural Sciences, Villanova University</td>
</tr>
<tr>
<td>8:45 am</td>
<td>2-4 Mass extinctions make way for mitochondrial metabolic endothermy in amniotes</td>
<td>Jasmina Wiemann; Field Museum, University of Chicago</td>
</tr>
<tr>
<td>9:00 am</td>
<td>2-5 Evolution of axial regionalization in Aves during the Mesozoic and its impact on the survival of modern lineages to KPg mass extinction</td>
<td>Francisco Serrano, Luis Chipipe, Alejandro Pérez-Ramos, Chapman Sussan, Dana Rashid, Jordi Marcé-Noqué; Ornella Bertrand, Steve Brusatte, Borja Figueiredo; University of Malaga, Natural History Museum of Los Angeles County, Clemson University, Montana State University, Universitat Rovira i Virgili, Institut Català de Paleontologia Miguel Crusafont, Universitat Autònoma de Barcelona, University of Edinburgh</td>
</tr>
<tr>
<td>9:15 am</td>
<td>2-6 Geographical patterns in turtle shell morphology: functional underpinnings of ecological rules</td>
<td>Charles Stayton; Bucknell University</td>
</tr>
</tbody>
</table>
### Session 3

**8:00 AM – 9:30 AM**

**Symposium in Honor of Sue Herring: A Giant in Her Field (Part 1)**

*Chairs: Robert Druzinsky, Rebecca Z. German, Anthony Herrel*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>3-1</td>
<td>The Legacy of Susan W. Herring: A Giant in Her Field</td>
<td>Rebecca German, Robert Druzinsky, Anthony Herrel; NEOMED, University of Illinois, UMR719 CNRS/INRS</td>
</tr>
<tr>
<td>8:15 am</td>
<td>3-2</td>
<td>Biomechanical insights into (para)symphysial fracture fixation</td>
<td>Callum Ross, Claire Lee, Jose Irarate-Diaz, Pranav Haravu, Russell Reid, Olga Panagiotopoulou; University of Chicago, Monash Biomedicine Discovery Institute, University of the South, Monash University</td>
</tr>
<tr>
<td>8:30 am</td>
<td>3-3</td>
<td>Modelling how suture morphology and complexity drives mammalian cranial evolution</td>
<td>Heather White, Yichen He, Abigail Tucker, Vincent Fernandez, Roberto Portela Miguel, Arkhat Abzhanov, Enrico Grisan, Alana Sharp, Anjali Goswami; Natural History Museum, King's College London, European Synchrotron Radiation Facility, Natural History Museum, Imperial College London, London South Bank University, University of Liverpool</td>
</tr>
<tr>
<td>8:45 am</td>
<td>3-4</td>
<td>Myosin heavy chain isoform expression in primate chewing muscles: Regional and functional heterogeneity fine-tunes muscles for specific feeding behaviors</td>
<td>Andrea Taylor, Megan Holmes; Touro University, Duke University</td>
</tr>
<tr>
<td>9:00 am</td>
<td>3-5</td>
<td>Morphology, Movement, and Mastication: Dr. Sue Herring's Impact on the Study of Mammalian Chewing</td>
<td>Christopher Vinyard, Christine Wall, Stephane Montuelle, Rachel Olson, Jillian Davis, Susan Williams; Ohio University, Duke University, University of Akron, West Virginia University</td>
</tr>
<tr>
<td>9:15 am</td>
<td>3-6</td>
<td>Short Primate Faces and Gums: Facial Sutures in Gouging Primate Gummivores Close Early</td>
<td>Anne Burrows, Tim Smith, Christopher Vinyard; Duquesne University, Slippery Rock University, Ohio University</td>
</tr>
</tbody>
</table>

### Session 4

**8:00 AM – 9:30 AM**

**The Rise and Reign of Mammals**

*Chair: Eloy Gálvez-López*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>4-1</td>
<td>Evolutionary convergence and integration among carnivoran skeletal systems</td>
<td>Chris Law, Leslea Hlusko, Jack Tseng; University of Washington, University of Texas, Spanish National Center for Research on Human Evolution, University of California, Berkeley</td>
</tr>
<tr>
<td>8:15 am</td>
<td>4-2</td>
<td>Functional morphology toolkit for the evolutionary scenarist of chiropteran flight machine</td>
<td>Aleksandra Panyutina; Independent</td>
</tr>
<tr>
<td>8:30 am</td>
<td>4-3</td>
<td>Evolution of scapula size and shape in Carnivora</td>
<td>Eloy Gálvez-López, Adrià Casinos; University of York, Ecology and Environmental Sciences, University of Barcelona</td>
</tr>
<tr>
<td>8:45 am</td>
<td>4-4</td>
<td>Using dynamic simulations to explore the sprawling-to-erect postural transition in synapsids</td>
<td>Peter Bishop, Richard Blob, Stephanie Pierce; Harvard University, Clemson University</td>
</tr>
<tr>
<td>9:00 am</td>
<td>4-5</td>
<td>Evolutionary dynamics of the synapsid pelvis and femur provides insight into the origin of mammalian limb posture</td>
<td>Mark Wright, Stephanie Pierce; Harvard University</td>
</tr>
<tr>
<td>9:15 am</td>
<td>4-6</td>
<td>Musculoskeletal modeling untangles the origins of mammal forelimb function and posture</td>
<td>Robert Brocklehurst, Stephanie Pierce; Museum of Comparative Zoology, Harvard University</td>
</tr>
</tbody>
</table>

### Session 5

**10:00 AM – 11:30 AM**

**Muscles and Movement**

*Chair: Jan Wölfer*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>5-1</td>
<td>Hindlimb myology in the Macropodiformes</td>
<td>Natasha Tay, Trish Fleming, Natalie Warburton, Harry Butler Institute, Murdoch University</td>
</tr>
<tr>
<td>10:15 am</td>
<td>5-2</td>
<td>Ultrastructural analysis of an extensible muscle in Boa constrictor</td>
<td>Jarrod Petersen, John Capano, Thomas Roberts; Brown University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>5-3</td>
<td>Feats of supercontractile strength: testing for the presence of supercontracting muscle among chameleon hyoid musculature</td>
<td>Nikole Schneider, Nicholas Henchal, Christopher Anderson; University of South Dakota</td>
</tr>
<tr>
<td>10:45 am</td>
<td>5-4</td>
<td>Characterization of the muscle architecture of the zebrafish palatal organ and pharyngeal jaw</td>
<td>Kelsie Pos, L Patricia Hernandez; George Washington University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>5-5</td>
<td>What to do when mammalian forelimb muscles don’t divide into dorsal and ventral groups: the special case of panniculus carnosus</td>
<td>Margaret Hall, Justin Georgi, Aranye Grossman, Jose Rodriguez-Sosa, E.L.R. Simons, Heather Smith, Georgina Voegele; Midwestern University, Midwestern University, University of Chicago</td>
</tr>
<tr>
<td>11:15 am</td>
<td>5-6</td>
<td>Adaptation and integration in the muscle moment arms of two hip extensors in caviomorph rodents</td>
<td>Jan Wölfer, Maximilian Vella, Leonie Schielke, John Nyakatura; Humboldt-Universität zu Berlin, Humboldt Universität zu Berlin</td>
</tr>
</tbody>
</table>
### New Approaches to Vertebrate Brain Evolution

**Chairs:** Andrew Iwaniuk, Kara E. Yopak

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>6-1</td>
<td>Sharks, smarts, and headstarts: Brain evolution in cartilaginous fishes</td>
<td>Kara Yopak; University of North Carolina Wilmington</td>
</tr>
<tr>
<td>10:15 am</td>
<td>6-2</td>
<td>Evolution of the cerebro-cerebellar system revealed by neuron counts</td>
<td>Pavel Némec, Francesco Dionigi, Alexandra Polonyiová, Lucie Marhoumová, Martin Kocourek, Yicheng Zhang, Seweryn Olkowicz, Kristina Kverkova, Patrik Stěhlík; Charles University</td>
</tr>
<tr>
<td>10:30 am</td>
<td>6-3</td>
<td>The Evolution of the Brain in Euarchontoglires: new perspectives and novel methodologies</td>
<td>Mary Silcox, Madlen Lang; University of Toronto, Scarborough</td>
</tr>
<tr>
<td>10:45 am</td>
<td>6-4</td>
<td>Brain and endocast evolution over the fish-tetrapod transition: insights from extant taxa inform interpretation of Palaeozoic Sarcopterygians</td>
<td>Alice Clerent, Richard Cloutier, Tom Challands, Connine Mensforth, John Long; Finders University, Université du Québec à Rimouski, University of Edinburgh</td>
</tr>
<tr>
<td>11:00 am</td>
<td>6-5</td>
<td>How artificial selection can inform the study of brain evolution</td>
<td>Andrew Iwaniuk; University of Lethbridge</td>
</tr>
<tr>
<td>11:15 am</td>
<td>6-6</td>
<td>Understanding the endocranial morphological diversity of modern bats (Mammalia: Chiroptera)</td>
<td>Camilo Lopez-Aguirre, John Ratcliffe, Mary Silcox; University of Toronto Scarborough, University of Toronto Mississauga</td>
</tr>
</tbody>
</table>

### Pointy Things

**Chair:** Zichuan Qin

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>7-1</td>
<td>Comparative variation in kinematic transmission of the beak among birds</td>
<td>Amber Wagstaffe, Philip Anderson, Roger Benson, Gavin Thomas, Peter Watson, Jen Bright; University of Hull, University of Illinois, Urbana-Champaign, University of Oxford, University of Sheffield</td>
</tr>
<tr>
<td>10:15 am</td>
<td>7-2</td>
<td>What’s the point?: Morphology and function of claws in attachment in pad-bearing geckos</td>
<td>Rishab Pillai, Jendrian Riedel, Wyattam Mirth, Will Edwards, Slade Allen-Ankins, Lin Schwarzkopf, James Cook University, Leibniz Institute for the Analysis of Biodiversity Change - Museum Koenig Bonn, Peter Doherty Institute for Infectious Diseases</td>
</tr>
<tr>
<td>10:30 am</td>
<td>7-3</td>
<td>Morphological disparity and functional adaption of Mesozoic birds manual claws</td>
<td>Zichuan Qin, Emily Rayfield, Yuming Liu, Mike Benton, William Deakin, Shiyong Wang, Congyu Yu; University of Bristol, Shenyang Normal University</td>
</tr>
<tr>
<td>10:45 am</td>
<td>7-4</td>
<td>Snakes – Have They Bitten Off More Than They Can Chew?</td>
<td>Roxanne Armfield, Jacques Gauthier; Yale University</td>
</tr>
<tr>
<td>11:00 am</td>
<td>7-5</td>
<td>Putting the sharp in sharpnose: the morphology and distribution of denticles inside the olfactory rosette of Atlantic sharpnose sharks (Rhizoprionodon terraenovae)</td>
<td>Lauren Simonitis, Aubrey Clark, Tricia Meredith, Marianne Porter; Florida Atlantic University, University of Washington’s Friday Harbor Labs</td>
</tr>
</tbody>
</table>

### Symposium in Honor of Sue Herring: A Giant in Her Field (Part 2)

**Chairs:** Robert Druzinsky, Rebecca Z. German, Anthony Herrel

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>8-1</td>
<td>Revisiting old questions with new methods: interplay between embryonic motility and craniofacial development</td>
<td>Julia Molnar, Akinobu Watanabe; New York Institute of Technology College of Osteopathic Medicine</td>
</tr>
<tr>
<td>10:15 am</td>
<td>8-2</td>
<td>Ontogenetic changes in bite force and gape in tufted capuchins</td>
<td>Myra Laird, Cláudia Kanno, Caitlin Yoakum, Mariana Fogaça, Andrea Taylor, Callum Ross, Janine Chalk-Wilayto, Megan Holmes, Claire Terhune, José Américo de Oliveira; University of Pennsylvania, Universidade Estadual Paulista (UNESP), Research Center “Núcleo de Procriação de Macacos-Prego”, Araratuba Dental School, Arkansas College of Health Education, Institute of Population Genetics, University of Veterinary Medicine, Vienna &amp; Neotropical Primates Research Group – NeoPRéGo, Touro University, University of Chicago, Mercer University, Duke University, University of Arkansas</td>
</tr>
<tr>
<td>10:30 am</td>
<td>8-3</td>
<td>Ontogeny of masticatory muscle size in tufted and untufted capuchins</td>
<td>Claire Terhune, Caitlin Yoakum, Myra Laird, Janine Chalk-Wilayto, Cláudia Kanno, José Américo de Oliveira, Callum Ross, Andrea Taylor, Megan Holmes; University of Arkansas, Arkansas College of Health Education, University of Pennsylvania, Mercer University, Universidade Estadual Paulista (UNESP), Research Center “Núcleo de Procriação de Macacos-Prego”, Araratuba Dental School, Institute of Population Genetics, University of Veterinary Medicine, Vienna &amp; Neotropical Primates Research Group – NeoPRéGo, University of Chicago, Touro University, Duke University</td>
</tr>
</tbody>
</table>
FRIDAY, 28 JULY 2023

10:45 am 8-4 The Ontogenetic Interface of Jaw-Muscle Leverage and Cranial Morphology in Capuchin Primates
Megan Holmes, Parker Taylor, Rocío Ramírez, Megan Solis, Mariana Fogaça, Janine Cháik-Wilayo, Claire Terhune, Myra Laird
Duke University, University of Arkansas, University of Southern California, Stony Brook University, Institute of Population Genetics, University of Veterinary Medicine, Vienna & Neotropical Primates Research Group – NeoPReGo, Mercer University, University of Pennsylvania

11:00 am 8-5 Neuromotor control of food processing and swallowing in the red-footed tortoise Chelonoidis carbonarius
Christopher Mayerl, Chloe Edmonds, Johnson Gao, Kree Kerkvliet, Kendall Steer, Khaled Adjerid, Maxwell Johnson, Rebecca German; Northern Arizona University, Northeast Ohio Medical University, Kent State University, Tulane University, NEOMED

11:15 am 8-6 Bendy Hyoids: In-Vivo and Ex-Vivo Loading and Stiffness of the Hyoid Arch in Elasmobranchs:
Cheryl Wilga, Elizabeth Dumont, Lara Ferry; University of Rhode Island, University of California Merced, Arizona State University

1:30 PM – 3:30 PM Session 9 Auditorium C

Fish Feeding
Chair: L Patricia Hernandez

1:30 pm 9-1 Is that a fish tongue?: Comparative morphology of the cypriniform palatal organ
L Patricia Hernandez, Kelsie Pos; George Washington University

1:45 pm 9-2 Pharyngeal jaw suction feeding in channel catfish (Ictalurus punctatus)
Corrine Avidan, Elizabeth Brainerd; Brown University

2:00 pm 9-3 Comparative feeding mechanics of extant lungfishes
Hugo Dutel, Matteo Fabbri, Laura Porro, Kathleen Dollman, Emily Rayfield; University of Bristol, Field Museum of Natural History, University College London, ESRF

2:15 pm 9-4 Feeding kinematics of algal grazing in the goboid fish Sicydium punctatum: a missing link in the evolution of goby climbing biomechanics?
Richard Blob, Takashi Maie, Heiko Schoenfuss; Clemson University, University of Lynchburg, St. Cloud State University

2:30 pm 9-5 The influence of diet on dental complexity in damselfishes
Keiffer Williams, Samantha Price; Clemson University

2:45 pm 9-6 To Bite or Not to Bite: An investigation into the Tongue-Bite-Apparatus in mormyrid fishes (Osteoglossiformes)
Kassandra Ford, L Patricia Hernandez; George Washington University

3:00 pm 9-7 A pound of flesh, a pint of blood - ectoparasitic fishes as a model system for understanding evolutionary novelty & diversity
Matthew Kolmann; University of Louisville

3:15 pm 9-8 Evolution and Anatomy of Gizzards in Fishes
Sarah Handy, Lauren Simonitis, Karly Cohen, Matthew Kolmann; Arizona State University, Florida Atlantic University, University of Washington’s Friday Harbor Labs, University of Florida, University of Louisville

1:30 PM – 3:30 PM Session 10 M2-M3

Jumping, Digging, Climbing, and Hanging
Chair: Kristi L. Lewton

1:30 pm 10-1 Comparative analysis of musculoskeletal anatomy in relation to locomotor mode in frogs
Alice Leavay, Laura Porro, Christopher Richards; UCL, University College London, Royal Veterinary College

1:45 pm 10-2 Climbing kinematics and ecomorphology of Aneides salamanders
Jonathan Huie, R. Alexander Pyron, Sandy Kawano; The George Washington University

2:00 pm 10-3 Size and locomotor influences on hindlimb bone cross-sectional properties in salamanders, marsupials, and primates
Kristi Lewton, Kaitlin Hsu, Chloe Knitt, Kyle Schtul, Megan Solis; University of Southern California, University of Colorado, Stony Brook University

2:15 pm 10-4 Long bone loading during suspensory locomotion in brown-throated three-toed sloths (Bradypus variegatus)
Angela Mossor, Andrew McKemy, Melody Young, Michael Granatosky, Michael Butcher, Jesse Young; Kent State University/NEOMED, Youngstown State University, New York Institute of Technology, Northeast Ohio Medical University

2:30 pm 10-5 Anatomical Correlates of Cursoriality are Compromised by Body Size and Propensity to Burrow in a Group of Small Mammals (Lagomorpha)
Ellen Martin, Jesse Young, Conrie Fellmann, Brian Kraatz, Emma Sherratt; University of Adelaide, Northeast Ohio Medical University, Colorado State University, Western University of Health Sciences

2:45 pm 10-6 A Permian burrow of stem lepidosaurs and the Paleozoic origin of extant reptile diversity
Tyler Lyson, Eldon Panigot, Holger Petermann, Chase Brownstein, Bruce Rubidge, Gabriel Bever; Denver Museum of Nature & Science, Yale University, University of Witwatersrand, Johns Hopkins University

3:00 pm 10-7 Functional morphology of the head and neck in a new cistecephalid dicynodont (Therapsida: Anomodontia) with implications for the evolution of fossoriality within the clade
Selena Martinez, Jacqueline Lingham, Kenneth Angielczyk; The University of Chicago, Sam Noble Oklahoma Museum of Natural History, University of Oklahoma, Field Museum of Natural History
### 3:15 pm 10-8 Variation in curvature and cortical geometry in the primate humerus and their consequences for inferring biomechanical performance
Blake Dickson, Daniel Schmitt, Kevin Hunt; University of New South Wales, Duke University, Indiana University

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Chair(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>11-1</td>
<td>Synchrotron-based palaeohistology of a small aetosaur from the Upper Triassic Wózniki locality (southern Poland) – growth plasticity or ontogenetic variation?</td>
<td>Elżbieta Teschner, Dawid Dróżdż, Julia Desojo, Mateusz Talanda, Mateusz Antczak, Vincent Fernández, Tomasz Sulej; University of Opole, Institute of Paleobiology, Polish Academy of Sciences, CONICET División Paleontología Vertebrados Museo de La Plata, University of Warsaw, Institute of Evolutionary Biology, European Synchrotron Radiation Facility</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>11-2</td>
<td>Evaluating femur volume as a predictor of body size in Pseudosuchia</td>
<td>Holly Woodward, Haley O'Brien, Paul Aubier, Jorge Cubo, James Farlow; Oklahoma State University Center for Health Sciences, University of Arizona Health Sciences, Sorbonne Université, Indiana University-Purdue University Fort Wayne</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>11-3</td>
<td>Was Pelagosaurus typus (Crocodylomorpha: Metriorhynchoidea) an ambush predator or an active hunter? Warm-blooded or cold-blooded?</td>
<td>Jorge Cubo, Stéphane Jouve, Mariana Sena, Romain Pellarin, Ronan Allain, Nour-Eddine Jallal; Sorbonne Université, MNHN</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>11-4</td>
<td>An examination into the palaeohistology of Thalattosuchia (Crocodylomorpha) from the Posidonia Shale Formation, Germany</td>
<td>Michela Johnson, Erin Maxwell; Staatliches Museum für Naturkunde</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>11-5</td>
<td>The consequences of calcium: investigating intracortical reproductive signals in the American Alligator for sex determination.</td>
<td>Christian Heck, Holly Woodward; Pacific Northwest University of Health Sciences, Oklahoma State University Center for Health Sciences</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>11-6</td>
<td>Integrating histology and vertebral anatomy to reconstruct cardiopulmonary evolution near the divergence of Avermetatarsalia and Pseudosuchia</td>
<td>Paul Byrne, Lucas Legendre, Nathan Smith, Randall Irmis, James Farlow; Oklahoma State University Center for Health Sciences, University of Arizona Health Sciences, Sorbonne Université, Indiana University-Purdue University Fort Wayne</td>
</tr>
</tbody>
</table>

### 5:00 PM – 6:00 PM Plenary 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Chair(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:00 pm</td>
<td>Musculoskeletal adaptations in macropodoids – convergence and functional analogues</td>
<td>Natalie Warburton; Harry Butler Institute, Murdoch University</td>
</tr>
</tbody>
</table>
Saturday, 29 July 2023

**Session 13**

**Functional Morphology and Biomechanics of Trabecular Bone: Insights Across Organisms and Scales (Part 1)**

*Chairs: Stephanie Smith, Michael Doube*

- **8:00 am** 13-1 Trabecular bone distribution and its relationship to joint loading across the ape metatarsus
  - Zewdi Tsegai, Tracy Kivell, Matthew Skinner; University of Chicago, University of Kent, Max Plank Institute for Evolutionary Anthropology

- **8:15 am** 13-2 The 'indianaBones' R package and a novel protocol to study whole trabecular network: preliminary results from primates
  - Fabio Alfieri, Marine Cazenave, Uyen Nguyen, Daniele Panetta, Piero Salvadori, Daniele Marchi, Eli Amson, John Nyakatura, Alessio Veneziano, Humboldt Universität zu Berlin, American Museum of Natural History, University of Kent, Canterbury, University of Pretoria, Universität di Pisa, University of the Witwatersrand, Museum für Naturkunde Stuttgart, Universität Rovira i Virgili

- **8:30 am** 13-3 Regional variation of epiphysal fusion and trabecular architecture in cetacean vertebrae
  - Jamie Knaub, Marianne Porter; Florida Atlantic University

- **8:45 am** 13-4 How trabecular bone adapts to biomechanical constraints associated with high body weight in limb long bones
  - Alexandra Houssaye, Cyril Etienne; CNRS/MNHN

- **9:00 am** 13-5 Does carnivoran trabecular bone morphology reflect differences in intensity of locomotor strategy?
  - Habiba Chirchir, Layne Assif; Marshall University

**Session 14**

**Joints in Motion**

*Chair: Armita Manafzadeh*

- **8:00 am** 14-1 XROMM analysis of flipper movement during locomotion in loggerhead sea turtles
  - Samantha Trail, Christopher Mayerl, John Capano, Armita Manafzadeh, Noraly van Meer, Richard Blob, Jeanette Wyneken, Elizabeth Brainerd; Florida Atlantic University, Northern Arizona University, Brown University, Yale University, Wageningen University, Clemson University

- **8:15 am** 14-2 Keeping clean: a study of self-grooming kinematics in small sized mammals.
  - Manuela Schmidt, Celina Richter, Julia van Beesel, Martin Fischer; Friedrich Schiller University, Delft University of Technology

- **8:30 am** 14-3 Extreme long-axis rotation: the functional consequences of fibular reduction in theropod dinosaurs
  - Armita Manafzadeh, Stephen Gatesy; Yale University, Brown University

- **8:45 am** 14-4 X-ray motion analysis reveals 3D kinematics in the forelimb of balancing tamanduas (Tamandua tetradactyla)
  - Adrian Schiedt, Paulo Ditzel, Sandra Geiger, Franziska Wagner, Christoph Mülling, John Nyakatura; Humboldt Universität Berlin, Leipzig University

- **9:00 am** 14-5 A novel mode of jaw protrusion in the hingemouth, Phractolaemus ansorgii
  - Allyson Evans, Emily Naylor, Nathan Lujan, Sandy Kawano, Patricia Hernandez; George Washington University, James Madison University, Royal Ontario Museum

**Session 15**

**More Than Sucking, Chewing, and Swallowing: Feeding Biomechanics in Vertebrates and Beyond (Part 1)**

*Chairs: Christine Böhmer, Mugino Kubo, Daniela E. Winkler, Shinji Nagata*

- **8:00 am** 15-1 Is there a veggie option? Dietary adaptation and feeding mechanics in dinosaurs
  - Stephan Lautenschlager; University of Birmingham

- **8:30 am** 15-2 Diet-induced morphological change in red squirrels
  - Kim Chandler, Andrew Kitchener, Philip Cox; University of York, National Museums Scotland, University College London

- **9:00 am** 15-3 Extant anamniotes as models of how feeding influences terrestrialization events
  - Nicolai Konow; U. Mass. Lowell

**Session 16**

**Traumatic Brain Injury: Not Just for Humans (Part 1)**

*Chair: Nicole Ackermans*

- **8:00 am** 16-1 Lessons from outside of the laboratory: naturally occurring TBI
  - Nicole Ackermans; University of Alabama

- **8:30 am** 16-2 TBI magnitude affects anxiety and dopaminergic signaling in fish
  - Cassidy McColl, Ryan Earley, Grace Bollinger, Kathryn Rathke, Bailey Maze, Andrew Atkinson, Jenna Hartzler; University of Alabama, University of South Carolina School of Medicine Columbia
10:00 AM – 11:30 AM   Session 17

Functional Morphology and Biomechanics of Trabecular Bone: Insights Across Organisms and Scales (Part 2)

Chairs: Stephanie Smith, Michael Doube

10:00 am 17-1  Characterizing the complex relationship between limb morphology, microanatomy and posture to draw reliable palaeoecological inferences in early amniotes and relatives
Aurore Canoville, Andréas Jannel; Stiftung Schloss Friedenstein Gotha, Museum für Naturkunde

10:15 am 17-2  BoneJ status and the evolving ecosystem of bone analysis software
Michael Doube; City University of Hong Kong

10:30 am 17-3  Early evolution of trabecular-bone resistance to terrestrial constraints in a fossil lobe-finned fish
François Clarac, Alexis Comille, Sifra Bijl, Paul Tafforeau, Sophie Sanchez; CR2P, Centre de Recherche en Paléontologie–Paris, Muséum National d’Histoire Naturelle, Sorbonne Université, Centre National de la Recherche Scientifique, Museum für Naturkunde Berlin, Uppsala University, European Synchrotron Radiation Facility

10:45 am 17-4  The helmeted hornbill’s hammer: complex anatomy and impact-resistant structural design of the casque
Chloe Hatten, Mason Dean, Venkata Surapaneni, Benjamin Flann, Ting Fai Kong, Ruien Hu; City University of Hong Kong, The Hong Kong Polytechnic University

11:00 am 17-5  Body size effects on trabecular bone morphology in Philippine cloud forest rodents
Stephanie Smith, Kenneth Angelczyk, Lawrence Heaney; Field Museum of Natural History

11:15 am 17-6  Intraspecific variation in trabecular bone in metapodials – a case-study in kangaroos
Tyson Puggaard, Natalie Warburton, Guanjin Wang, Aaron Camens; Murdoch University, Harry Butler Institute, Murdoch University, Flinders University

10:00 AM – 11:30 AM   Session 18


Chairs: Tahlia Pollock, Adam Hartstone-Rose, Lars Werdelin

10:00 am 18-1  Sabertooths and beyond: a review of hypertrophied canines and their uses
Lars Werdelin, Tahlia Pollock, Adam Hartstone-Rose; Swedish Museum of Natural History, Monash University, North Carolina State University

10:30 am 18-2  A myological approach to gape and bite force reconstruction in Smilodon
Adam Hartstone-Rose, Ashley Deutsch, Ann Berger, Lara Martens; North Carolina State University

11:00 am 18-3  Assessing the biomechanics of sabre teeth through the trade-off between puncture performance and breakage resistance
Tahlia Pollock, William Deakin, William Parker, Narimane Chatar, Olga Panagiotopoulou, Douglag Rovinsky, Justin Adams, David Hocking, Philip Donoghue, Emily Rayfield, Alastair Evans, Monash University, University of Bristol, University of Liège, Flinders University, Tasmanian Museum and Art Gallery

11:15 am 18-4  Comparative serration histology in hyper carnivorous fossils
Megan Whitney, Aaron LeBlanc, Ashley Reynolds, Kirstin Brink; Loyola University of Chicago, King’s College London, University of Toronto, University of Manitoba

10:00 AM – 11:30 AM   Session 19

More Than Sucking, Chewing, and Swallowing: Feeding Biomechanics in Vertebrates and Beyond (Part 2)

Chairs: Christine Böhmer, Mugino Kubo, Daniela E. Winkler, Shinji Nagata

10:00 am 19-1  Evolutionary changes of the mammalian skull and their influence on feeding efficiency
Julia Schultz; Universitäts Bonn

10:15 am 19-2  The universal wear process: mandible microwear texture analysis of crickets raised on different diets
Daniela E. Winkler, Hitomi Seke, Shinji Nagata, Mugino Kubo; Kiel University, Zoological Institute, The University of Tokyo

10:30 am 19-3  Aquatic feeding in pinnipeds: Does the masticatory musculature reflect dietary specializations in grey seals and harbor seals?
Christine Böhmer, Anne Erichsen, Paul Krapoth, Charlotte Thøstesen; Christian-Albrechts-Universität zu Kiel, The Fisheries and Maritime Museum

10:45 am 19-4  Unique agenesis of third molars in a wild sika deer population impacts longevity
Mugino Kubo, Daniela E. Winkler; The University of Tokyo, Graduate School of Frontier Sciences, Kiel University, Zoological Institute
11:00 am 19-5 Dynamic simulation of macaque jaw mechanics during a complete power stroke of mastication. Olga Panagiotopoulou, Dale Robinson, Jose Irarre-Diaz, David Ackland, Alec Wilken, Andrea Taylor, Callum Ross, Monash University, University of Melbourne, University of the South, University of Chicago, Touro University

10:00 AM – 11:30 AM Session 20 M4-M5

Traumatic Brain Injury: Not Just for Humans (Part 2)
Chair: Nicole Ackermans

10:00 am 20-1 An amphibious fish that might self-inflict TBI?
Ryan Earley, Cassidy McColl, Grace Bollinger, Jenna Hartlez, Brandon McCormick, Andrea Glenn, University of Alabama

10:30 am 20-2 Short and Long-Term Effects of Mild Traumatic Brain Injury on Aggressive and Risky Behavior
Grace Bollinger, Cassidy McColl, Kathryn Rathke, Claire Tumlin, Ryan Earley, University of Alabama, University of South Carolina School of Medicine Columbia

10:45 am 20-3 Transcriptomic Characterization of neuronal damage markers in the dolphin cortex
Brigid Maloney, Ksenia Orekhova, Maisha Uddin, Erich Jarvis, Marcelo Magnasco; Rockefeller University, University of Padova, CUNY Hunter College

1:30 PM – 4:00 PM Session 21 M4-M5

Birds: Past and Present
Chair: Daniel Field

1:30 pm 21-1 Elucidating the ecological and life history drivers of Galloanserae skull evolution using high density 3D geometric morphometrics
Eloise Hunt, Ryan Felice, Daniel Field, Joseph Tobias, Anjali Goswami; Natural History Museum, London, University College London, University of Cambridge, Imperial College London

1:45 pm 21-2 A tool for testing aeroelastic links in bird wings: Blocking feather muscle activity in vivo in fowl (Gallus gallus) with 6-hydroxydopamine.
Tobin Hieronymus, Patricia Sanchez Montejo, Caleb Oleson, Bret Tobalske; Northeast Ohio Medical University, University of Montana

2:00 pm 21-3 Quantification of avian postcranial pneumaticity sheds light on the evolution and function of skeletal pneumatisation
Maria Grace Burton, Roger Benson, Daniel Field; University of Cambridge, University of Oxford

2:15 pm 21-4 Patterns of morphological convergence in the crania and hindlimbs of Anseriformes
Ray Chatterji, Janet Buckner; The University of Texas at Arlington

2:30 pm 21-5 Phenotypic evolution influences speciation and extinction in birds
Ryan Felice, Christopher Torres, Patrick O’connor, Michael May; University College London, Ohio University, University of California, Davis

2:45 pm 21-6 Comparative morphology of the passerine appendicular skeleton; implications for unravelling the early evolution of Passeriformes
Elizabeth Steell, Matthieu Chotard, Jacqueline Nguyen, Roger Benson, Daniel Field; University of Cambridge, The Chinese University of Hong Kong, Australian Museum, University of Oxford

3:00 pm 21-7 Remarkable insights into modern bird origins from the Type Maastrichtian
Daniel Field, Juan Benito, Pei-Chen Kuo, Albert Chen, Klara Widrig, Daniel Ksepka, John Jagt; University of Cambridge, Bruce Museum, Natuurhistorisch Museum Maastricht

1:30 PM – 4:00 PM Session 22 Auditorium C

Long in the Tooth: New Insights Into the Functional Morphology of Hypertrophied Canines from Gorgonopsids to Sabertooth Cats (Part 2)
Chairs: Adam Hartstone-Rose, Lars Werdelin, Tahlia Pollock

1:30 pm 22-1 Investigating the Morphological Diversity of the Canine Teeth of Sabretooth Feliforms and their Extant Relatives and its Potential Use as a Diagnostic Tool
Caitlin Shelbourne, Stephan Lautenschlager; University of Birmingham

1:45 pm 22-2 Mandibular shape and mechanical performance of Smilodon fatalis through ontogeny
Nanime Chatar, Valentin Fischer, Clara Julémont, Jack Tseng; University of Liège, University of California, Berkeley

2:00 pm 22-3 Bite me: comparing cranial biomechanics in Smilodon fatalis vs Barbourofelis fricki
Boja Figuerido, Stephan Lautenschlager; University of Málaga, University of Birmingham

2:15 pm 22-4 Taking a bite out of the controversy: A practical method for investigating the killing bite of sabertooths
Joseph Costa, Frank Mendel; State University of New York at Buffalo

2:45 pm 22-5 Fangs, Beaks and Spines—Oh My! The Diversity and Energetics of Biological Puncture Systems
Philip Anderson, Keahn Pan, Brad Scott, Abby Weber, Bingyang Zhang; University of Illinois, Urbana-Champaign, ETH Zürich
3:00 pm 22-6 Leveraging the Bite: Comparative humeral strength in Smilodon fatalis and extant pantherine cats
Emily Bogner, Jack Tseng, Julie Meachen; University of California, Berkeley, Des Moines University

3:15 pm 22-7 The Utility of Saber-like Canines in Gentle Giants; a study of Untathere teeth
Benjamin Burger; Utah State University - Uintah Basin Campus

3:45 pm 22-8 Who was the real sabertooth: Thylacosmilus or Thylacoleo?
Christine Janis; Bristol Palaeobiology Group, University of Bristol

1:30 PM – 4:00 PM Session 23
M6-M7
More Than Sucking, Chewing, and Swallowing: Feeding Biomechanics in Vertebrates and Beyond (Part 3)
Chairs: Christine Böhmer, Mugino Kubo, Daniela E. Winkler, Shinji Nagata

1:30 pm 23-1 Moving skulls: kinesis and sutures in feeding biomechanics of reptiles
Jordi Marçòl-Nogué, Josep Fortuny, Universitat Rovira i Virgili, Institut Català de Paleontologia Miquel Crusafont

2:00 pm 23-2 Evolutionary conserved mandibular exoskeleton structures in chewing insects
Shinji Nagata, Hitomi Seike, Wataru Kashiwabara, Michio Suzuki; The University of Tokyo

2:15 pm 23-3 Investigating the strength of mechanical function in controlling the shape of vertebrate jaws
William Deakin, Emily Rayfield, Philip Donoghue; University of Bristol

2:30 pm 23-4 Functional morphology of the pharyngeal teeth of the ocean sunfish, Mola mola
Benjamin Flurm, Mason Dean, Laura Ekstrom, Michael Blumer; City University of Hong Kong, Wheaton College, Medical University of Innsbruck

2:45 pm 23-5 Lessons from really big fish: integrating incomplete data in parametric modelling of coherent skeletal model
Tairan Li, Martha Paskin, Mike Schindler, Venkata Surapaneni, Frederik Mollen, Daniel Baum, Sean Hanna, Mason Dean; University College London, Zuse Institute of Berlin, City University of Hong Kong, Elasmobranch Research Belgium (ERB), Zuse Institute Berlin

1:30 PM – 4:00 PM Session 24
M2-M3
Paleo-Evo-Devo
Chair: Zachary Morris

1:30 pm 24-1 The evolution and development of the cetacean (whales, dolphins, porpoises) flukes
Lia Gavazzi, Manas Nair, Sharon Usig, Robert Suydam, Lisa Cooper, J.G.M. Thewissen; Kent State University, NEOMED

1:45 pm 24-2 Positive allometric shift of prenasal cartilage during craniofacial development underpins the origin of the avian beak
Matteo Fabbrini, Daniel Paredes, Micaela Cereghino, Hugo Dutel, Alex Ruebenstahl, James Napoli, Roxanne Armfield, Laurel Yohe, Lawrence Witmer, Jingmai O’Connor, Roger Benson, Bhart-Anjan Bhullar; Field Museum of Natural History, Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, University of Bristol, Yale University, American Museum of Natural History, UNC Charlotte, Ohio University Heritage College of Osteopathic Medicine, University of Oxford

2:00 pm 24-3 Developmental mechanism for pelvic fin evolution in chondrichthians.
Catherine Boisvert, Jacob Pears, Carley Tillet, Rui Tahara, Hans Larsson, Kate Trianajstic; Curtin University, Hub for Immersive Visualisation and eResearch, Curtin University, Redpath Museum, McGill University

2:15 pm 24-4 Developmental mechanisms of maxillary variation among bats and implications for craniofacial diversification in mammals
Fumiyuki Meguro, Masaki Takechi, Toshiko Furutera, Taro Nojiri, Yannick Panmery, Laura Wilson, Vuong Tan Tu, Kai Ito, Daïsuke Koyabu; University of Tsukuba, Jusendo University, Australian National University, Vietnam Academy of Science and Technology, The University of Tokyo, City University of Hong Kong

2:30 pm 24-5 Revisiting the homology of the therian premaxilla
Hiroki Higashiyama, Daïsuke Koyabu, Hiroki Kurihara; The University of Tokyo, University of Tsukuba, City University of Hong Kong

2:45 pm 24-6 The developmental mechanisms underlying the evolution of the avian pelvis
Christopher Griffin, Zachary Morris, Bhart-Anjan Bhullar; Yale University

3:00 pm 24-7 The origin of tympanic hearing in crown reptiles from a paleo-evo-devo perspective
Mario Bronzati, Felipe Vecelli, Pedro Godoy, Felipe Montefeltro, Jann Nassif, Douglas Ribiero, Vitoria Botezelli, C.Y. Irene Yan, Ingmar Werneburg, Tiana Kohlsdorf, University of São Paulo, University of Tübingen, Stony Brook University, Midwestern University

3:15 pm 24-8 Embryonic origins of amniote palate diversity
Zachary Morris, Bhart-Anjan Bhullar; Yale University

3:30 pm 24-9 Evolution of the naso-palatal complex in Lepidosauria – insights from comparative embryology
Paweł Kaczmarek, Ingmar Werneburg, Brian Metscher, Magdalena Kowalska, Weronika Rupik; University of Silesia in Katowice, University of Tübingen, University of Vienna
### Preliminary Program

#### SATURDAY, 29 JULY 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:00 PM – 5:00 PM</td>
<td>P1</td>
<td>Auditorium A/B/D</td>
<td>Locomotor biomechanics of the early dinosaur relative Lagosuchus lilloensis</td>
<td>Alejandro Otero, Peter Bishop, John Hutchinson; Museo de La Plata, Harvard University, Royal Veterinary College</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Pug-nosed Pigs—What Goes Wrong?</td>
<td>Michael Baldwin, Katherine Rafferty, Sue Herrn; University of Washington</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Glide-reflection symmetry, homology of body sides, and evolution of gastrolution in deuterostomes</td>
<td>Alexander Kuznetsov; Independent</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Trunk morphology in the Asian and African savanna elephant</td>
<td>Lennart Eigen, Luke Longren, Daniel Baum, Ani Shubitidze, Oliver Leschnegg, Thomas Hildebrandt, Michael Brecht, Bernstein Center for Computational Neuroscience Berlin, Zuse Institute Berlin, Leibniz Institute for Zoo and Wildlife Research</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>The bracing strut for flapping muscles: coracoid strength can be used to reveal the origin and evolution of wing-beat propulsion in birds.</td>
<td>AKEDA Takumi, Shin-ichi Fujiwara; Nagoya University Graduate School of Environmental Studies, Nagoya University Museum</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>On the Development of the Avian Patella</td>
<td>Juan Pablo Venegas Martínez, Joao Boteho; Universidad de Chile, Pontificia Universidad Católica de Chile</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Limb development GRNs are alternatively spliced during limb development</td>
<td>Sean Driscoll, Fjodor Merkuri, Jennifer Fish, Frederic Chain; UMass Lowell</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Histomorphological indices to evaluate unique forelimb posture and digging strategy in moles (Eulipotyphla: Talpidae)</td>
<td>Daichi Nakai, Yasushi Yokohata; Nagoya University, University of Toyama</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Postcanine tooth morphology of Arctic seals and its relation to their zooplankton reliance</td>
<td>Uno Ishihara, Yuuki Watanabe; Department of Polar Science, Graduate Institute for Advanced Studies, Japan</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Integration of the oral and pharyngeal jaws of suckers (Cypriniformes: Catostomidae)</td>
<td>Kelsie Pos, L Patricia Hernandez; George Washington University</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Lost in Endocranial Space: CT-based investigation of brain and endocast shape in frogs</td>
<td>David Blackburn, Jaimi Gray; University of Florida, Florida Museum of Natural History</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>The chondrocranium of the common musk turtle (Sternoterus odoratus, Kinosternidae, Cryptodira, Testudines), with a comparison to other turtles</td>
<td>Luca Leicht, Zitong Zhang, Ingrid Werneburg; University of Tübingen, Fachbereich Geowissenschaften, Universität Tübingen</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Morphological diversity and functional adaptations of the non-avian maniraptoran manual claws and indication of their ecological niche shifts</td>
<td>Yuming Liu, Zichuan Qin, William Deakin, Emily Rayfield, Mike Benton; University of Bristol</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Analysis of a three-dimensional musculoskeletal model of the forelimb of Guanlong wucaii (Theropoda: Tyrannosauroidea)</td>
<td>Sara Burch, John Hutchinson, Xi Yao, Xing Xu; SUNY Geneseo, Royal Veterinary College, Yunnan University, Institute of Vertebrate Paleontology and Paleoanthropology</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Comparative 3D myology of the koala (Phascolarctos cinereus) and common wombat (Vombatus ursinus) forelimb</td>
<td>Hazel Richards, Justin Adams, Alistair Evans; Monash University</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Comparative functional morphology of the pharyngeal musculature in invasive Asian Carp</td>
<td>L Patricia Hernandez, Caitlin Garrett, Alyson Evans, Kelsie Pos; George Washington University, The George Washington University</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Biting off more than you can chew: Using finite-element analysis to predict feeding biomechanics of Devonian lungfish jaws</td>
<td>Joshua Bland, Alice Clement, Olga Panagiotopoulou, John Long; Flinders University, Monash University</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Ozboneviz: A virtual 3D database of Australian vertebrate fauna skeletons</td>
<td>Vera Weisbecker, Pietro Viacava, Sofia Samper-Carro, Erin Mein, Jacob Van Zoelen, Tiina Manne; Flinders University, Australian National Wildlife Collection (CSIRO), The Australian National University, The University of Queensland</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Cutting corners: a tool for measuring Functional Homodonty in 3D Slicer</td>
<td>Jonathan Hue, Karly Cohen; The George Washington University, University of Florida</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td></td>
<td>Influence of muscular mechanical forces during the embryonic development of the opposable hallux of birds and its evolution from basal theropods.</td>
<td>Daniela Flores, Viviana Toro-Ibache, Dominique Adriams, Alexander Vargas; University of Chile, Centro de Análisis Cuantitativo en Antropología Dental, Universidad de Chile, Ghent University</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td>Plenary 2</td>
<td>Auditorium C</td>
<td>Taking a step back: 3-D kinematic studies spark new perspectives on skeletal and footprint form</td>
<td>Stephen Gatesy; Brown University</td>
</tr>
</tbody>
</table>
### Session 25

#### Domestication and Feralization: Modern Techniques on Evolutionary Exemplars (Part 1)

**Chairs:** Emma Sherratt, Ana Balcarcel, Akinobu Watanabe

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>25-1</td>
<td>Rethinking animal domestication as a process, with degrees and diversity</td>
<td>Adam Wilkins, Institute of Theoretical Biology, Humboldt Universität zu Berlin</td>
<td></td>
</tr>
<tr>
<td>8:15 am</td>
<td>25-2</td>
<td>The emergence of domestic dog morphology</td>
<td>Ailowen Evin, Carly Armeen, Keith Dobney, Gregor Larson, Institut des Sciences de l'Evolution, Université de Montpellier, CNRS, IRD, EPHE, University of Exeter, University of Sydney, University of Oxford</td>
<td></td>
</tr>
<tr>
<td>8:30 am</td>
<td>25-3</td>
<td>Universal or unique? Insights into morphological changes along the ‘domestication continuum’</td>
<td>Madeleine Geiger, Natural History Museum St Gallen</td>
<td></td>
</tr>
<tr>
<td>8:45 am</td>
<td>25-4</td>
<td>Phenomics Of Goldfish Domestication</td>
<td>Kévin Le Verger, Laurelle Kung, Anne-Claire Fabre, Thomas Schmelde, Gabriel Aguirre-Fernández, Marcelo Sánchez-Villagra, Paleontological Institute and Museum at the University of Zurich, NMBE/UniBe</td>
<td></td>
</tr>
<tr>
<td>9:00 am</td>
<td>25-5</td>
<td>On the developmental origin of Araucana’s ear-tufts</td>
<td>Daniel Nunez-Leon, Cheng-Ming Chuong, University of Southern California</td>
<td></td>
</tr>
<tr>
<td>9:15 am</td>
<td>25-6</td>
<td>Setting the tempo of morphological change: Osteological shape diversity in domestic pigs over 100 generations of intensive human directed selection</td>
<td>Ashleigh Haruda, University of Oxford</td>
<td></td>
</tr>
</tbody>
</table>

### Session 26

#### Hearing, Seeing, and Smelling

**Chair:** Catherine Early

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>26-1</td>
<td>Paleoneurobiology of the Tetrapod Olfactory Bulb Inferred from Extant Chemoreceptor Repertoires</td>
<td>Laurel Yohe, Nicholas Krell, Matteo Fabbri, Bhart-Anjan Bhullar, UNC Charlotte, Field Museum of Natural History, Yale University</td>
<td></td>
</tr>
<tr>
<td>8:15 am</td>
<td>26-2</td>
<td>Diversification in the hearing and vestibular organs of elasmobranch fishes in 3D</td>
<td>Lucille Chapuis, Kara Yopak, Shaun Collin, Craig Radford, University of Bristol, University of North Carolina Wilmington, La Trobe University, Australia, University of Auckland</td>
<td></td>
</tr>
<tr>
<td>8:30 am</td>
<td>26-3</td>
<td>Developmental transcriptomics and morp homo-informatics of bats provide new insights into the evolution of laryngeal echolocation and hearing</td>
<td>Rui Cao, Masaki Takeshi, Fumiya Meguro, Peng Shi, Xiwan Wang, Yoshiko Furuta, Taro Nojiri, Jun Li, Daisuke Koyabu, City University of Hong Kong, Juntendo University, University of Tsukuba, Vietnam Academy of Science and Technology</td>
<td></td>
</tr>
<tr>
<td>8:45 am</td>
<td>26-4</td>
<td>Avian olfactory bulb evolution informed by the Late Cretaceous neornithine Asteriornis maastrichtensis</td>
<td>Catherine Early, Sam Giles, Daniel Ksepka, Daniel Field, Science Museum of Minnesota, University of Birmingham, Bruce Museum, University of Cambridge</td>
<td></td>
</tr>
<tr>
<td>9:00 am</td>
<td>26-5</td>
<td>First turbinals from an allotherian mammal from Meniscoessus robustus (Cimolodonta, Multituberculata) of the Late Cretaceous of North America</td>
<td>Anne Weil, Alexander Claxton, Oklahoma State University Center for Health Sciences</td>
<td></td>
</tr>
<tr>
<td>9:15 am</td>
<td>26-6</td>
<td>Functional morphology of human and non-human primate middle ears</td>
<td>Alexander Stoessel, Romain David, Laura-Isabell Janitz, Steffen Ossmann, Matthias Bornitz, Max Planck Institute for Evolutionary Anthropology Leipzig, Centre for Human Evolution Research, The Natural History Museum, Instituto de Medicina Molecular, University of Lisbon, TU Dresden</td>
<td></td>
</tr>
</tbody>
</table>

### Session 27

#### Teeth: Morphology, Function, and Evolution (Part 1)

**Chairs:** Marion Segall, Maitena Dumont

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>27-1</td>
<td>Probing for the developmental mechanisms underlying repeated tooth loss in frogs</td>
<td>Daniel Puliu, University of Dayton</td>
<td></td>
</tr>
<tr>
<td>8:15 am</td>
<td>27-2</td>
<td>Evolution of asymmetric dentition in Asian snail-eating snakes</td>
<td>Masaki Hoso, Waseda University</td>
<td></td>
</tr>
<tr>
<td>8:30 am</td>
<td>27-3</td>
<td>General principles of form and function in vertebrate teeth</td>
<td>Alistair Evans, Monash University</td>
<td></td>
</tr>
<tr>
<td>9:00 am</td>
<td>27-4</td>
<td>Squamates as a model to understand the key dental features of vertebrates</td>
<td>Lotta Salomies, Dana Razmadze, Julia Eymann, Nicolas Di-Poi, University of Helsinki</td>
<td></td>
</tr>
<tr>
<td>9:15 am</td>
<td>27-5</td>
<td>What causes differential colouration and banding in the dentine and enamel of fossilized teeth?</td>
<td>Kirstin Brink, Virginia Gold, Emily Cross, Rhy McMillan, Mostafa Fayek, Michael Schindler, Stefanie Brueckner, Caleb Brown, University of Manitoba, University of Victoria, Vancouver Island University, Royal Tyrrell Museum of Palaeontology</td>
<td></td>
</tr>
</tbody>
</table>
### Preliminary Program

**SUNDAY, 30 JULY 2023**

## 10:00 AM – 11:30 AM  
### Session 28  
**M2-M3**

### Anatomical Variations of Hearing and Sound Production in Amniotes (Part 1)

**Chairs:** Jason Bourke, Daisuke Koyabu, Laura Wilson  

**10:00 AM – 11:30 AM**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Chairs</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>28-1</td>
<td>Subsonic symphonics of duck-bill dinosaurs: Computationally reconstructing acoustics in the nasal-crest of Parasaurolophus (Dinosauria: Hadrosauridae: Lambeosaurinae)</td>
<td>Jason Bourke, Terry Gates, Lawrence Witmer, Lindsay Zanno, NYITCOM at Arkansas State, North Carolina State University, Ohio University Heritage College of Osteopathic Medicine, North Carolina Museum of Natural Sciences</td>
<td></td>
</tr>
<tr>
<td>28-2</td>
<td>Modelling nasal airflow and acoustics in The Greater Horseshoe Bat (Rhinolophus ferrumequuminum)</td>
<td>Carley Goodwin, Jason Bourke, Daisuke Koyabu, Laura Wilson; Australian National University, NYITCOM at Arkansas State, University of Tsukuba, City University of Hong Kong</td>
<td></td>
</tr>
<tr>
<td>28-3</td>
<td>Pre- and postnatal morphogenesis of the hyolaryngeal apparatus in bats with evolutionary insights into the laryngeal echolocation.</td>
<td>Taro Nojiri, Nicolas Brualla, Masaki Takechi, Vuong Tan Tu, Dai Fukui, Richard Carter, Daisuke Koyabu; Juntendo University, City University of Hong Kong, Vietnam Academy of Science and Technology, The University of Tokyo Hokkaido Forest, East Tennessee State University, University of Tsukuba</td>
<td></td>
</tr>
</tbody>
</table>

## 10:00 AM – 11:30 AM  
### Session 29  
**M6-M7**

### Domestication and Feralization: Modern Techniques on Evolutionary Exemplars (Part 2)

**Chairs:** Ana Balcarcel, Akinobu Watanabe, Emma Sherratt  

**10:00 AM – 11:30 AM**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Chairs</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-1</td>
<td>Polish Crested Chickens: A Promising New Model System with Aberrant Head Anatomy</td>
<td>Akinobu Watanabe, Scott Landman, Sylvia Marshall, Mohit Shah, Meredith Taylor, Todd Green, Paul Gignac; New York Institute of Technology, University of Arizona, Tucson</td>
<td></td>
</tr>
<tr>
<td>29-2</td>
<td>Does behavioral selection correlate with brain size? Testing the evolutionary plasticity of the brain with the cattle and dog breed models.</td>
<td>Ana Balcarcel, Marcelo Sánchez-Villagra, Anne-Claire Fabre, Allowen Evin; Paleontological Institute and Museum at the University of Zurich, NMBE/UniBe, Institut des Sciences de l’Evolution, Université de Montpellier, CNRS, IRD, EPHE</td>
<td></td>
</tr>
<tr>
<td>29-3</td>
<td>Feral cats in Australia – skull shape as a reflection of diet</td>
<td>Trish Fleming, Heather Crawford, Clare Auckland, Sarah Barber, Natasha Tay, Natalie Warburton, Mike Calver, Harry Butler Institute, Murdoch University</td>
<td></td>
</tr>
<tr>
<td>29-4</td>
<td>Morphological Consequences of Domestication and Feralization in Rabbits</td>
<td>Emma Sherratt, Brian Kraatz, Julia Schaar, Christine Böhmer, Inna Ruf, Thomas Sanger, Madeleine Geiger; The University of Adelaide, Western University of Health Sciences, Christian-Albrechts-Universität zu Kiel, Senckenberg Forschungsinstitut und Naturmuseum Frankfurt, Loyola University Chicago, Natural History Museum St.Gallen</td>
<td></td>
</tr>
<tr>
<td>29-5</td>
<td>Modularity patterns in mammalian domestication: assessing developmental hypotheses for diversification</td>
<td>Laura Wilson, Ana Balcarcel, Madeleine Geiger, Laura Heck, Marcelo Sánchez-Villagra; Australian National University, Paleontological Institute and Museum at the University of Zurich, Natural History Museum St.Gallen</td>
<td></td>
</tr>
<tr>
<td>29-6</td>
<td>Sheep and Goat: Comparison of 8000 years of evolution of two morphologically close domesticated species</td>
<td>Marine Jeanjean, Cyprien Mureau, Allowen Evin; Institut des Sciences de l’Évolution, Université de Montpellier, CNRS, IRD, EPHE</td>
<td></td>
</tr>
</tbody>
</table>

## 10:00 AM – 11:30 AM  
### Session 30  
**Auditorium C**

### Teeth: Morphology, Function, and Evolution (Part 2)

**Chairs:** Marion Segall, Maitena Dumont  

**10:00 AM – 11:30 AM**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Chairs</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-1</td>
<td>Microstructure, biomechanics and chemical composition of teeth in seals</td>
<td>Carolina Loch; University of Otago Faculty of Dentistry</td>
<td></td>
</tr>
<tr>
<td>30-2</td>
<td>Beyond the fangs: the untold story of snake tooth microstructure</td>
<td>Maitena Dumont, Anthony Herrel, Marion Segall; HUJI, UMR7179 CNRS/MNHN, Natural History Museum</td>
<td></td>
</tr>
<tr>
<td>30-3</td>
<td>The hidden complexity of reptilian enamel</td>
<td>Aaron LeBlanc, Alexander Morrell, Slobodan Sirovica, David Labonte, Owen Addison; King’s College London, Queen Mary University of London, Imperial College London</td>
<td></td>
</tr>
<tr>
<td>30-4</td>
<td>Multiple evolutionary pathways to piscivory in Neotropical freshwater fishes (Characiformes)</td>
<td>Karly Cohen, Matthew Kolmann; University of Florida, University of Louisville</td>
<td></td>
</tr>
<tr>
<td>30-5</td>
<td>Ecomorphology of snakes’ teeth</td>
<td>Marion Segall, Anthony Herrel, Maitena Dumont; Natural History Museum, UMR7179 CNRS/MNHN, HUJI</td>
<td></td>
</tr>
<tr>
<td>30-6</td>
<td>Developmental mechanisms facilitating molar shape diversification in bats</td>
<td>Alexa Sadler, David Grossnickle, Marina Zernik; Paul François, Sharlene Santana, Karen Sears; University of California, Los Angeles, University of Washington, Université de Montréal</td>
<td></td>
</tr>
</tbody>
</table>

---
The 13th International Congress of Vertebrate Morphology Meeting

**Session 31**

**The Morphology of Coral Reef Fishes: Functional, Ecological, and Evolutionary Implications (Part 1)**

Chairs: Laura Wilson, Jason Bourke, Daisuke Koyabu

**10:00 am – 11:30 AM**

**31-1** The feeding kinematics of a surgeonfish (Zebrasoma desjardinii) and the associated functional implications  
Michalis Mihalitsis, Peter Wainwright; University of California, Davis

**10:15 am**  
**31-2** The functional morphospace of fish skulls is constrained by evolutionarily rigid, ubiquitous bounds  
Roi Holzman, Christopher Martin, Peter Wainwright, Edward Buness; Tel Aviv University, University of California, Berkeley, University of California, Davis, University of Alabama

**10:30 am**  
**31-3** A Functional Morphospace for the Feeding System of Coral Reef Fishes  
Peter Wainwright; University of California, Davis

**10:45 am**  
**31-4** Leveraging kinematic performance landscapes to model the macroevolution of feeding in reef fishes  
Katherine Corn, Roi Holzman, Christopher Martin, Josef Uyeda; Virginia Tech, Tel Aviv University, University of California, Berkeley

**11:00 am**  
**31-5** The morphological-functional-ecological diversity of damselfishes (Pomacentridae) is tightly linked to a ligament  
Bruno Frederich; University of Liège

**Session 32**

**Anatomical Variations of Hearing and Sound Production in Amniotes (Part 2)**

Chairs: Laura Wilson, Jason Bourke, Daisuke Koyabu

**1:30 PM – 4:00 PM**

**32-1** Comparative anatomy of the vocal apparatus in bats: insights into the evolutionary history of echolocation  
Nicolas Brualla, Laura Wilson, Vuong Tan Tu, Taro Nojiri, Richard Carter, Thongchai Ngamprasertwong, Thanakul Wanniapraser, Michael Doube, Dai Fukui, Daisuke Koyabu; City University of Hong Kong, Australian National University, Vietnam Academy of Science and Technology, Juntendo University, East Tennessee State University, Chulalongkorn University, The University of Tokyo Hokkaido Forest, University of Tsukuba

**2:00 pm**  
**32-2** Vocal learning, chorusing seal pups and the evolution of rhythm  
Andrea Ravignani; Comparative Bioacoustics Group, Max Planck Institute for Psycholinguistics

**2:30 pm**  
**32-3** Comparison of cranial development in echolocating and non-echolocating bats  
Yannick Pommery, Daisuke Koyabu, Fumiya Meguro, Taro Nojiri, Vuong Tan Tu, Alistair Evans, Tim Denham, Laura Wilson; Australian National University, University of Tsukuba, City University of Hong Kong, Juntendo University, Vietnam Academy of Science and Technology, Monash University

**3:00 pm**  
**32-4** Embryonic evidence uncovers convergent origins of laryngeal echolocation in bats  
Daisuke Koyabu, Taro Nojiri, Rui Cao, Laura Wilson, Camilo Lopez-Aguirre, Fumiya Meguro, Hiroki Higashiyama, Alexa Sadler, Karen Sears, Vuong Tan Tu, Jun Li; University of Tsukuba, City University of Hong Kong, Juntendo University, Australian National University, University of Toronto Scarborough, The University of Tokyo, University of California, Los Angeles, Vietnam Academy of Science and Technology

**Session 33**

**Backbones: Bending, Bouncing, and Beyond**

Chair: Verónica Díez Díaz

**1:30 PM – 4:00 PM**

**33-1** Sequential Scales: New perspectives on snake axial evolution  
Tamika Nash-Hahn, Kate Sanders, Emma Sherratt; University of Adelaide

**1:45 pm**  
**33-2** Vertebrate Spines and Continuum Robots  
Ian Walker, Nithesh Kumar; Clemson University

**2:00 pm**  
**33-3** Born to do pilates: morphological analysis of flexibility and stability in the backbone of hares and rabbits  
Nuttakorn Taewcharoen, Philip Stott, Rachel Norris, Emma Sherratt; University of Adelaide

**2:15 pm**  
**33-4** Morphological disparity and integration in the vertebral column of pinnipeds (Mammalia, Carnivora)  
Alberto Martín-Sierra, Juan Miguel Esteban Núñez, Alejandro Pérez-Ramos, Bonja Figueirido; Universidad de Málaga

**2:30 pm**  
**33-5** Analysing the intervertebral articulation and center of rotation using digital methods: the caudal series of Giraffatitan brancai (Sauropoda, Dinosauria) as case study  
Verónica Díez Díaz, Daniela Schwarz, William J. Sellers, Pasha van Bijlert, Mathew Wedel, Museum für Naturkunde Berlin - Leibniz Institute for Evolution and Biodiversity Science, University of Manchester, Utrecht University, Western University of Health Sciences

**2:45 pm**  
**33-6** Raise your head: Evaluating mechanical advantage of predorsal region of terrestrial quadrupedal amniotes  
Kuan-Yu Chou, Ren-Chung Cheng, Kai-Jung Chi, Tzu-Ruei Yang; Department of Geology, National Museum of Natural Science, National Chung Hsing University

---

SUNDAY, 30 JULY 2023
SUNDAY, 30 JULY 2023

3:00 pm Session 33

33-7 Hole in Two: describing the basivertebral foramina in Tardigrada
Hartnich Zack, Stephanie Smith, Kenneth Angielczyk; University of Chicago, Field Museum of Natural History

3:15 pm Session 33

33-8 Connective Tissue and Lateral Stabilization of the Giraffe Cervical Vertebral Column
Justin Georgi, Kevin Manfredi, K. E. Townsend; Midwestern University

3:30 pm Session 33

33-9 Shape diversification of spine in bony fish by adaptation to mechanical forces
Misaki Sakashita, Shigeru Kondo, Shintaro Yamasaki, Naoyuki Wada; Applied Biological Science, Tokyo University of Science, Osaka University, Waseda University

3:45 pm Session 33

33-10 The role of spine motion in vertical jumping performance of the common degu (Octodon degus, Rodentia).
Celina Richter, Martin Fischer, Manuela Schmidt; Friedrich Schiller University

1:30 PM – 4:00 PM Session 34

Teeth: Morphology, Function, and Evolution (Part 3)
Chairs: Marion Segall, Maitena Dumont

1:30 pm Session 34

34-1 Odonto-seq: using shark developmental transcriptomics to define a tooth
Gareth Fraser, Ella Nicklin, Karly Cohen; University of Florida

1:45 pm Session 34

34-2 Thinking beyond the cusp: patterns of tooth diversity in Lake Tanganyika cichlid fishes
Nick Peoples, Peter Wainwright; University of California, Davis

2:00 pm Session 34

34-3 Growing long in the tooth – continuously growing dentition and the power cascade model
William Parker, Justin Adams, Alistair Evans; Monash University

1:30 PM – 4:00 PM Session 35

The Morphology of Coral Reef Fishes: Functional, Ecological, and Evolutionary Implications (Part 2)
Chairs: Roi Holzman, Michalis Mihalitsis

1:30 pm Session 35

35-1 Many roads lead to herbivory: Phylogenetic Constraints on the Convergent Evolution of Marine Herbivorous Fishes
Kory Evans, Christopher Martinez; Rice University, University of California Irvine

2:00 pm Session 35

35-2 Effects of history on ecomorphological convergence across planktivorous fishes
Jennifer Hodge, Danielle Adams, Laura Alencar, Benjamin Camper, Olivier Larouche, Mason Thurman, Keiffer Williams, Katerina Zapfe, Samantha Price; Clemson University, Yale University, University of Houston, University of North Carolina Charlotte

2:30 pm Session 35

35-3 Body Shape and Bold Colour Pattern Evolution across Reef-Associated Fishes
Katerina Zapfe, Jennifer Hodge, Samantha Price; Clemson University, University of North Carolina Charlotte

2:45 pm Session 35

35-4 A snap to the left, a swing to the right - head and body shape affect biting kinematics in reef fishes
Tal Perevolotsky, Jacob Brotman-Krass, Cassandra Donatelli, Matthew Kolmarn, Adam Summers, Roi Holzman, Tel-Aviv University, Chapman University, University of Louisville, University of Washington

3:00 pm Session 35

35-5 How to measure color pattern variation in coral reef fishes
Hannah Weller, Steven Van Belleghem; Brown University, KU Leuven

3:15 pm Session 35

35-6 Morphological differences in surgeonfishes shape ecological roles and response to a key stressor
Sterling Tebbett, David Bellwood; James Cook University

3:30 pm Session 35

35-7 Three-dimensional morphometric data reveals patterns of cranial evolution associated with habitat transitions in fossil and extant tetraodontiform fishes
Emily Troyer, Kory Evans, Christopher Gostkey, Dahianna Arcilla; University of Oklahoma, Rice University, University of Southampton

4:00 PM – 5:00 PM P2

P2-1 Jaws wide open: 50 years of modeling mammalian jaw gapes since Herring and Herring 1974
Andrea Taylor; Claire Terhune, Christopher Vinyard; Touro University, University of Arkansas, Ohio University

P2-2 Structure and function in the Cetacean pulmonary airway tree
Robert Cieri, Robert Shadwick, Meryn Tawhai, Marina Piscotelli; University of British Columbia, University of Auckland

P2-3 Sthenurine kangaroos break the CREA rule of facial allometry
Christine Janis, William Richardson, Nuna Morales-Garcia; University of Bristol

P2-4 Comparative Anatomy of Otomorphan Epibranchial Organs
Allyson Evans, L. Patricia Hernandez, Joshua Egan; George Washington University, University of Minnesota

P2-5 Looking into the future of migratory parrots: assessing the vision of iconic species to assist conservation planning
Aubrey Kerman, Vera Weisbecker, Andrew Iwaniuk, Gavin Prideaux; Flinders University, University of Lethbridge
SUNDAY, 30 JULY 2023

P2-6  Growing up sucks: modelling sucking and biting in human mandibles through development
Tahlia Pollock, Pranav Haravu, Alec Wilken, Andrea Taylor, Russell Reid, Callum Ross, Olga Panagiotopoulou; Monash University, University of Chicago, Touro University

P2-7  The anomalous form of the tapir scapula (Perissodactyla: Tapiridae), with new insights from dissection and 3D imaging
Jamie MacLaren; University of Antwerp

P2-8  Musculoskeletal constraints on hopping in the distal hindlimbs of giant extinct kangaroos
Megan Jones, Katrina Jones, Robert Nudds; University of Manchester

P2-9  Correlation of precipitation and hatching morphology in sea turtles Caretta caretta and Chelonia mydas
Omar Ragalado Fernandez, Parima Parsi-Pour, John Nyakatura, Ingrid Werneburg, University of Tübingen, Museum für Naturkunde Berlin, Humboldt Universität zu Berlin

P2-10  Functional morphology of the skull of Henodus chelyops (Placodonta)
Ingmar Werneburg, Yannick Pommery, Maciej Ruciński, Benedikt Kästle, Gabriel Cohen, Nikolay Natev, Octávio Mateus, Gabriel Ferreira; University of Tübingen, Australian National University, Natural History Museum at the University of Oslo, University of Zurich, Konstantin Preslavsky University of Shumen, GeoBioTec, NOVA School of Science and Technology, Senckenberg Centre for Human Evolution & Palaeoenvironment (SHEP) at the Eberhard Karls Universität Tübingen

P2-11  Evolution of phalangeal morphology in an ecomorphological gecko radiation with incipiently expressed adhesive toepads
Jendrian Riedel, Jonas Dreßmann, Mariam Gabelaia, Timothy Higham, Lee Grismer, Dennis Rödder, Benjamin Wipfler, Anthony Russell; Leibniz Institute for the Analysis of Biodiversity Change - Museum Koenig Bonn, University of California, Riverside, La Sierra University, University of Calgary

P2-12  What factors create mammalian complex molar morphology: classical theories revisited
Masakazu Asahara, Tomohiro Harano; Aichi Gakuin University

P2-13  What’s diet got to do with it? Analysis of craniofacial evolution in Lake Victoria cichlids
Kassandra Ford, L Patricia Hernandez, Pooja Singh, Mikki Law, David Haberthur, Ruslan Hlushchuk, Kory Evans, Ole Seehausen; George Washington University, University of Bern, Institute of Anatomy, Universität Bern, Rice University

P2-14  Soft tissues, hard limits: integrating ligament strain into joint range-of-motion estimates
Stephanie Pierce, Robert Brocklehurst, Peter Bishop; Harvard University, Museum of Comparative Zoology

P2-15  Telling Tails: Comparative muscular morphology and function of mammalian tails
Juri Miyamae, Talia Moore; University of Michigan

P2-16  The current state of the field in using continuous shape data for phylogenetic reconstruction: A systematic review
Emma Holvast, Melina Celik, Matthew Phillips, Laura Wilson; Australian National University, Queensland University of Technology

P2-17  Osteological Correlates of Carnivoran Masticatory Fascicle Lengths
Sarah Piersanti, Ashley Deutsch, Adam Hartstone-Rose; Arizona State University, North Carolina State University

P2-18  Effects of cursoriality on mammalian semicircular canal morphology
Addison Kemp, Justin Benjamin; University of Southern California

5:00 PM – 6:00 PM  Plenary 3

5:00 pm  Uncovering the mechanisms of bat diversification through integrative morphology research
Sharlene Santana; University of Washington
**Monday, 31 July 2023**

### Session 36 (M2-M3)
**Feeding: Soft Parts**
*Chair: Jillian Davis*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>The Impacts of Various Modalities of Esophageal Stimulation on Infant Mammalian Feeding Physiology</td>
<td>Chloe Edmonds; Kaitlyn Robbins, Christopher Mayerl, Rebecca German; Northeast Ohio Medical University, Kent State University, The Ohio State University, Northern Arizona University, NEOMED</td>
</tr>
<tr>
<td>8:15 am</td>
<td>The impact of diet on vertebrate intestinal length</td>
<td>Maria José Duque Correa, Carlo Meloro, Walter Salzburger, Kendall Clements, Marcus Claus, University of Zurich, Liverpool John Moores University, University of Basel, Zoological Institute, University of Auckland</td>
</tr>
<tr>
<td>8:30 am</td>
<td>Comparative anatomy of the musculoskeletal feeding system in plethodontid salamanders</td>
<td>Henry Camarillo, Bhart-Anjan Bhullar, Martha Muñoz; Yale University</td>
</tr>
<tr>
<td>8:45 am</td>
<td>Masticatory Motor Patterns in Frugivorous Phyllostomid Bats</td>
<td>Jillian Davis, Enka Tavares, Brooke Quinn, Megan McCullough, Sharon Swartz; West Virginia University, Brown University</td>
</tr>
<tr>
<td>9:00 am</td>
<td>Gotta catch them all: a novel view of the anatomy and functional morphology of the masticatory apparatus in hystricomorphous rodents</td>
<td>Léa Da Cunha, Pierre-Henri Fabre, Anthony Herrel, Lionel Hautier; Institut des Sciences de l’Evolution de Montpellier, Université de Montpellier</td>
</tr>
<tr>
<td>9:15 am</td>
<td>Diversifying the Power Stroke of Premaxillary Protrusion: The Evolution of Diverse Cranial Musculature in Cypriniform Fishes</td>
<td>Joshua Storch; George Washington University</td>
</tr>
</tbody>
</table>

### Session 37 (Auditorium C)
**Limbs and "Limbs"**
*Chair: Jamie MacLaren*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>The evolution of the knee sesamoids in Primates</td>
<td>Michael Berthaume, Nelly Fragoso; London South Bank University</td>
</tr>
<tr>
<td>8:30 am</td>
<td>Rates of evolution and morphological disparity in the primate tarsal skeleton</td>
<td>Nicole Barber, Christophe Soligo, Anjali Goswami; University College London, The Natural History Museum</td>
</tr>
<tr>
<td>8:45 am</td>
<td>Investigation of the convergent evolution of the prehensile tail among small-bodied rodents from the Hydromyini tribe</td>
<td>Arthur Naas, František Vojmělka, Anthony Herrel, Pierre-Henri Fabre; Institute of Evolutionary Sciences of Montpellier, Biology Centre of the Czech Academy of Sciences, Université de Montpellier</td>
</tr>
<tr>
<td>9:00 am</td>
<td>Avoiding the edge of failure: a strength-based perspective to explain equid digit reduction</td>
<td>Jamie MacLaren, Peter Aerts; University of Antwerp</td>
</tr>
<tr>
<td>9:15 am</td>
<td>The hindlimb of Allopodosuchus (Crocodyliformes, Eusuchia) from a biomechanical viewpoint</td>
<td>Alejandro Blanco, Verónica Díez Díaz, Blanca Moncunill-Solé; Université de Corufia, Museum für Naturkunde Berlin - Leibniz Institute for Evolution and Biodiversity Science</td>
</tr>
</tbody>
</table>

### Session 38 (M6-M7)
**The Integumentary Skeleton: Evolution, Development, Biomechanics, and Bioinspiration (Part 1)**
*Chairs: Matthew Vickaryous, Mehran Moazen, Catherine Williams*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>Dermal ossifications in extinct tetrapods and their bearing on phylogenetics, function, and palaeoecology</td>
<td>Torsten Scheyer; University of Zurich, Switzerland</td>
</tr>
<tr>
<td>8:30 am</td>
<td>Skeletal Diversity in the Skin: Histological Variation and the Evolution of Lizard Osteoderms</td>
<td>Matthew Vickaryous, Gabriella Willian, Catherine Williams, Alex Kirby, Anthony Herrel, Loïc Kéver; Arsalan Marghoub, Shreya Rai, Akhmat Abzhanov, Edward Stanley, Susan Evans, Mehran Moazen; University of Guelph, University College London, Imperial College London, Florida Museum of Natural History</td>
</tr>
<tr>
<td>9:00 am</td>
<td>Lizards in Chain Mail: Reconstructing the Enigmatic Past of Dermal Armour in Squamate Reptiles</td>
<td>Roy Ebel, Chris Broockhoven, Edward Stanley, Till Ramml, Rocio Aguilar, Johannes Muller, David Chapple, Scott Keogh; Australian National University, University of Antwerp, Florida Museum of Natural History, Museum für Naturkunde – Leibniz Institute for Evolution and Biodiversity Science, Museums Victoria, Monash University</td>
</tr>
</tbody>
</table>
MONDAY, 31 JULY 2023

10:00 AM – 11:30 AM Session 39

Feeding: Hard Parts
Chair: Larisa DeSantis

10:00 am 39-1 On the cusp of adaptive change: the tempos and modes of molar evolution during the phyllostomid bat radiation
David Grossnickle, Alexa Sadier, Edward Patterson, Stephanie Jimenez Rivera, Nashaly Cortes-Vinuez, Karen Sears, Sharlene Santana; University of Washington, University of California, Los Angeles, Inter American University of Puerto Rico

10:15 am 39-2 A new Jurassic shuotheriid casts light on pseudotribosphenic tooth evolution and higher-level phylogeny of mammals
Jin Meng, Fangyuau Mao; American Museum of Natural History, Chinese Academy of Sciences

10:30 am 39-3 Temporal dietary shift toward more abrasive food among Cretaceous ornithopod dinosaurs
Tai Kubo, Mugino Kubo, Manabu Sakamoto, Wenjie Zheng, Xingsheng Jin, Hai-Lu You; Okinawa Institute of Science and Technology, The University of Tokyo, University of Lincoln, Kiel University, Zoological Institute, Fukui Prefectural University, Zhejiang Museum of Natural History, Institute of Vertebrate Paleontology and Paleoanthropology

10:45 am 39-4 Dental microwear texture attributes in similar tooth forms can reasonably be compared in phylogenetically disparate mammals
Larisa DeSantis; Vanderbilt University

11:00 am 39-5 Dietary correlates of primate tooth root surface areas
Ashley Deutsch, Adam Hartstone-Rose; North Carolina State University

11:15 am 39-6 Fantastic filters: comparative morphology of rorqual baleen
Shirel Kahane-Rapport, Megan Vandenberg, Karly Cohen, Robert Rubin, Jeremy Goldbogen, Adam Summers, Misty Paig-Tran; California State University, Fullerton, University of Florida, Hopkins Marine Station, Stanford University, University of Washington

10:00 AM – 11:30 AM Session 40

Fins (Not Limbs)
Chair: Markus Lambertz

10:00 am 40-1 Comparative and evolutionary perspectives on the ontogeny of post-cranial skeletal pneumaticity
Markus Lambertz, Pia Schucht; Rheinische Friedrich-Wilhelms-Universität Bonn

10:15 am 40-2 MYTHBUSTERS: refining observations about anal fin variation in surfperches
Breana Goldman, Karen Crow; San Francisco State University

10:30 am 40-3 Turning a Skate into a Ray: The Genetic Basis of Modified Pectoral Fins in Manta Rays and their Relatives
Emily McFarland, Karen Crow; San Francisco State University

10:45 am 40-4 Red lionfish (Pterois volitans) use big fins and persistence to exploit the evasion strategy of prey
Ashley Peterson, Anthony Thompson, Derek Paley, Matthew McHenry; University of Irvine, University of Maryland

11:00 am 40-5 Investigating the only extant vertebrate with three sets of paired appendages
Karen Crow, Kayla Hall, Riley Jones; San Francisco State University, University of California, Northridge

11:15 am 40-6 What are they good for? Morphological variations of Pre-Pelvic Claspers across Holocephalans
Kayla Hall; University of Washington

10:00 AM – 11:30 AM Session 41

The Integumentary Skeleton: Evolution, Development, Biomechanics, and Bioinspiration (Part 2)
Chairs: Mehran Moazen, Catherine Williams, Matthew Vickaryous

10:00 am 41-1 Scaled up defenses: Patterns and drivers of dermal armor in lizards
Edward Stanley, Jaimi Gray, David Blackburn; Florida Museum of Natural History, University of Florida

10:30 am 41-2 Multi-scale interactions in the armor of fishes
Adam Summers, Matthew Kolmann, Cassandra Donatelli; University of Washington, University of Louisville, Chapman University

11:00 am 41-3 Form and function of lizard cranial osteoderms
Anthony Herrel, Loic Kéver, Arsalan Marghoub, Edward Stanley, Catherine Williams, Matthew Vickaryous, Arkhat Abzhanov, Shreya Rai, Susan Evans, Mehran Moazen; UMR7179 CNRS/MNHN, UCL, Florida Museum of Natural History, University of Guelph, Imperial College London
## Session 42
### The Sensory World of Vertebrates (Part 1)

**Chairs:** Irina Ruf, Tim Smith

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>42-1 Development and morphofunction of the malleus in muroid rodents</td>
</tr>
<tr>
<td>10:15 am</td>
<td>42-2 Development of dolphin sensory systems</td>
</tr>
<tr>
<td>10:30 am</td>
<td>42-3 Bioimaging of sensory organs and the central nervous system in fishes and reptiles</td>
</tr>
<tr>
<td>10:45 am</td>
<td>42-4 Open Questions in Fish Photoreception</td>
</tr>
<tr>
<td>11:00 am</td>
<td>42-5 The Parietal Eye in Fossil Amniotes</td>
</tr>
<tr>
<td>11:15 am</td>
<td>42-6 Mammalian olfaction, an integrative perspective</td>
</tr>
</tbody>
</table>

## Session 43
### Cranial Evolution

**Chair:** Maria Laura Habegger

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>43-1 The Perks of Being a Eupercarian: Rapid Skull Shape Evolution in a Massive Radiation of Bony Fishes</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>43-2 Sample size and two-dimensional geometric morphometrics impact the evaluation of morphological variation in three species of Louisiana bat</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>43-3 An osteological description of the rostrum in billfishes through development (Xiphiidae and Istiophoridae)</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>43-4 Modularity, biomechanics and bmp4 expression integrate developmental plasticity in fish novel head morphotypes.</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>43-5 Biomechanical basics for the evolution of cranial openings in amniotes</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>43-6 Evolutionary patterns in the composition of the tetrapod lower jaw</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>43-7 3D anatomy of the craniodental joint of derived South American cynodonts and homoplasy in the evolution of the mammalian jaw</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>43-8 On the development of the nasal turbinals and homology in laurasiatherians, with special reference to pangolins</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>43-9 The influence of jaw muscle architecture on mandibular disparity in Lepidosauria</td>
</tr>
</tbody>
</table>
MONDAY, 31 JULY 2023

1:30 PM – 4:00 PM  Session 44  M6-M7

The Integumentary Skeleton: Evolution, Development, Biomechanics, and Bioinspiration (Part 3)

Chairs: Matthew Vickaryous, Mehran Moazen, Catherine Williams

1:30 pm  44-1 Armed to the teeth: Adaptive functionality of shark denticles from material and mechanical perspectives
          Mike Schindler, Chuang Liu, Tairan Li, Martha Paskin, Yen Png, Frederik Mollen, Nicholas Payne, Shahrouz Amini, Venkata Surapaneni, Mason Dean; City University of Hong Kong, Hofai University, University College London, Zuse Institute of Berlin, Elasmobranch Research Belgium (ERB), Trinity College Dublin, Max Planck Institute of Colloids and Interfaces

2:00 pm  44-2 Nanoscale Investigation of an Enigmatic Skeletal Tissue type: Lizard Osteoderm Capping Tissue
          Catherine Williams, Arsalan Marghoub, Shreya Rai, Dmitry Karpov, Gabriella Willan, Loïc Kéver, Arkhat Abzhanov, Anthony Herrel, Edward Stanley, Susan Evans, Mehran Moazen, Matthew Vickaryous, UCL, Imperial College London, European Synchrotron Radiation Facility, University of Guelph, UMR7179 CNRS/MNHN, Florida Museum of Natural History

2:30 pm  44-3 Mechanical properties of lizard osteoderms
          Mehran Moazen, Arsalan Marghoub, Anastasiia Maliuk, Jeremy Tan, Loïc Kéver, Catherine Williams, Shreya Rai, Susan Evans, Arkhat Abzhanov, Matthew Vickaryous, Anthony Herrel; University College London, Imperial College London, University of Guelph

2:45 pm  44-4 More than just a platey face: the versatile role of armor in fishes
          Cassandra Donatelli, Megan Vandenberg, Adam Summers, Matthew Kolmann; Chapman University, University of Washington, University of Louisville

3:15 pm  44-5 Mechanical Anisotropy of Shark Skin
          Madeleine Hagood, Joseph Alexander, Marianne Porter; Florida Atlantic University

1:30 PM – 4:00 PM  Session 45  M4-M5

The Sensory World of Vertebrates (Part 2)

Chairs: Irina Ruf, Tim Smith

1:45 pm  45-1 Whisked Away: synapsid sensory innovations and the evolution of facial musculature
          Jun Miyamae; University of Michigan

2:00 pm  45-2 Grasping at primate touch: integrating genetics, histology, and ecology
          Carrie Veilleux, Magdalena Muchlinski, Amanda Melin; Midwestern University, Oregon Health & Science University, University of Calgary

2:15 pm  45-3 Relating olfactory behavior and nasal morphology in Southeast Asian primates
          Stephanie Poindexter; University at Buffalo

2:30 pm  45-4 On the relationship between retinal and visual field topography in vertebrates
          Christopher Heesy; Midwestern University

2:45 pm  45-5 Aging and the senses
          Jeffrey Laitman, Christopher Smith; Icahn School of Medicine at Mount Sinai, The Graduate Center, City University of New York

3:00 pm  45-6 Hair, there and everywhere: a comparison of bat wing sensory hair distribution
          Brooke Quinn, Andrea Rummel, Melissa Sierra, Sharon Swartz; Brown University, Princeton University, University of Maryland School of Medicine

3:15 pm  45-7 The Extraordinary Sensory Biology of the Silverjaw Minnow, Notropis buccatus
          Aubree Jones, Kevin Conway, Jacqueline Webb; University of Rhode Island, Texas A&M University

3:30 pm  45-8 Predicting Ecology and Hearing Sensitive in Parapontoporia
          Joyce Sanks, Rachel Racicot; Vanderbilt University

3:45 pm  45-9 Anatomy of the premaxilla of Tylosaurus nepaolicus (Squamata: Mosasauridea) and its implications in the sensoriality of aquatically adapted squamates
          Paulina Jiménez-Huidobro, Ariana Paulina-Carabajal, Michael Caldwell; Universitat Bonn, CONICET-Universidad Nacional del Comahue, University of Alberta

1:30 PM – 4:00 PM  Session 46  M2-M3

Transitions: Water to Land to Water

Chair: Laura Porro

1:30 pm  46-1 Two limbs or four: evaluating the role of forelimbs in protocetid swimming
          Sam Coatham, William I. Sellers, Lia Gavazzi, Richard Sandberg; University of Manchester, School of Natural Sciences, Kent State University, NEOMED, University of Melbourne

28  The 13th International Congress of Vertebrate Morphology Meeting
Preliminary Program

1:45 pm  46-2  New insights on cetacean locomotion: a quadrupedal species from the middle Eocene of Peru as a transition toward a fully aquatic lifestyle

2:00 pm  46-3  Middle Jurassic fossils from England and Scotland document early stages in salamander evolution

2:15 pm  46-4  Reconstruction undulatory swimming in the first secondarily aquatic amniote

2:30 pm  46-5  Morphology and kinematics of amphibious marine vertebrates for transition to biorobotic systems

2:45 pm  46-6  Early tetrapod lower jaw shape and performance across the water-land transition

3:00 pm  46-7  Whole-body volumetric modelling of the early tetrapod Ichthyostega

3:15 pm  46-8  Hear far, wherever you are: the evolution of amphibious hearing in seals

3:30 pm  46-9  Comparing axial versus appendicular change across secondarily aquatic amniotes

4:00 PM – 5:00 PM  P3

P3-1  Turbinal skeleton of Myocastor coypus (Rodentia, Mammalia)

P3-2  Endosseous labyrinths, ear bones, and digital endocasts of fossil baenid turtles reveal functional aspects of hearing and balance in Paracryptodira

P3-3  Postnatal ontogeny of the midface and turbinals in Eptesicus fuscus

P3-4  Understanding a missing link in the evolution of mammalian hearing and balance systems through morphometric analysis of the Ductus Reuniens

P3-5  Hypotheses on the evolutionary and biogeographic history of the Ankylosauria (Thyreophora: Ankylosauria) from Gondwanan continents

P3-6  Tweaking the chicken beak: Investigating the shape and development of the chicken (Gallus gallus) beak from embryo to adult

P3-7  Comparative Morphology of Olfactory Bulbs Mammals Different Ecological Groups

P3-8  The first 3D cranial and myological reconstruction of the highly flattened remains of Askeptosaurus italicus (Diapsida: Thalattosauriformes)

P3-9  Convergent evolution and innervation patterns of caudal ear muscles in distantly related constant-frequency echolocating bats

P3-10  The propatagium as an evolutionary novelty in the lineage towards birds

P3-11  Lung differentiation in the brown anole Anolis sagrei (Squamata: Iguania) embryos
P3-12 Craniofacial malformations in squamate embryos
Julita Jakubiec, Magdalena Kowalska, Weronika Rupik, Paweł Kaczmarek; University of Silesia in Katowice

P3-13 Evolutionary developmental perspective for the early evolution of the pectoral fin
Tatsuya Hirasawa, Ryota Urémaya; The University of Tokyo

P3-14 Development and evolution of the jaw joint and middle ear structures in the dinosaur-bird lineage
Takumi Watanabe, Tatsuya Hirasawa; The University of Tokyo

P3-15 Replacement, regeneration, or maintenance? Deployment of the dental developmental toolkit in skin denticles of adult small-spotted catshark (Scyliorhinus canicula)
Karly Cohen, Gareth Fraser; University of Florida

P3-16 Who nose the flow: nasal dermal denticle morphology and water flow
Amani Webber-Schultz, Kayla Hall, Ayi Ajavon, Adam Summers, Brooke Flammang, Lauren Simonits; New Jersey Institute of Technology, Rutgers University, University of Washington, Georgia State University, Florida Atlantic University, University of Washington’s Friday Harbor Labs

P3-17 Quantifying mammalian locomotion using cluster analysis
Sophia Anderson, Philip Cox, Eloy Gálvez-López; University of York, University College London

P3-18 The evolution of cochlea shape in primates and other euarchontans
Joaquin del Río, Alexander Stoessel, Nils Krommer; Max Planck Institute for Evolutionary Anthropology

P3-19 A preliminary analyze of cranial variations in three Amphisbaenia species
Leandro Hohl, Albo Vassallo, Adrià Casinos, Concepcion Azorit, Oscar Rocha-Barbosa; Universidade do Estado do Rio de Janeiro, Instituto de Biologia Roberto Alcântara Gomes, Universidad Nacional de Mar del Plata, University of Barcelona, Universidad de Jaén

P3-20 Effect of early-life stress on skeletal development in a tropical agamid lizard
Subhasmita Patro, Maria Thaker; Indian Institute of Science

5:00 PM – 6:00 PM  Plenary 4  Auditorium C

5:00 pm  From Development to Deep Time: Reconstructing the Evolution of Tetrapod Diversity with a Phenomic Approach  Anjali Goswami; The Natural History Museum, London
Tuesday, 1 August 2023

8:00 AM – 9:30 AM  
Session 47  
Auditorium C

**Development, Genetics, Biomechanics, and Evolution of the Spine in Vertebrates (Part 1)**  
*Chairs: Christine Böhmer, Maxime Taverne, Roman Khonsari*

- **8:00 am**  
  **Session 47**  
  **47-1**  
  On the evolution and recapitulation of the vertebral column  
  Shigeru Kuratani, Tatsuya Hirasawa, RIKEN Center for Biosystems Dynamics Research, The University of Tokyo

- **8:30 am**  
  **47-2**  
  The control of transitions during vertebrate body formation  
  Moises Mallo, Patricia Duarte, Ana Novoa, Anastasias Lozovska, Rion Brattig Correia, Instituto Gulbenkian de Ciencia

- **9:00 am**  
  **47-3**  
  Evolutionary morphology of the neck-to-trunk boundary in artiodactyls and the iconic case of the long neck of giraffes  
  John Nyakatura, Marlena Müller, Luisa Merten, Sandra Schüller, Christine Böhmer, Alana Sharp, Jan Wöller; Humboldt Universität zu Berlin, Christian-Albrechts-Universität zu Kiel, University of Liverpool

---

8:00 AM – 9:30 AM  
Session 48  
M2-M3

**Morphological Medley**  
*Chair: Alexander Stoessel*

- **8:00 am**  
  **48-1**  
  Combination of qualitative and quantitative data reveals unique patterns in the post cranial anatomy and taxonomy of Sphenacodontidae (Synapsida::Sphenacodontidae)  
  Jacqueline Lungmus; Sam Noble Oklahoma Museum of Natural History, University of Oklahoma

- **8:15 am**  
  **48-2**  
  Morphological Variation and Ecological Signals in Extant Crocodylomorph Endocasts  
  Alexander Beyl, Amy Balanoff, Paul Gignac, Jeroen Smaers, Akim Ota, Eric Wilberg, Alan Turner; Stony Brook University, Johns Hopkins University, University of Arizona, New York Institute of Technology College of Osteopathic Medicine

- **8:30 am**  
  **48-3**  
  Endocast morphology differs significantly within North American river otters  
  Leigha Lynch, Dominik Valdez, Alexander Claxton, Christopher Heesy, Kari Allen, Haley O’Brien, Ryan Felce; Midwestern University, Oklahoma State University Center for Health Sciences, Washington University St. Louis, University of Arizona Health Sciences, University College London

- **8:45 am**  
  **48-4**  
  How does brain region size and neuronal investment compare in ecologically diverse snakes?  
  Jenna Crowe-Riddell, Natasha Stepanova, Ramon Nagesan, Brianna Miins, Taylor West, Mike Lee, Kate Sanders, Alison Davis Rabosky; La Trobe University, University of Michigan, Museum of Zoology, EEB, Flinders University, University of Adelaide, La Trobe University

---

8:00 AM – 9:30 AM  
Session 49  
M6-M7

**Tissues: Mechanics, Molecules, and Microscopy**  
*Chair: Donald Davesne*

- **8:00 am**  
  **49-1**  
  Bone microstructure across ocean depth in teleost fishes  
  Donald Davesne, Léo Botton-Diré, Vincent Fernandez, El Amson; Museum für Naturkunde, Humboldt-Universität zu Berlin, European Synchrotron Radiation Facility, Museum für Naturkunde Stuttgart

- **8:15 am**  
  **49-2**  
  Molecular markers of bone marrow tissues in modern and ancient samples  
  Luke Brosnan, Kliti Grice, Amy Elson, Sifra Bijl, Stephen Poropat, Auraya Manaprasertsak, Emma Hammarlund, William Rickard, Lorenz Schwark, Sophie Sanchez; Western Australian Organic and Isotope Geochemistry Centre, Curtin University, Uppsala University, Lund University, Christian-Albrechts-University of Kiel

- **8:30 am**  
  **49-3**  
  Mechanical Behavior of Sea Turtle Shells throughout Ontogeny  
  Ivana Serra, Jeanette Wyneken; Florida Atlantic University

- **8:45 am**  
  **49-4**  
  Regional mechanical properties of mineralized cartilage from shark vertebrae  
  Marianne Porter, Maria Uribe Mejia, Jamie Knaub, Aubrey Clark, Delaney Frazier; Florida Atlantic University

- **9:00 am**  
  **49-5**  
  Setal morphology of Sphaerodactylus geckos: Microscopic diversity in some of the smallest amniotes  
  Aaron Griffith, Zildjian Brooks, Tony Gamble, Juan Daza; Princeton University, Marquette University, Sam Houston State University

- **9:15 am**  
  **49-6**  
  Relationship between skull roof bone microanatomy and ecological traits in rodents  
  Antonia Kaffler, Ignacio Lazagabaster, El Amson, Johannes Müller; Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Centro Nacional de Investigacion sobre la Evolucion Humana
### Session 50: Development, Genetics, Biomechanics, and Evolution of the Spine in Vertebrates (Part 2)

- **10:00 AM – 11:30 AM**
  - **Auditorium C**

#### Chairs: Maxime Taverne, Roman Khonsari, Christine Böhmer

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>50-1</td>
<td>Break-neck pace: analysing the interplay between integration and evolutionary rate in avian neck evolution</td>
<td>Ryan Marek, Ryan Felice; University College London</td>
</tr>
<tr>
<td>10:15 am</td>
<td>50-2</td>
<td>Functional regionalization of the backbone along the land-to-water transition in mammals</td>
<td>Amandine Gillet, Katrina Jones, Stephanie Pierce; Museum of Comparative Zoology, Harvard University, University of Manchester</td>
</tr>
<tr>
<td>10:30 am</td>
<td>50-3</td>
<td>Morphological indicators of hunting behaviour in the carnivoran axial skeleton</td>
<td>Julia Schwab, Botja Figueyroa, Katrina Jones; University of Manchester, University of Malaga</td>
</tr>
<tr>
<td>10:45 am</td>
<td>50-4</td>
<td>Evolution of intervertebral joint function in Crocodylomorpha assessed via automated digital methods</td>
<td>Charles Bates, Katrina Jones, John Hutchinson; University of Manchester, Royal Veterinary College</td>
</tr>
</tbody>
</table>

### Session 51: Special Session in Honor of Walter J. Bock

- **10:00 AM – 11:30 AM**
  - **M6-M7**

#### Chairs: Dominique Homberger

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>51-1</td>
<td>Walter J. Bock 1933-2022: Evolutionary Biologist, Functional Morphologist, and Science Organizer</td>
<td>Dominique Homberger; Louisiana State University, Baton Rouge</td>
</tr>
<tr>
<td>10:30 am</td>
<td>51-2</td>
<td>Testable Narratives of Evolution: Walter J. Bock’s Account of Historical Explanation in Biology</td>
<td>Bradley Wood; University of Montana Western</td>
</tr>
</tbody>
</table>

### Session 52: Visceral Organs: Form and Function

- **10:00 AM – 11:30 AM**
  - **M2-M3**

#### Chairs: Patricia Brennan

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am</td>
<td>52-1</td>
<td>Reproductive impacts of differential extensibility of cloacal and vaginal wall tissues in the American alligator</td>
<td>Diane Kelly, Brandon Moore, Patricia Brennan; University of Massachusetts, Stephens College, Mount Holyoke College</td>
</tr>
<tr>
<td>10:15 am</td>
<td>52-2</td>
<td>How does the pancreas of lizards develop? Lessons from the brown anole Anolis sagrei (Squamata: Iguania)</td>
<td>Magdalena Kowalska, Paweł Kaczmarek, Weronika Rupik; University of Silesia in Katowice, Institute of Biology, Biotechnology and Environmental Protection</td>
</tr>
<tr>
<td>10:30 am</td>
<td>52-3</td>
<td>Female Reproductive Organ Anatomy and CRISPR Gene Editing in the Brown Anole</td>
<td>Bonnie Kircher, Richard Behringer; University of Texas MD Anderson Cancer Center</td>
</tr>
<tr>
<td>10:45 am</td>
<td>52-4</td>
<td>Intra-horn insemination in the alpaca: Copulatory wounding and deep sperm deposition</td>
<td>Patricia Brennan, Stephen Purdy, Sarah Bacon, Mount Holyoke College, Nunoa Project</td>
</tr>
<tr>
<td>11:00 am</td>
<td>52-5</td>
<td>Shape differences in the hemipenes of rattlesnakes in a hybrid zone</td>
<td>Rachel Keeffe, Dylan Maag, Brandon Hedrick, Rulon Clark, Patricia Brennan; Mount Holyoke College, San Diego State University, Cornell University</td>
</tr>
</tbody>
</table>

### Session 53: Morphological Methods and Databases

- **1:30 PM – 4:00 PM**
  - **M6-M7**

#### Chairs: Rui Diogo

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>53-1</td>
<td>The Visible Ape Project: A free, comprehensive, web-based anatomical atlas to raise public awareness about apes and conservation</td>
<td>Rui Diogo; Howard University</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>53-2</td>
<td>The openVertebrate (oVert) Project: successes and shortcomings from the past six years</td>
<td>David Blackburn, Jaimi Gray, Doug Boyer, Julie Winchester, Edward Stanley; University of Florida, Florida Museum of Natural History, Duke University</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>53-3</td>
<td>No scalpel required: using diffusible iodine-based contrast-enhanced Computed Tomography for high-throughput imaging of the anatomy of natural history specimens in 3D</td>
<td>Jaimi Gray, Edward Stanley, Coleman Sheehy, Zachary Randall, Laura Rincón Rodriguez, David Blackburn; Florida Museum of Natural History, University of Florida</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>53-4</td>
<td>Finite element model validation in biomechanics using a 3D scanning Laser Doppler Vibrometer</td>
<td>Ananth Srinivas-Nurani, Arend von der Lieth, Jen Bright, Emily Rayfield, David Goldsby, Lauren Sallan; University of Pennsylvania, Polytec Inc., University of Hull, University of Bristol, Okinawa Institute of Science and Technology</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>53-5</td>
<td>Nothing to yawn about: comparing multiple measures of primate gape</td>
<td>Rachel Smith, Hanna Barrett, Justice Skinner, Elizabeth Wichlard, Adam Hartstone-Rose; North Carolina State University</td>
</tr>
</tbody>
</table>
TUESDAY, 1 AUGUST 2023

1:30 PM – 4:00 PM  
**Session 54**  

**Taking a Breath: The Mechanics and Evolution of Tetrapod Ventilation**  
*Chairs: Robert Brocklehurst, Katrina Jones*

1:30 pm 54-1  
**Evolution of lung ventilation in tetrapods**  
Elizabeth Brainerd; Brown University

2:00 pm 54-2  
**Origin and evolution of lung and gas bladder ventilation in air-breathing fish**  
Elska Kaczmarek; Brown University

2:15 pm 54-3  
**Rib kinematics in lizards provide insight into the evolution of ventilation and locomotion**  
Robert Cieri; University of British Columbia

2:30 pm 54-4  
**The subpectoral diverticulum in Buteo: not just another air sac**  
Emma Schachner, Brandon Hedrick, Andrew Moore, Aracely Martinez, Paul Diaz, Jr., Scott Echols, Karl Bates; University of Florida, University of Colorado, University of California, Riverside, The University of Tokyo, RIKEN Center for Biosystems Dynamics Research

2:45 pm 54-5  
**Breathing inside a box & how it constrains movement**  
Jonathan Codd; University of Manchester

3:00 pm 54-6  
**Thoracic cage morphology coadapts with aerobic capacity in artificially selected High Runner mice**  
Katrina Jones, Elizabeth Webb, Nicole Schwartz, Theodore Garland; University of Manchester, University of California, Riverside

3:15 pm 54-7  
**The key innovation of the mammalian respiratory system**  
Tatsuya Hirasawa, Shigeno Kuratani; The University of Tokyo, RIKEN Center for Biosystems Dynamics Research

1:30 PM – 4:00 PM  
**Session 55**

**The Land Down Under (Australian Animals)**  
*Chair: Vera Weisbecker*

1:30 pm 55-1  
**Genus at Work: Cranial shape diversity in a recent radiation of marsupial herbivores**  
Rex Mitchell, Sally Potter, Mark Eldridge, Vera Weisbecker; Flinders University, Macquarie University, Australian Museum

1:45 pm 55-2  
**Shapes and traits that don't match: the thylacine as a mammalian evolutionary curiosity**  
Vera Weisbecker, Andrew Pask, Axel Newton, Douglass Rovinsky; Flinders University, The University of Melbourne

2:00 pm 55-3  
**Morphological and ecological correlates of inner ear labyrinth in limb-reduced Australian skinks (Scincidae: Sphenomorphinae)**  
Marco Camaiti, James Wiles, Rocío Aguilar, Mark Hutchinson, Christy Hipsey, David Chapple, Alastair Evans; Monash University, Museums Victoria, South Australian Museum, University of Copenhagen

2:15 pm 55-4  
**Locomotor joint moments in Varanid lizards and the scaling of locomotion in sprawling tetrapods**  
Christofer Clemente, Robert Cieri, Taylor Dick, Peter Bishop, John Hutchinson; University of the Sunshine Coast, University of British Columbia, University of Queensland, Harvard University, Royal Veterinary College

2:30 pm 55-5  
**A new diminutive durophagous Miocene dasyuromorphian (Marsupialia, Malleodectidae) from the Riversleigh World Heritage Area, northern Australia**  
Timothy Churchill, Michael Archer, Suzanne Hand, Troy Myers, Anna Gillespie, Robin Beck; University of New South Wales, University of Salford

2:45 pm 55-6  
**Three new late Oligocene thylacinids (Marsupialia: Thylacinidae) from the Riversleigh World Heritage Area**  
Timothy Churchill, Michael Archer, Suzanne Hand; University of New South Wales

3:00 pm 55-7  
**Assessing the cassowary casque as a visual display ornament via geometric morphometric shape analysis**  
Todd Green, David Kay, Michael Granatosky, Akinobu Watanabe, Paul Gignac; New York Institute of Technology, Oklahoma State University, University of Arizona

T2023 33  
Preliminary Program
The 13th International Congress of Vertebrate Morphology Meeting

3:15 pm  55-8  Morphological and ecological shifts in Australian reptile community assemblies over time, using fossil records
            Jessica Fenker, Rocio Aguilar, Till Ramm, Jane Melville; Museums Victoria, Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science

3:30 pm  55-9  Utilising Geometric Morphometrics to identify snake and varanid fossils to answer macroevolutional Geometric Morphometrics to identify snake and varanid fossils to answer macroevolutional questions
            Ammrehn , Rocio Aguilar, Scott Hocknull, Emma Sherratt, Alistair Evans, Jane Melville, Monash University, Melbourne Museum, Museums Victoria, Queensland Museum, The University of Adelaide

3:45 pm  55-10  Impacts of Quaternary climate change on shaping past reptile and frog species and communities along eastern Australian.
            Juan Pedro Valbuena Fernandez, Rocio Aguilar, Jane Melville; Museums Victoria, Monash University

4:00 PM – 5:00 PM  P4  Auditorium A/B/D

P4-1  Investigating the relationship between neck length and vertebral morphology at the cervicothoracic transition in ungulates
            Lena Golombiewski, Destina Ocak, Marilena Müller, Luisa Merten, John Nijakatura, Christine Böhmer, Christian-Albrechts-Universität zu Kiel, Humboldt-Universität zu Berlin

P4-10  Assessing Morphological Variation in the Avian Quadrate Through 3D Geometric Morphometrics
            Philip Morris, Sebastián Alvarez de Araya, Alec Baines, Israel Molina, Kaleb Smallwood, Ryan Carney; University of Birmingham, University of South Florida, The George Washington University

P4-11  Parallel evolution of trabecular bone and bone marrow haematopoiesis
            Sophie Sanchez, Jordi Estefa, Luke Brosnan, Paul Tafforeau, Sifra Bjil, Emma Hammarlund, Alec Clement, Jozef Klembara, Grzegorz Niedzwiedzki, Camille Berruyer, Stephen Forcups, William Rickard, Auraya Manaprasertsak, Kitti Groen, Uppsala University, Western Australian Organic and Isotope Geochemistry Centre, Curtin University, Australia, European Synchrotron Radiation Facility, Lund University, Flinders University, Comenius University in Bratislava

P4-12  The Olfactory Anatomy of the Archaic Oligocene Odontocete, Archaeodelphis
            Stephen Godfrey; Calvert Marine Museum

P4-13  Developmental morphology of squamate lungs, with special reference to the bizarre lungs of chameleons
            Aaron Griffing, Michael Palmer, Tony Gamble, Natasha Shyklo, Paul Trainor, Celeste Nelson, Princeton University, Marine Biological Laboratory, Marquette University, Stowers Institute for Medical Research

P4-14  Structural specialization of nuchal ligament in American bison and gaur
            Megu GUNJI; Toyo University

P4-15  Australian herpetological biodiversity under the spotlight of CT scanning using paleontological collections from the Quaternary period
            Rocio Aguilar, Jane Melville, Scott Hocknull, Jay Black; Museums Victoria, Queensland Museum, University of Melbourne

P4-16  First description of the air-breathing behaviors of Australian lungfish (Neoceratodus forsteri)
            Elska Kaczmarek, Samantha Gartner, Elizabeth Brainard; Brown University, University of Chicago

P4-17  Digitized endocasts and brains: measurements and analyses of the evolution of 172 fossil and extant vertebrate specimens
            Harry Jerison, Catherine Early, Andrew Farke, Ashley Morhardt; University of California, Los Angeles, Science Museum of Minnesota, Raymond M. Alf Museum of Paleontology, Washington University

P4-18  Body-support-dependency of the torsional stiffness in the forearm of Asian black bear (Ursus thibetanus)
            Akira Fukuhara, Hayato Amaike, Megu GUNJI, Yoichi Masuda, Kenjiro Tadakuma, Akio Ishiguro; Tohoku University, Toyo University, Osaka University

P4-19  In-vitro experiment using alligator teeth to test the relationship between diets, frequency of food contact, and dental microwear texture
            Kodai Usami, Daniela E. Winkler, Tai Kubo, Mungo Kuba; The University of Tokyo, Kiel University, Zoological Institute, Okinawa Institute of Science and Technology

P4-20  A physical model for reproducing the passive dynamics of limbs in walking and running horses
            Tatsuya Yoshida, Kazuhiro Miyashita, Antsune Kobayashi, Yoichi Masuda, Megu Gunji, Akira Fukuhara, Yui Takahashi, Ohmura Hajime, Kenjiro Tadakuma, Masato Ishikawa; Osaka University, Toyo University, Tohoku University, JRA Equine Research Institute

P4-21  The effects of shape and complexity on the performance of mammal teeth
            Alistair Evans; Monash University

P4-22  Quantifying nasal airflow in large carnivores using computational fluid dynamics (CFD)
            Alejandro Pérez-Ramos, Manuel Burgos, Daniel Sanz-Prieto, Francisco Pastor, Baptiste Miotot, Israel Sánchez Lle, Markus Bastr, Boga Figueira; University of Málaga, Universidad Politécnica de Cartagen, Museo Nacional de Ciencias Naturales - Spanish National Research Council, Universidad de Valladolid, ZooParc de Beauval & Beauval Nature, Servicio de Radiodiagnostico del Hospital Clínico Universitario

P4-23  Directional Asymmetry in Limb Bone Shape of the North American River Otter
            Dominik Valdez, Brandon Vera Covarrubias, Leigha Lynch; Midwestern University
P4-5 Skull morphology variability in island Arctic foxes (Vulpes lagopus) are not correlated with ecology or development

Alberto Martín-Serra, Olga Nanova, Ceferino Varón-González, Borja Figueirido; Universidad de Málaga, Zoological Museum, M.V Lomonosov Moscow State University, Muséum National d'Histoire Naturelle

P4-6 Anomaluromorph rodents: evolution through masticatory muscle anatomy

Léa Da Cunha, Pierre-Henri Fabre, Lionel Hautier; Institut des Sciences de l'Évolution de Montpellier, Université de Montpellier

P4-7 Comparative anatomy of pelvic girdles in climbing fish

Takashi Maie; University of Lynchburg

P4-8 A strepsirrhine primate from the late Oligocene Nsungwe Formation, southwestern Tanzania

Nancy Stevens, Patrick O'Connor, Eric Roberts, Theresa Orr, Cassy Mtelela; Ohio University, James Cook University, University of Dar es Salaam

P4-9 Insights into the brain-braincase relationship across the Sarcopterygii, Lissamphibia and Lepidosauria

Corinne Mensforth, Marc Jones, Lívia Miron, John Long, Alice Clement; Flinders University, Natural History Museum London

5:00 PM – 6:00 PM  Plenary 5  Auditorium C

5:00 pm  Life and movement: The unbreakable bond  Virginia Abdala; Universidad Nacional de Tucumán, IBN CONICET-UNT