

23rd conference of the EAVP

– European Association of Vertebrate Palaeontologists

Vilnius, 29th June – 5th July 2026

Book of abstracts



23rd conference of the European Association of Vertebrate Palaeontologists

Vilnius, Lithuania
June 29th - July 5th

Organised by

Nature Research Center (NRC), Vilnius, Lithuania

Co-funders and sponsors

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Welcome!

Dear Friends and Colleagues,

On behalf of the Organising Committee, it is our great pleasure to welcome you to the **23rd Annual Meeting of the European Association of Vertebrate Palaeontologists (EAVP)** in Vilnius.

From 29 June to 5 July 2026, researchers, students, and enthusiasts from across Europe and beyond will gather to share the latest discoveries, ideas, and advances in vertebrate palaeontology. EAVP has long served as an important meeting place for scientific exchange, collaboration, and the development of new research partnerships, and we are delighted to host this year's meeting in Lithuania.

Vilnius, renowned for its rich history, diverse cultural heritage, and welcoming atmosphere, provides an inspiring setting for scientific discussion and networking. We hope that alongside an engaging scientific programme, participants will have the opportunity to explore the city's unique character and enjoy the hospitality of our region.

This abstract volume reflects the breadth and diversity of contemporary vertebrate palaeontological research, showcasing contributions from established researchers and early-career scientists alike. We thank all authors, reviewers, session organisers, sponsors, and volunteers whose efforts have made this meeting possible.

We wish you a productive conference, engaging discussions, and an enjoyable stay in Vilnius.



Welcome to EAVP 2026!

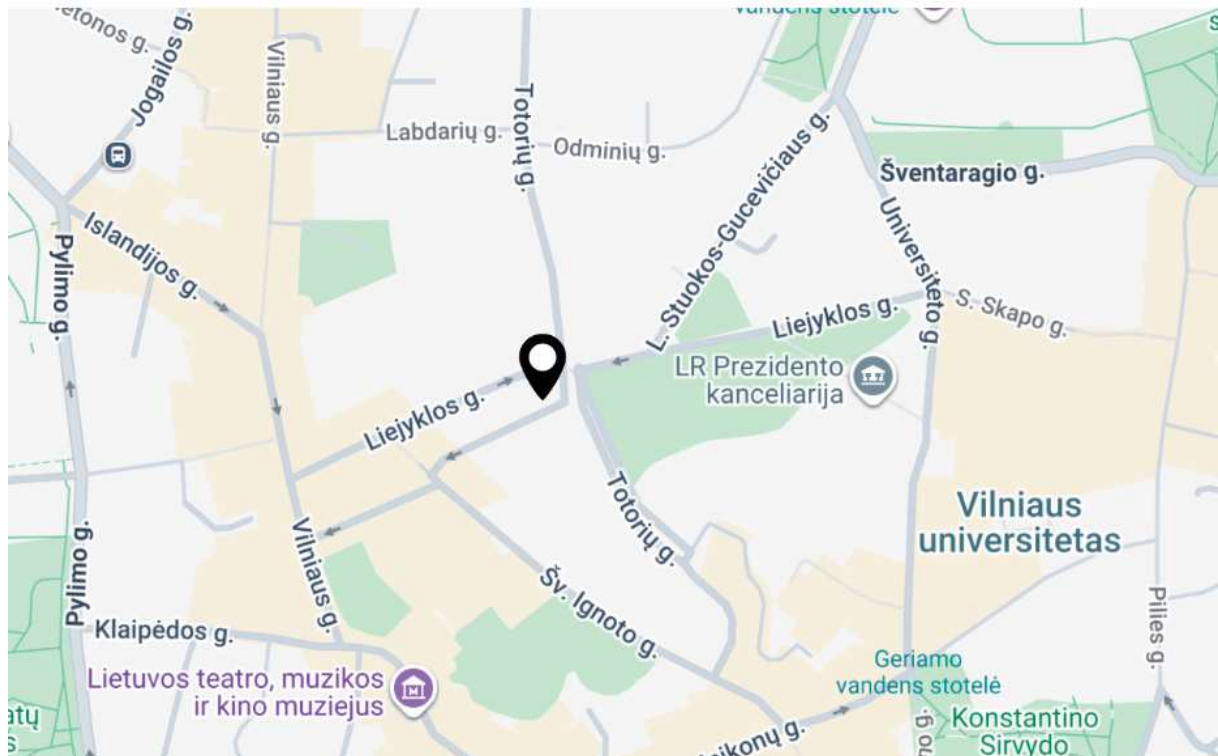
The Organising Committee

Information for attendees

VENUE

The main conference venue for the scientific program, posters, palaeoart, and workshops will be the “**Artis Centrum Hotels**”, located in the centre of **Vilnius**.

Totorių st. 23, 01120 Vilnius



WEATHER IN VILNIUS (JUNE–JULY)

Late June to early July is one of the most pleasant periods to visit Vilnius. The city experiences mild to warm summer weather, with:

- Average daytime temperatures: 20–25°C
- Cooler evenings: 12–15°C, so a light jacket is useful
- Sunlight: Long daylight hours (up to 17 hours around late June)
- Rain: Occasional light showers or brief summer storms—an umbrella or raincoat can be helpful
- Humidity: Generally comfortable, though it can feel warmer on sunny days

***** Please feel free to contact us on eavp2026@gmail.com with any queries.*****

A word about Philippe Taquet

"Paleontology of dinosaurs and Mesozoic ecosystems"

From the Ténéré sands to the Grande Galerie de l'Évolution – Tribute to Philippe Taquet

The death of Philippe Taquet on November 16, 2025, deeply affected the scientific community. The National Museum of Natural History and the Academy of Sciences lost one of their most loyal servants and the main promoter of the reopening of the Great Hall of Evolution in 1994. Beyond his scientific contribution to the study of dinosaurs and numerous famous paleontological sites such as Gadouafaoua in Niger, the Savannakhet basin in Laos, the High Atlas Mountains in Morocco, and Canjuers in France, Philippe Taquet was always keen to continue his work to protect sites, promote, and disseminate scientific research. He was elected member of the Academy of Sciences in 2004, before becoming its president. The Comptes Rendus Palevol, of which he was Editor-in-Chief, decided to pay tribute to Philippe Taquet by publishing a special issue. Philippe Taquet was interested in dinosaurs in all their aspects, from a scientific, historical, and museological point of view. This special issue will therefore include a series of articles on three topics: Mesozoic dinosaurs, their ecosystems, and the history of science, a discipline dear to Philippe Taquet.



Programme

Monday, 29th June

10:00 - 17:00 **Registration desk open; poster drop-off**

Artis Hotel

10:30 - 13:30 **Workshop: Beyond Your Thesis: Curation and Future Use of Microfossils Collections**

Tosca room, Artis Hotel

10:30 - 13:30 **Workshop: Paleoart Workshop: Linking Research and Art**

Carmen room, Artis Hotel

13:30 - 14:00 **Lunch break**

Free time for lunch in the city

14:00 - 17:00 **Roundtable: Women in Science (organised by EAVP and AWAP - Association for early-career Women Archaeologists and Paleontologists)**

Tosca room, Artis Hotel

14:00 - 17:00 **Workshop: First Steps into Geometric Morphometrics (Transmitting Science)**

Carmen room, Artis Hotel

From 18:30 **Ice-Breaking Party**

Artistai Pub, Šv. Kazimiero St. 3

Tuesday, 30th June

08:00 - 08:30 **Registration desk open**

Artis Hotel

08:30 - 09:00 **Conference opening and welcome words**

Artis Hotel

09:00 - 11:12 **Session 1 – Palaeozoic Vertebrates, Methods & Taphonomy**

Chairs: Sébastien Olive and Valters Alksnitis

Artis Hotel

09:00 - 09:12 What's New in Placoderms? Rethinking Early Jawed Vertebrates

- *Vincent Dupret*

09:12 - 09:24 A Giant Jawed Vertebrate in the Non-Marine Lower Devonian: A New Species of *Tityosteus* (Arthrodire, Placodermi) from Luxembourg

- *Sébastien Olive*

09:24 - 09:36 New Data on *Holoptychius* (Sarcopterygii, Porolepiformes) from the Upper Famennian Ketleri Formation, Latvia

- *Tatjana Visotina*

09:36 - 09:48 Three-Dimensional Reconstruction of the Exoskeleton of the Late Devonian Placoderm Fish *Bothriolepis ciecere*

- *Ervīns Lukševičs*

09:48 - 10:00 Predator Bite Marks on the Fossil Armour Plates of the Late Famennian Antiarch *Bothriolepis ciecere* from Latvia

- *Valters Alksnitis*

10:00 - 10:12 Acanthodian Species Identification Guide Based on Scales from the Pridoli (Silurian) Milaičiai-103 Core

- *Morta Plyčiuraitytė Plyčiūtė*

10:12 - 10:24 Genus-Specific $\delta^{88}\text{Sr}$ Signatures in the Late Devonian Conodonts from

Poland

- *Przemysław Świś*

10:24 - 10:36 Isotopes and Teeth: $\delta^{18}\text{O}$ Paints the Picture of the Earliest Land Vertebrate Ecosystems

- *Zivile Zigaite-Moro*

10:36 - 10:48 Asaphostera and the Origin of Pan-Amniotes

- *David Marjanović*

10:48 - 11:00 Pyritised Intestines: Digestive Taphonomy and Palaeoecology in a Seymouriamorph (Early Permian, France)

- *Arnaud Rebillard*

11:00 - 11:12 The Death of an Ocean: The Impact of the Zechstein Salt Giant Formation over Marine Biota

- *Geanina Butiseaca*

11:12 - 11:30 **Coffee break; posters on display**

Artis Hotel

11:30 - 16:06 **Session 2 – Special Session: Tribute to Philippe Taquet (Part 1)**

Chairs: Michel Laurin and Michael Pittman

Artis Hotel

11:30 - 11:42 Dating the Early Pipid Evolutionary Radiation

- *Michel Laurin*

11:42 - 11:54 Late Cretaceous Actinopterygian Fish Assemblages from the Maastrichtian Type Area (Netherlands–Belgium)

- *John W.M. Jagt*

11:54 - 12:06 "Not from a Billfish": Rostral, Histological and Neurovascular Blueprint for Xiphoid-Like Bodyplans in a New Upper Cretaceous Teleost Fish

- *Giovanni Serafini*

12:06 - 12:18 A New Archosauriform from the Middle Triassic of Poland with Unique Dermal Armour

- *Łukasz Czepiński*

12:18 - 12:30 Vertebrate Bromalites from the Middle Triassic (Ladinian) Shallow Marine Deposits of Miedary, Southern Poland

- *Anthony Paul Rozario*

12:30 - 12:42 Exceptional Soft Tissue Preservation in Rhynchocephalians from the Kimmeridgian of Wattendorf, Germany

- *Victor Beccari*

12:42 - 12:54 The Stratigraphical Distribution of Simosauridae (Sauropterygia): An Update on the Occurrences of the Clade – ONLINE

- *Alberto Cabezuelo Hernández*

12:54 - 13:06 An Exquisite, Three-Dimensionally Preserved Elasmosaurid from the Lower Cretaceous of Colombia

- *Dirley Cortés*

13:06 - 14:30 **Lunch break**

Free time for lunch in the city

- 14:30 - 14:42 A Lost Morphology – The Underestimated Complexity in Triassic Ichthyosaur Dentition
- *Petter Nordenhaug*
- 14:42 - 14:54 Tracking Archosaurian Brain Evolution Through Early Embryonic Development
- *Lisa Sophia Freisem*
- 14:54 - 15:06 A Small-Bodied Crocodylomorph from the Upper Jurassic of Portugal and Its Implications for Atoposaurid Diversity
- *Eduardo Puértolas Pascual*
- 15:06 - 15:18 Pterosaur Wings, a Complicated Story – ONLINE
- *Natalia Jagielska*
- 15:18 - 15:30 Another Dino Bites the Dust: Feeding Height Partition Among Jurassic Herbivores from Lourinhã – ONLINE
- *André Saleiro*
- 15:30 - 15:42 Near-Complete Patagonian Parankylosaur Uncovers Tail Weapon Distinctiveness and Miniaturisation
- *Michael Pittman*
- 15:42 - 15:54 Sauropod Trackways in the Upper Jurassic–Lower Cretaceous La Puerta Formation, Bolivia
- *Raúl Esperante*
- 15:54 - 16:06 Walking on Gastropods: The First Sauropod Tracks from the Campanian of France (Greasque, Provence)
- *Matteo Belvedere*

16:06 - 16:15 Coffee break

Artis Hotel

16:15 - 16:35 Online flash talks

Artis Hotel

- 16:15 - 16:20 New Data on Tooth Replacement in *Nemegtbaatar gobiensis* (Multituberculata, Mammalia) – ONLINE
- *Paweł Muniak*
- 16:20 - 16:25 Ontogenetic Scaling in the Humerus of *Palaeoloxodon falconeri* from Pleistocene Sicily: A 3D Geometric Morphometric Approach – ONLINE
- *Lawiza Kamran*
- 16:25 - 16:30 Geochemical Variations in Megaloolithid Eggshells During the Late Maastrichtian Along the Iberian Plate – ONLINE
- *Lope Ezquerro Ruiz*
- 16:30 - 16:35 Archaeopalaeontological Record of the Genus *Hystrix* in the Pleistocene of the Iberian Peninsula – ONLINE
- *Hugo Bal García*

16:35 - 17:35 Posters

Artis Hotel

- 1 A Reconstruction of Environmental Conditions Associated with Early Vertebrate Colonization of Land (Lower Devonian, Holy Cross Mountains, Poland)
- *Katarzyna Grygorczyk*

- 2 Peramorphosis on Example of Late Devonian *Dasbergina trigonica* Lineage
- *Przemysław Świś*
- 3 Changing Trees: Historical Shifts in Early Elasmobranch Phylogenetic Placement
- *Manuel Amadori*
- 4 Testing the Suitability of Fossil Holocephalan Teeth as Palaeotemperature Archive
- *Esther Manzanares Ubeda*
- 5 Gogolin Formation: Revisiting the Oldest Record of the Mesozoic Marine Reptile Communities in Central Europe
- *Adam Rytel*
- 6 Histovariability Within Polish Aetosaurs
- *Elżbieta M. Teschner*
- 7 A New Tiny Rhynchocephalian from the Late Triassic of Frick with Potential Bipedal Locomotion
- *Feiko Miedema*
- 8 The Role of Apicobasal Ridges in Gripping Prey: Teeth Mechanics of *Nothosaurus* and Modern Marine Predators
- *Joanna Piwowarczyk*
- 9 Do Phytosaur Occurrence Patterns Support Sexual Dimorphism as an Explanation for Diversity in Skull Shape?
- *Dominik Świątek*
- 10 A Diverse Middle Triassic Vertebrate Tracksite from the South-Central Iberian Peninsula (Albacete, Spain)
- *Javier Mora Fernández*
- 11 Kierszula: A New Upper Triassic Vertebrate-Bearing Locality from Southern Poland
- *Przemysław Świś*
- 12 Exceptional Soft Tissue Preservation in an Upper Jurassic Ophthalmosaurian Ichthyosaur: Preliminary Results
- *Giovanni Serafini*
- 13 The Jurassic Dinosaurs of Peterborough: Mini Morrison in the Clay or Tiny Tendaguru in the Mud?
- *Femke Holwerda*
- 14 Interdisciplinary Insights into Mid-Jurassic Terrestrial and Coastal Ecosystems in Lithuania
- *Laura Gedminienė*
- 15 Identifying Newly Uncovered Stegosaurid Material from Western Portugal
- *Verena M. Buschhaus*
- 16 Redescription of *Archaeornithoides deinosauriscus*, an Enigmatic Theropod from the Upper Cretaceous of Mongolia
- *Filip Pozauć*

18:00 - 20:30 **City Tour (3 groups)**

Departure from Artis Hotel

Wednesday, 1st July08:30 - 11:00 **Session 2 – Special Session: Tribute to Philippe Taquet (Part 2)**

Chairs: Michel Laurin and Michael Pittman

Artis Hotel

- 08:30 - 08:42 The Overprinting Index (OI): A Novel Approach to Understand Sauropod Manus Morphology
- *Vincenzo Gesualdi*
- 08:42 - 08:54 The Rostral Neurovascular System of Titanosaurs: Paleobiological Implications and Soft Tissues Reconstruction
- *Giacomo Gobbo*
- 08:54 - 09:06 Digging Sauropods? Barking Up the Wrong Tree: An Example from the Late Cretaceous Potosi Basin (Bolivia)
- *Christian A. Meyer*
- 09:06 - 09:18 A New Diminutive Neosauropod from the Jurassic of India: Systematics and Histology
- *Abhishek Natarajan*
- 09:18 - 09:30 Small Coelurosaurian Theropod Diversity from the Upper Cretaceous of Transylvania Based on Isolated Teeth
- *Manuel Pérez Pueyo*
- 09:30 - 09:42 Wing Muscle Attachment in Early Paravians and Their Implication for Early Flight Strokes – ONLINE
- *FAN Yui Chi*
- 09:42 - 09:54 Formation and Paleoecology of a High-Density Avian-Dominated Track Assemblage at the Carreras Pampa Tracksite (Torotoro, Bolivia)
- *Nelson Llempen*
- 09:54 - 10:06 Revisiting Historical Lagerstätten Specimens: New Insights into the Diversity of Eurysternid Turtles (Thalassochelydia)
- *Gaël E. Spicher*
- 10:06 - 10:12 Gait Variability and Biomechanical Reconstruction in Early Mammaliaforms: Insights from Jurassic Trackways of Patagonia, Argentina
- *Verónica Krapovickas*
- 10:12 - 10:24 Reconstructing Life Histories of Late Cretaceous Eutherians: Traits from Bones and Teeth
- *Lucja Fostowicz-Frelik*
- 10:24 - 10:36 Palaeohistology Helps Unravelling a High Taxonomic Diversity in an Early Cretaceous Fissure Filling from Germany
- *Alina Buschhaus*
- 10:36 - 10:48 A Tale of Two Rivers: Contrasting Palaeontological and Taphonomical Features at Sebeş-Glod (Transylvanian Basin, Romania) – ONLINE
- *Gábor-Mátyás Vremir*
- 10:48 - 11:00 Plant Diversity and Dependency Drove Ecosystem Dynamics Prior to the Cretaceous–Palaeogene Extinction – ONLINE
- *Cassius Morrison*

11:00 - 11:15 **Coffee break; posters on display***Artis Hotel*

11:15 - 12:15 Session 3 – Mesozoic Vertebrate Evolution and Functional Morphology

Chairs: Esther Manzanares Ubeda and Victor Beccari

Artis Hotel

11:15 - 11:27 Assessing the Neck Mobility of *Tanystropheus* Through Biomechanical Analyses

- *Adam Rytel*

11:27 - 11:39 Exploring the Skull of *Eoabelisaurus mefi* (Early Jurassic, Argentina): Osteological Description and Novel Insights into Cranial Anatomy of Early Ceratosaurs

- *Elena Cuesta Fidalgo*

11:39 - 11:51 Like Father, Like Son: The Body Dimensions of Subadult *Tarbosaurus bataar*

- *Justyna Słowiak*

11:51 - 12:03 Dietary Reconstruction of *Nemegtosaurus mongoliensis*: Implications for Its Convergence with Diplodocoidea

- *Marceli Witasik*

12:03 - 12:15 He's Not All There: Suspension-Feeding in the Niobrara Seaway and the Not-Always-Ossified Fish That Did It

- *Anthony Maltese***12:15 - 13:35 Lunch break***Free time for lunch in the city***13:35 - 15:59 Session 4 – Cenozoic Vertebrate Evolution and Palaeoecology (Part 1)**

Chairs: Geanina-Adriana Butiseaca and Georgios Georgalis

Artis Hotel

13:35 - 13:47 Rescue Palaeontology and a New Ursid-Bearing Karst Cave from Northern Apennines (Lucca, Italy) – ONLINE

- *Luca Pandolfi*

13:47 - 13:59 The Vertebrate Palaeontological Collection and Exhibitions of the G.A.M.P.S. (Florence Province, Italy) – ONLINE

- *Luca Bonfigli*

13:59 - 14:11 The Lagerstätte of Chiavon (Vicenza, N Italy): A Forgotten Tropical Ichthyofauna of the Veneto Region

- *Pietro Calzoni*

14:11 - 14:23 New Data on the Villafranchian Vertebrate Fauna of Kos Island (Dodecanese, Greece) from a Historical Collection – ONLINE

- *Antonios Isidoros Avrithis*

14:23 - 14:35 New Specimen and CT Scan Data of a Fossil Gavialoid from the Ypresian of the Isle of Sheppey, UK

- *Sophie Boerman*

14:35 - 14:47 Hidden Diversity Uncovered: MicroCT Reveals New Pliocene Salamandrids from the Camp dels Ninots Konservat-Lagerstätte (Spain)

- *Roy Minden Farman*

14:47 - 14:59 Squamate Assemblage from the Late Miocene of Grytsiv (Ukraine) and Its Implications for Paratethyan Biogeography

- *Yohan Pochat-Cottilloux*

- 14:59 - 15:11 Cranial Osteology and Ontogenetic Assessment of a Partially Articulated Sub-Adult *Malpolon sp.* (Serpentes: Psammophiidae) from the Early Pleistocene of Quibas – ONLINE
- *Adrià Navarro Rodríguez*
- 15:11 - 15:23 Convergent Evolution of Vertebral Complex Structures Among Snakes from the Cenozoic of Europe
- *Georgios Georgalis*
- 15:23 - 15:35 Complex Biogeographical Patterns Revealed by New Species of Fossil Snakes from the Oligo-Miocene of South America
- *Andres Felipe Alfonso-Rojas*
- 15:35 - 15:47 Virtual Endocasts of *Hyrachyus modestus* and the Neurosensory Evolution of Early Rhinocerotoida – ONLINE
- *Narcís Pérez Hernández*
- 15:47 - 15:59 Can the Otic Region Resolve Intrafamilial Relationships? A Case Study with Camelids – ONLINE
- *Selina-Viktor Robson*

15:59- 16:15 Coffee break; posters on display

Artis Hotel

16:15 - 17:00 Posters

Artis Hotel

- 17 Unexpected Complexity of Molariform-Like Dentition in a Cretaceous Lizard *Adamisaurus magnidentatus*
- *Kacper Węgrzyn*
- 18 Porphyrin Confetti Records the Transformation of Haem Iron in Fossil Soft Tissues
- *Dawid Surmik*
- 19 Dusk of the Plagiosaurids (Plagiosauridae, Temnospondyli) in a Paleoenvironmental Context
- *Jakub Zalewski*
- 20 The COST Action CA23124 SALTAGES: International Collaboration on Salt Giant Earth System Processes
- *Marija Bošnjak*
- 21 Late Cretaceous Theropod Diversity in SW Europe: Evidence from the Dental Record of “Lo Hueco” (Spain)
- *Mirella López Miguel*
- 22 Dating Absolute Time with Fossil Eggshells from the Horcajo Site, Enciso Group (Lower Cretaceous), La Rioja, Spain
- *Jonathan Silvino Cabrera Hernández*
- 23 Inner Ear Morphology and Auditory Sensitivity in the Pachycephalosauria
- *Wiktoria Wieliczko*
- 24 New Insights into Protostegid (Pan-Chelonioidea) Evolution from Upper Cenomanian of NE Italy
- *Riccardo Guerra*
- 25 Dinosaur Tail Traces at the T’ankar Pampa Tracksite (Maastrichtian, Torotoro, Bolivia) Reveal Unusual Locomotion Behavior
- *Raúl Esperante*

- 26 First Occurrence of Brasilichnium Trackways in the Lower Cretaceous of Bolivia
- *Raúl Esperante*
- 27 A Herd of Basal Ornithopod Dinosaurs from the Barremian–Aptian Site of Vajete (Burgos, N Spain)
- *Javier Rubio Nieto*
- 28 Fossil Vertebrate Collections Housed at the Croatian Natural History Museum
- *Marija Bošnjak*
- 29 EvoGuesser: A Proposal for Fun and Taxonomic Dissemination of Extinct Animals
- *Javier Mora Fernández*
- 30 Pliocene Insectivores (Eulipotyphla) from the Moreda Karstic Site (Southern Iberian Peninsula)
- *Raef Minwer-Barakat Requena*
- 31 Evolutionary Trends of Brain Size in Primates and Their Kin
- *Adam Lis*
- 32 Machine-Learning Reconstruction of Mediterranean Eocene Palaeoclimates: Implications for Primate Evolution
- *Ambra Figueroa-Torrejón*
- 33 A Morphometric Approach to Two Enigmatic Primate Distal Phalanges from the Middle Eocene of Sant Jaume de Frontanyà-3C (Iberian Peninsula)
- *Mohamed L. Abdou-Abdou*

17:00 - 18:15 **EAVP Annual General Meeting**

Artis Hotel

From 19:30 **Charity Auction**

Šnekutis Bar, Šv. Mikalojaus St. 15 (basement)

Thursday, 2nd July

08:30 - 11:00 **Session 4 – Cenozoic Vertebrate Evolution and Palaeoecology (Part 2)**

Chairs: John Jagt and Ervīns Lukševičs

Artis Hotel

- 08:30 - 08:42 Tooth Morphology Reveals Contrasting Evolutionary Histories of Leporids and Ochotonids (Lagomorpha)
- *Álvaro Quesada*
- 08:42 - 08:54 Comparative Mastication Analysis of Paleogene Hyracoid Dentitions Reveals Strong Diet-Independent Functional Trends
- *Marius Frederic Losco*
- 08:54 - 09:06 A European Bear-Dog in Oregon & the Timing of Giant Amphicyonid Migration
- *John Orcutt*
- 09:06 - 09:12 CT-Based Cranial Evolution in Mediterranean Hippopotamuses – ONLINE
- *Luca Pandolfi*
- 09:12 - 09:24 Pleistocene Hippopotamidae Diversity in Europe: Untangling an Evolutionary Story Through a Multiproxy Approach – ONLINE
- *Roberta Martino*
- 09:24 - 09:36 The Dwarf *Hippopotamus creutzburgi* from the Pleistocene of Crete: Craniodental Morphology, Sexual Dimorphism, and Digital

Reconstruction – ONLINE

- *Nikolaos Gerakakis*

09:36 - 09:48 Dental Microwear Analysis Reveals Trophic Niche Partitioning Among Plio-Pleistocene Proboscideans from the Apennine Peninsula – ONLINE

- *Federica Mulè*

09:48 - 10:00 Still in the Shadow of the Dinosaurs: Evidence for Avian Predation Driving Nocturnality in Small Mammals

- *Simona Bekeraite*

10:00 - 10:12 Timescales of Large Mammal Macroevolution

- *Andrej Spiridonov*

10:12 - 10:24 Deep-Time Paleoenvironments in Eastern Africa: Ecometric Analysis of a 30-Million-Year Record of Large Mammal Herbivores from the Turkana Basin

- *Jeremias Glögger*

10:24 - 10:36 Reconstructing Miocene Climate Change in the Siwalik Using Herbivore Community Dental Traits

- *Sania Zubaid*

10:36 - 10:48 Experimental and Actualistic Bone Weathering: Insights from a Mediterranean Ecosystem (Doñana National Park, Spain) ONLINE

- *Marcos Pizarro Monzó*

10:48 - 11:00 Taphonomic Evidence for the Southernmost Pleistocene Hyena Denning and Cannibalism in Asia: Yai Ruak Cave, Peninsular Thailand – ONLINE

- *Holly Anderson*

11:00 - 11:15 **Coffee break; posters on display**

Artis Hotel

11:15 - 11:51 **Session 5 – FossilLegal 2026**

Chair: Jeff Liston

Artis Hotel

11:15 - 11:27 FossilLegal: Ten Years On

- *Jeff Liston*

11:27 - 11:39 From Colonial Legacy to Global Integration: How War Transformed Ukrainian Vertebrate Palaeontology – ONLINE

- *Oleksandr Kovalchuk (Baranov)*

11:39 - 11:51 Challenges and Chances in Colonial Vertebrate Palaeontology Collections

- *Verónica Díez Díaz*

11:51 - 13:03 **Session 6 – Collections, Methods and Innovation (Part 1)**

Chairs: Elzbieta Teschner and Matteo Belvedere

Artis Hotel

11:51 - 12:03 An Archosauromorpha Stratigraphic Database and Its Applications

- *Tom Forêt*

12:03 - 12:15 Problems of Track-Trackmaker Correlation in Phylogenetic Approaches to Trackway Data

- *Michael Buchwitz*

12:15 - 12:27 Visualizing and Quantifying Bioapatite Preservation in Dental Fossils of Vertebrates

- *Zivile Žigaitė-Moro*

12:27 - 12:39 The Shapes of Shark Teeth: From Morphometrics to AI

- *Erin Walker*

12:39 - 12:51 Quantifying Shape Variation in Fossil and Extant Squaliform Sharks Using Elastic Shape Analysis

- *Kim J. Stroben*

12:51 - 13:03 Dietary Reconstruction and Disparity Through Time of South American Fossil Metatherians Using Dental Topography and Machine Learning Methods

- *Dorien de Vries*

13:03 - 14:30 **Lunch break**

Free time for lunch in the city

14:30 - 15:42 **Session 6 – Collections, Methods and Innovation (Part 2)**

Chairs: Živilė Žigaitė-Moro and Andrej Spiridonov

Artis Hotel

14:30 - 14:42 Microwear and Dental Morphometric Analysis of a Post-LGM

Mammuthus primigenius from Jičín (Czech Republic)

- *Amin Bhija*

14:42 - 14:54 Description of the Intervertebral Cartilage Volume of the Caudal Series in Crocodylians: Implications for Palaeontology and Biomechanics

- *Clemens Zinner*

14:54 - 15:06 Biomechanical Trends in the Thoracolumbar Vertebrae of Nile Crocodile (*Crocodylus niloticus*) Across Early Growth

- *Rémi Lefebvre*

15:06 - 15:18 Biomechanical Limits of Hopping in the Hindlimbs of Giant Extinct Kangaroos

- *Megan E Jones*

15:18 - 15:30 Neurosensory Evolution in Thalattosuchian Crocodylomorphs: Integrating Somatosensory and Visual Adaptations Across Ecological Transitions – ONLINE

- *Ashish Sunilkumar Soni*

15:30 - 15:42 Synchrotron Data Provide New Insights into the Origin of the Bird Respiratory System

- *Richard Butler*

15:42 - 16:00 **Coffee break; posters on display**

Artis Hotel

16:00 - 17:00 **Posters**

Artis Hotel

34 New Ichthyofaunal Remains from the Early Miocene Himalayan Bhubhan Formation of Mizoram, India

- *Anthony Paul Rozario*
- 35 The Ear Region of Dormice: Septal Compass of the Middle Ear Cavity in Extinct and Extant Glirids (Gliridae, Mammalia)
- *Cathrin Pfaff*
- 36 Internal Canine Morphology of *Ouranopithecus macedoniensis* (Primates, Hominoidea)
- *Melania Ioannidou*
- 37 Standing on Sturdy Feet: Metapodial Shape Variation in the Insular Bovid *Myotragus*
- *Niko Balan*
- 38 Under the Sea: The Miocene Marine Mammal Fauna from the Sarmatian Deposits of Dobrudja (Romania and Bulgaria)
- *Bogdan-Alexandru Torcărescu*
- 39 Preliminary Report on a Newly Discovered Shark Tooth Assemblage from the Middle Eocene of Peru (Paracas Formation, Pisco Basin)
- *Samuele Desogus*
- 40 New Insights into the Cranial Anatomy of *Adelphailurus kansensis*, an Enigmatic Late Miocene Machairodontine Felid
- *Narimane Chatar*
- 41 Canid Molar Evolution Shears Through Developmental Constraints
- *Otto Eric Stenberg*
- 42 Cranial Remains of a cf. *Aelurognathus* (Gorgonopsia) from the Ruhuhu Basin, Southern Tanzania
- *Anna Shchutka*
- 43 Late Pleistocene–Early Holocene Herpetofaunal Remains from Stoieni Cave (Mehedinți County, SW Romania): Preliminary Results
- *Stefan Vasile*
- 44 Fossil Collagen as a Qualitative Molecular Archive: Preservation, Diagenetic Masking, and Early Anthropogenic Signatures in Pleistocene Animal Remains
- *Alicja Staniek*
- 45 Preliminary Biostratigraphic Results from the “Cruzeiro do Oeste Paleontological Site” (Caiuá Group, Bauru Basin, Brazil)
- *Renan Martins*
- 46 Deciphering the Molecular Palimpsest: From Individual Spectra to Data Science and Machine Learning
- *Dawid Surmik*
- 47 New Data on the Axial Osteology of the Upper Cretaceous European Ankylosaurs
- *Albert Prieto-Marquez*
- 48 On the Anatomy and Diversity of Early Maastrichtian Hadrosaurid Dinosaurs from Ibero-Armorica
- *Albert Prieto-Marquez*
- 49 Cranial Topology of Ornithischian Dinosaurs: A Comparative Anatomical Network Analysis
- *Albert Prieto-Marquez*
- 50 Perissodactyl Mammals from the Upper Eocene of Mallorca (Balearic Islands, W Mediterranean): A Systematic and Taxonomic Reassessment
- *Pau Segurado*

From 19:00 **Conference Dinner**

Bernelių Užėiga, J. Lelevelio St. 6 (corner of Gedimino pr. 19)

Friday, 3rd July

10:30 - 14:30 **Workshop 5: Multivariate Statistics in Environmental and Biogeosciences**

Tosca room, Artis Hotel

10:30 - 12:30 **Workshop 6: Impro-Palaeo – Improvisational Theatre as a Tool for Developing Skills in Communicating Science**

Carmen room, Artis Hotel

12:30 - 13:00 **Lunch break**

Free time for lunch in the city

13:00 - 17:00 **Workshop 7: Quantitative and Hierarchical Methods in Biogeosciences:**

Part 1: The Hierarchical Theory of Evolution

Part 2: Revealing the Hierarchy of Structures in Biota and Geosystems – the HespDiv Approach

Carmen room, Artis Hotel

Saturday, 4th July

Half day **Field trip 2: Vilnius - Mammoth**

Departure from Smėlio St. 14, Vilnius

All day **Field trip 3: North Lithuania (Day 1)**

Departure from S. Daukanto square, Vilnius

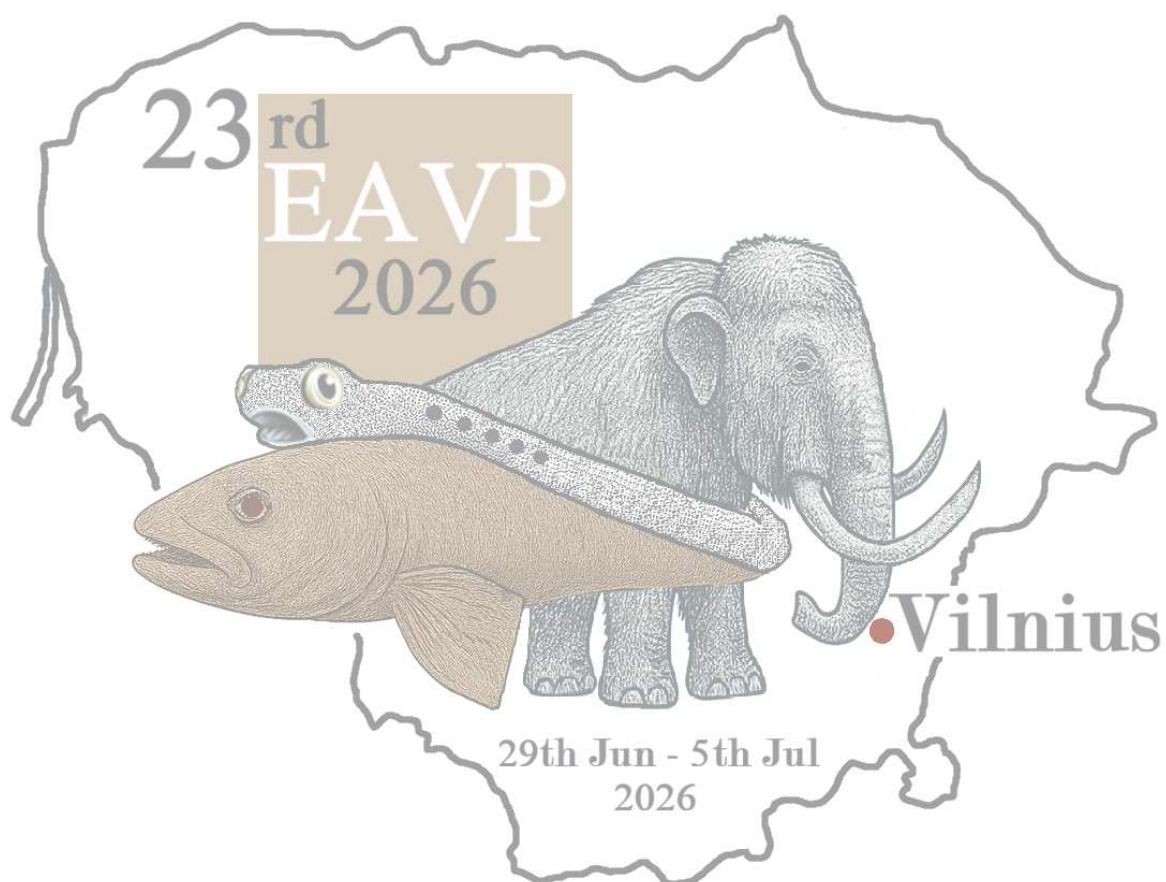
Sunday, 5th July

All day **Field trip 3: North Lithuania (Day 2)**

Departure from Akmenė to Vilnius

Abstracts

Oral presentations



Session 1: VERTEBRATES, METHODS & TAPHONOMY

WHAT'S NEW IN PLACODERMS? RETHINKING EARLY JAWED VERTEBRATESV. Dupret^{1*}

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Keywords: *vertebrates, phylogeny, anatomical innovations, technologies*

Placoderms, often referred to as “armored fishes,” have long been viewed as primitive vertebrates and even as an evolutionary dead end. However, recent discoveries have profoundly challenged this perspective. Exceptionally preserved fossils, combined with advanced imaging techniques such as micro-CT scanning, have led to a major reassessment of their anatomy, diversity, and evolutionary significance.

This presentation provides an overview of current knowledge on placoderms, highlighting key advances from the past decade as well as remaining open questions.

First appearing in the Early Silurian, placoderms became the most diverse vertebrate group of the Devonian. They even survived the major Frasnian–Famennian crisis before going extinct at the end of the period. As the earliest jawed vertebrates (gnathostomes), they fundamentally reshaped aquatic ecosystems. Numerous key innovations are now recognized within the group, including features still present in living jawed vertebrates, such as teeth, internal fertilization, viviparity, craniofacial organization, and possibly parental care.

These insights have been greatly facilitated by new analytical methods that allow the investigation of internal structures without damaging fossils.

Paradoxically, while these discoveries have enriched our understanding, they have also complicated placoderm phylogeny. Their relationships—both within the group and with other major gnathostome lineages (chondrichthyans and osteichthyans)—remain contentious, and their status as a natural group is still debated.

**A GIANT JAWED VERTEBRATE IN THE NON-MARINE LOWER DEVONIAN: A
NEW SPECIES OF *TITYOSTEUS* (ARTHRODIRE, PLACODERMI) IN THE
LOCALITY OF CONSTHUM I (LUXEMBOURG) AND ITS ECOLOGICAL
IMPLICATIONS**

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Keywords: *Devonian, geochemistry, paleoenvironment, placoderm, planktivory*

A new homostiid arthrodire placoderm (*Tityosteus* sp. nov.) from the Lower Emsian Klerf Formation in Luxembourg is presented. It is described based on two large dermal plates. The joint $\delta^{18}\text{O}_p$ - $\delta^{34}\text{S}$ analysis of the bioapatite of this taxon indicate that this species lived in a freshwater environment. This is the oldest occurrence of a freshwater aquatic habitat unequivocally demonstrated by the joint oxygen and sulfur isotope composition ($\delta^{18}\text{O}_p$ and $\delta^{34}\text{S}$) analyses. Because its relatives are all considered as marine forms, it is likely that freshwater environments were invaded by marine homostiid forms. Thus, it is probable that the forms having colonized freshwater environment were euryhaline and could have evolved over time to support permanently freshwater environments. The original length of the animal is estimated at approximately 2.3 m, making this is the oldest known occurrence of a vertebrate of such size in a non-marine environment. As this new species was most likely microphagous (like its closest relatives), it would also represent the oldest known occurrence of microphagy in a large sized vertebrate within a freshwater ecosystem. It demonstrates that as early as the Early Devonian, complex freshwater ecosystems may already have been established, with vertebrates potentially exploring alternative trophic strategies such as megaplanktivory.

Acknowledgements: S. Olive received funding from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement no. 101032456-TNT and from a Belspo FED-tWIN project from the Belgian Federal Government (Prf-2021-009-EAT).

NEW DATA ON *HOLOPTYCHIUS* (SARCOPTERYGII, POROLEPIFORMES) FROM THE UPPER FAMENNIAN KETLERI FORMATION, LATVIAT. Visotina^{1*}¹Department of Geology, Faculty of Science and Technology, University of Latvia, Rainis Blvd 19, Riga LV-1586, Latvia.

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Keywords: *Upper Devonian, Holoptychius, computed tomography, braincase, morphometrics*

The Upper Devonian porolepiform sarcopterygian *Holoptychius* Agassiz, 1839 is a widespread taxon whose taxonomy has long been complicated by overreliance on isolated scales for species diagnosis. Fossil remains assigned to *Holoptychius* from the Upper Famennian Ketleri Formation of Latvia were collected from the Pavāri-1, Pavāri-2 and Ketleri outcrops and include cranial bones, gular plates, cleithra, clavicles, jaw elements and numerous scales. In addition to comparative morphological study, computed tomography of the braincase was carried out. Virtual reconstruction and visualization in Dragonfly provided new data on the endocranial cavity and inferred brain structure of Holoptychiids. Morphometric analysis of taxonomically informative skeletal elements, especially the occipital shield, gulars, cleithra and clavicles, was performed using bone proportions and angular measurements. The resulting dataset was analysed with multivariate statistical methods, including principal component analysis and clustering. The combined evidence demonstrates that the Latvian material differs consistently from valid species of *Holoptychius* in the proportions of the occipital shield and in the shape of gular and pectoral girdle elements. These new data refine the anatomical interpretation and taxonomic position of the Latvian material within Late Devonian porolepiformes.

Acknowledgements: I thank Professor Ervīns Lukševičs for suggesting this research topic and for the computed tomography scanning.

THREE-DIMENSIONAL RECONSTRUCTION OF THE EXOSKELETON OF THE LATE DEVONIAN PLACODERM FISH *BOTHRIOLEPIS CIECERE*

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Keywords: morphology, Famennian, *Antiarcha*, digital imagery, modeling

The external morphology of the armor of the Late Devonian, Late Famennian placoderm fish *Bothriolepis ciecere* from the Ketleri Formation of Latvia is re-examined based on the detailed study of the previously described and the abundant new material, using the three-dimensional (3D) digital imagery such as photogrammetry, 3D surface scanner and Blender 3D modeling software. To create a 3D digital model of the armor, 14 well-preserved, undistorted specimens of *B. ciecere* were used, including an almost complete ventral wall of the trunk armor and an articulated head shield, as well as some disarticulated or partially articulated skeletal elements. A detailed comparison of the *B. ciecere* model with the *B. canadensis* model confirms the conclusions regarding practical immobility of the head shield and submarginal plates, and limited mobility of the pectoral fins. However, the proportions of the armor differ markedly between the two species. The thoracic armor of *B. ciecere* is much more slender than that of *B. canadensis*, with a relatively higher dorsal wall and an almost vertical lateral wall, but the pectoral fins are relatively shorter. A comparison of *B. ciecere* model with reconstructions of the trunk armor of other *Bothriolepis* species (of the approximately 77 valid species, reconstructions are known for at least 16 species) shows that the proportions of the dorsal and lateral walls vary considerably among species, making it a major challenge to reconstruct these walls of the thoracic armor correctly. In contrast, the proportions of the ventral wall are more consistent across reconstructions.

Acknowledgements: This study was partially supported by the project lzp-2024/1-0061 “Late Famennian tetrapods from the equator to the Devonian Antarctic circle: diversification and paleoecology” financed by the Latvian Council of Science. We thank all participants of the excavations of 2019–2025 at the Pavāri-2 fossil site.

**PREDATOR BITE MARKS ON THE FOSSIL ARMOUR PLATES OF THE LATE
FAMENNIAN ANTIARCH *BOTHRIOLEPIS CIECERE* FROM LATVIA**

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Keywords: *Devonian, placoderms, predation, paleoecology*

Fossil material of the Late Devonian antiarch placoderm *Bothriolepis ciecere* (in total 787 specimens, most of them disarticulated) collected during the last six seasons at the Pavāri-2 site and, from the 1970s to 2013, at the Pavāri site in Western Latvia exhibits bite marks. The results of the material analysis show that five distinct types of bite marks most likely caused by sarcopterygian attacks can be distinguished, differing in morphology. A 3D reconstruction of the animal was recently created and allowed to carry out previously unconduted study on the locations of the bite marks on the body of the fish. The results show that, while almost half of the bite marks are located on the dorsal side of the trunk armour, a significant part (approximately 30%) is located on the ventral side, indicating that in most cases the placoderm was bitten in dorso-ventral direction. Most bite marks display signs of healing, suggesting that these are caused by predators rather than scavengers. Bite marks of any kind on the fin bones are rare. Three plates (two of which belonging to the same individual) have bite marks on the lateral walls, indicating an unusual hunting strategy and suggesting that the jaw opening of the predator was at least 13 cm. We present direct evidence of predator-prey interactions in a Late Devonian sarcopterygian-placoderm dominated near shore marine environment. The bite marks indicate that the adult placoderms *Bothriolepis ciecere* at least for some time inhabited the same environment as the large sarcopterygians.

Acknowledgements: This study was funded by the Latvian Council of Science under project lzp-2024/1-0061 and the European Union under Grant Agreement no. 101131765. The author would like to thank the Latvian Museum of Natural History for the access to the material and people who took part in the excavations.

**ACANTHODIAN SPECIES IDENTIFICATION GUIDE BASED ON SCALES AND
PRACTICAL TEST ON ACANTHODIAN MICROFOSSILS FROM PRIDOLI
(SILURIAN) MILAIČIAI-103 CORE**

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Keywords: *acanthodii, Silurian, Pridoli, paleoichthyology, vertebrate*

Silurian (Pridoli) vertebrate microfossils from the Milaičiai-103 (Mil-103) drill core in Lithuania document early jawed vertebrate assemblages within the Baltic Basin. These microfossils were deposited during a period of dynamic palaeoenvironmental change associated with events such as the Šilalė Event. Previous works established initial taxonomic identifications of acanthodian and other vertebrate remains such as conodonts from this section. The aim of this study is to expand these results through continued investigation and the development of a practical identification framework for acanthodian scales, as no formal identification guide for acanthodian scales currently exists. Material is analysed using scanning electron microscopy (SEM) and light microscopy, complemented by schematic drawings of scale morphology. High-resolution sampling at ~0.5 m intervals enables detailed stratigraphic assessment of fossil distribution. Identified taxa include acanthodians such as *Drygantacanthus semiotunda* and *Promesacanthus eppleri*, as well as thelodonts (e.g., *Thelodus laevis*). The stratigraphic ranges of acanthodian species *Drygantacanthus semiotunda*, *Nostolepis digitus*, and *Promesacanthus eppleri* are extended from the Lochkovian (Early Devonian) to the Pridoli - Lochkovian (Late Silurian - Early Devonian). Preliminary results refine previously reported distributions and incorporate additional occurrences from newly analysed material. In addition, a structured acanthodian scale identification guide is being created, supported by schematic drawings to facilitate consistent and reproducible classification. This study contributes to a more detailed understanding of vertebrate microfossil distribution in the Silurian of Lithuania and provides a methodological framework applicable to comparable assemblages.

Acknowledgements: I gratefully acknowledge the invaluable guidance and support provided by my current and former supervisors and advisors, Dr. Darja Dankina, Dr. Andrej Spiridonov, and Dr. Donatas Kaminskas, whose expertise and encouragement have been instrumental throughout this research.

GENUS SPECIFIC $\delta^{88}\text{Sr}$ SIGNATURES IN THE LATE DEVONIAN CONODONTS FROM POLAND

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Keywords: *bioapatite, conodonts, isotope fractionation, trophic ecology, paleoecosystems*

Conodonts represent one of the earliest vertebrate lineages to develop mineralized feeding structures, yet their ecology and trophic roles remain uncertain. In this study, we explore the potential of stable strontium isotopes ($\delta^{88}\text{Sr}$) in conodont apatite to resolve ecological differentiation within Late Devonian communities. We analyzed six conodont genera (*Palmatolepis*, *Bispathodus*, *Branmehla*, *Mehlina*, *Idioprioniodus*, and *Pandorinellina*) from the upper Famennian succession of the Kowala Quarry (Holy Cross Mountains, Poland). Isotopic measurements ($\delta^{88}\text{Sr}$ and $^{87}\text{Sr}/^{86}\text{Sr}$) were obtained via MC-ICP-MS following diagenetic screening (X-ray microdiffraction, ESEM-EDS). Our data reveal statistically significant, genus-dependent differences in $\delta^{88}\text{Sr}$ values that are not explained by stratigraphic trends or diagenetic overprint. Instead, two distinct isotopic clusters emerge: (1) higher $\delta^{88}\text{Sr}$ values - *Palmatolepis*, *Bispathodus*, and *Pandorinellina*; and (2) lower values – in *Branmehla*, *Mehlina*, and *Idioprioniodus*. The 0.1‰ offset is consistent with trophic fractionation documented in other extant vertebrates, suggesting that these taxa occupied different trophic levels.

When integrated with apparatus architecture, the isotopic signal correlates most strongly with P_1 element morphology. Taxa bearing blade-like P_1 elements are associated with lower $\delta^{88}\text{Sr}$ values, indicative of higher trophic positions, whereas platform- and icrion-bearing taxa show comparatively higher values. This pattern supports functional differentiation of feeding strategies linked to element morphology and provides geochemical evidence for trophic partitioning among early vertebrates.

These findings demonstrate that $\delta^{88}\text{Sr}$ in conodont bioapatite could be used as proxy for reconstructing conodont paleoecology and highlight the value of combining geochemical and morphological approaches to investigate the ecological diversification of early vertebrate ecosystems.

Acknowledgements. This research was undertaken within the framework and with the financial support of the International Union of Geological Sciences (IUGS) and the European Community – Next Generation EU, Italian Ministry of University and Research, PRIN–PNRR 2022 Project P2022K9BE8, “OCEANS” granted to MR and AF.

ISOTOPES AND TEETH: $\delta^{18}\text{O}$ PAINTS THE PICTURE OF THE EARLIEST LAND VERTEBRATE ECOSYSTEMS

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Keywords: oxygen isotopes, bioapatite, dental fossils, tetrapods, Devonian.

In this study, we present oxygen isotope compositions of fossil teeth of three different species of Late Devonian tetrapods from Latvia, Pavāri site, South Timan, Sosnogorsk site, and North Timan, Volonga River locality. All the three localities are associated with diverse fish fauna that we have also sampled. High-precision $\delta^{18}\text{O}$ compositions were obtained in-situ, using secondary ion mass-spectrometry, and targeting the enamel exclusively. Enamel is the hardest of vertebrate mineralized tissues, composed of bioapatite that is highly resistant to post-mortem alteration. Similarly, we have analysed $\delta^{18}\text{O}$ in the enamel or enameloid from several contemporaneous fish as a palaeoenvironmental and palaeobiological control.

We found that the $\delta^{18}\text{O}$ signal in all the fishes showed an unambiguous freshwater signal in both Timan sites, even though they had different lifestyles and phylogenetic relationships. Fish from Pavāri site in Latvia displayed a wider variety of $\delta^{18}\text{O}$ values, yet consistent within each taxon, and altogether can be interpreted as ranging from strictly freshwater to brackish environments.

The tetrapod signal was quite different. South and North Timan tetrapods appear to have been euryhaline animals that spent some of the time in freshwater, and some in a more saline environment. Latvian tetrapod teeth yielded consistently higher $\delta^{18}\text{O}$ values, indicating a marine environment. Interestingly, this contrasts with the tetrapod $\delta^{18}\text{O}$ data reported from Greenland, and demonstrates the value of isotope analysis for distinguishing ecological-environmental patterns at taxon level, going beyond the collective association of the entire fossil assemblage with a particular environment of deposition to illuminate the actual lifestyles of these animals.

ASAPHESTERA AND THE ORIGIN OF PAN-AMNIOTES

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Keywords: *Asaphesteria*, “microsaurs”, *Amniota*, *Pan-Amniota*, *Nyctiphruretus*

Asaphesteria platyris is known only from an incomplete skull roof from the earliest Pennsylvanian of Joggins, Nova Scotia, Canada – the same site and age as *Hylonomus* and *Protoclepsydraps*, long considered the oldest known amniotes. After a very brief description in 1934, it was merged with “microsaur” and indeterminate tetrapodomorph material and redescribed in 1963 as the archetype of a “microsaur”. In 2020, the “microsaur” material was redescribed and named *Steenerpeton*, while the real *Asaphesteria* was redescribed as a pan-mammal with a temporal fenestra. In 2025, another redescription cast doubt on the fenestra and declared *Asaphesteria* a nomen dubium, implying it was probably a “microsaur” after all but not testing this hypothesis. A fresh look at the specimen shows that there is no fenestra, but the specimen isdiagnostic. The postparietal is single, triangular, and enters the skull table (shared with procolophonians, especially *Nyctiphruretus*); tabular and supratemporal are therefore both present, unlike in “microsaurs”. The “palpebral”, which would be an exclusive “microsaur” feature, is part of the palatine and vomer in dorsal view, showing part of the choanal margin. The orbits are large, and the temporal region is extremely short (reminiscent of *Nyctiphruretus*). There is a long parietal/postorbital contact. Yet, preliminary phylogenetic analyses place *Asaphesteria* only one node closer to Amniota than to the “microsaurs”, rootward of Diadectomorpha (while *Nyctiphruretus* remains a sauropsid amniote). This could be interesting for placing an animal of small body size at the divergence between amniotes and “microsaurs”, with implications for the origin of the amniotic egg.

**PYRITISED INTESTINES PROVIDE NEW INSIGHTS INTO DIGESTIVE
TAPHONOMY AND PALEOECOLOGY IN A SEYMOURIAMORPH (EARLY
PERMIAN, FRANCE)**

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Keywords: *bromalite, tetrapod, ichnofossil*

Fossilised intestinal remains (cololites) are among the rarest documented digestive remains (bromalites). Cololites are preserved within the body cavity, posteriorly to the stomach. They can replicate the morphology of the gastrointestinal tract, offering crucial information regarding the anatomy, trophic interactions and palaeoecology of extinct taxa. Here, we present a complete analysis of two cololites discovered in a single seymouriamorph *Discosauriscus* sp. from the early Permian Franchesse Lagerstätte (France). Synchrotron X-ray microtomography (SRμCT) enables a detailed visualisation of these intestinal segments and other gastrointestinal faunal remains such as small tubular teeth. They are attributable to aeduellid fish and reveal a new direct evidence of feeding in *Discosauriscus* sp. Moreover micro X-ray fluorescence (μXRF) analyses indicate high amounts of iron, sulphur, arsenic and zinc in the cololites, consistent with a pyrite-type mineralisation under reducing conditions. This was likely favoured by the inner-carcass anoxic environment created by decaying processes, leading to authigenic replacement of the intestines. This denotes of spatially limited geochemical environments within the surrounding *Discosauriscus* sp. carcass enriched in calcium, phosphorus and yttrium, and the surrounding claystone, mainly containing iron, silicon, aluminium and potassium. Additionally, a non-spiral elongated coprolite from the same locality was analysed using μXRF: Based on its composition and size, this coprolite was likely produced by *Discosauriscus* sp. It exhibits a predominantly phosphatic composition, typical for coprolites produced by carnivorous taxa. These contrasting preservational pathways between the two bromalites reveal distinct taphonomical pathways and expands our understanding on the different geochemical conditions under which intestinal remains can fossilise.

Session 2: SPECIAL SESSION — TRIBUTE TO PHILIPPE TAQUET

DATING THE EARLY PIPID EVOLUTIONARY RADIATIONA. Lemierre^{1,2}, M. Laurin^{2*}, G. Didier³¹Royal Tyrrell Museum of Palaeontology, Drumheller, Canada²CR2P, Muséum National d'Histoire Naturelle, Paris, France³2IMAG, Université de Montpellier, Montpellier, France

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Keywords: *Anura, Cretaceous, Cenozoic, paleobiogeography, timetrees*

Pipidae, and its total group, Pipimorpha, have one of the best fossil record of all anurans that encompasses Africa, South America, and Europe. To better constrain the timing of pipimorph diversification, we performed divergence time analyses using the FBD model, testing two pipimorph topologies (“morphological” and “molecular”) and two interpretations of the fossil record that differ in the inferred taxonomic affinities of isolated vertebrae from the Early Cretaceous (Aptian) Koum Basin that resemble closely those of *Pachycentrata taqueti*, a taxon otherwise known from In Beceten (Coniacian-Santonian, Niger). This taxon was named (as *Pachybatrachus taqueti*) after Philippe Taquet, one of the pioneers of paleontological field survey in Niger in the 1970s who discovered fossils of several vertebrate taxa at In Beceten.

Our analyses date the divergence between Pipidae and Shelaniinae to the Early Cretaceous (Barremian-Aptian), between 125.6 and 105.8 Ma. All analyses identify two rapid but modest evolutionary radiations in South America and Africa. The first one, in Pipidae and its stem, lasted about 10 My and occurred mostly in the Early Cretaceous. It may have been facilitated by the opening of the Equatorial segment of the South Atlantic Ocean. The second one occurred among shelaniines, during the middle Late Cretaceous. Pipid diversification started before the loss of a terrestrial connection between South America and Africa and required no transatlantic dispersal, indicating that South American and African lineages had already diverged by the Early/Late Cretaceous boundary. Finally, we found no evidence that pipimorphs were affected by mass extinction events.

**LATE CRETACEOUS ACTINOPTERYGIAN FISH ASSEMBLAGES FROM THE
MAASTRICHTIAN TYPE AREA (NETHERLANDS-BELGIUM): A
STATE-OF-THE-ART REPORT**

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Keywords: *Osteichthyes, Teleostei, skeletal remains, otoliths, taphonomy*

Although already featured in the first papers on type-Maastrichtian macrofossils from the Sint-Pietersberg area (south-east Netherlands), actinopterygians have subsequently received comparatively scant attention. Notable exceptions are recent publications on pycnodontiforms (*Anomoeodus*), pachycormiforms (*Protosphyraena*), aspidorhynchiforms (*Belonostomus*), ichthyodectiforms (*Saurocephalus*), aulopiforms (*Enchodus*, *Apateodus* and *Cimolichthys*), polymixiiforms (?*Omosoma*), beryciforms (*Hoplopteryx*) and tetraodontiforms. More or less complete specimens are extremely rare, although associated remains of dercetids are commoner. A recent paper (December 2025) on dercetids has demonstrated a high diversity (including several new genera); material subsequently collected and/or recognised in existing collections is likely to augment this further. At some levels within the Gulpen and Maastricht formations (upper Campanian-upper Maastrichtian), skull remains (mostly partial jaws, with teeth preserved) of aulopiforms have proved quite common, but linking these to other bones remains a moot point. Over recent years, fossil hash levels above omission surfaces, particularly within the lower Maastricht Formation, have yielded pycnodontiform prearticular and vomerine tooth plates and the first partial skeleton, presumably of *Anomoeodus subclavatus*. In addition, new collections include presently indeterminate teleost tooth-bearing jaws of diminutive to small size. Similarly, burrows of bristle worms (*Lepidenteron lewesiensis*) have furnished diverse isolated skeletal fish remains, including a range of scale and tooth types, currently under study. Early diagenetic silicification, closely associated with flint nodules, has yielded silicified, originally aragonitic otoliths (sagitta) of a range of actinopterygian fish. This has at least doubled the number of fish taxa recorded from the Maastrichtian type area, documenting anguilliforms, argentiiforms, gadiiforms, ophidiiforms, holocentriforms and perciforms.

Acknowledgements: We thank all citizen scientists in the wider Maastricht area for contributing finds and data over recent years.

**NOT FROM A BILLFISH: ROSTRAL, HISTOLOGICAL AND NEUROVASCULAR
BLUEPRINT FOR XIPHIROID-LIKE BODYPLANS IN A NEW UPPER
CRETACEOUS TELEOST FISH**

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Keywords: *Plethodidae, longirostry, rostral anatomy, histology, micro-dentition*

During the Late Cretaceous, plethodid teleostiforms (Teleostei) independently developed a longirostrine condition in a remarkable example of convergent evolution with Cenozoic billfishes (Xiphioidae). In 2025, a partial rostrum from a large undetermined plethodid was described from the Campanian-Maastrichtian deep-sea units from the Northern Apennines, Italy. The specimen possesses remarkable similarities to xiphioids, such as similar bone mesostructure, microscopic dentition, a false palate and a large sinus compatible with the osteological correlate of an oil gland. Here, we present a new specimen of the same enigmatic taxon from the same setting that enhances our understanding of the anatomy and functional morphology of these billfish analogues. The new material is represented by a fully three-dimensional terminal section of the rostrum, composed of fused premaxillae. Histological sections of the rostral tissue showcase an anosteocytic bone with large, dense and overlapping pseudo-osteonal systems, suggesting an active, tetrapod-like bone remodeling. Histological analysis was also applied to micro-teeth and sockets. Computed tomography (CT) scan analysis confirmed the presence of a central sinus, as with the previously described specimen, together with a unique array of longitudinal neurovascular canals. The cortical region of the rostrum appears highly vascularized, making contact with the external surface via foramina. The coarsely sculptured ornamentation of the rostrum is here interpreted as a correlate for dense superficial vascularization, cumulatively suggesting potential cranial endothermy. This new material supports the establishment of a new taxon and provides new insights into the recurrent development of a billfish-like body plan within Teleostei.

A NEW ARCHOSAURIFORM FROM THE MIDDLE TRIASSIC OF POLAND WITH UNIQUE DERMAL ARMOUR

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Keywords: *Archosauriformes, Ladinian, Triassic, Central European Basin, osteoderms*

The Middle Triassic (Ladinian) sediments of the Miedary beds of Upper Silesia (southern Poland) have yielded several thousand vertebrate specimens. These discoveries include numerous taxa of fishes, amphibians, and reptiles (e.g., sauropterygian *Nothosaurus*, archosauromorph *Tanystropheus*, and pseudosuchians). Among the most important finds are the remains of a new medium-sized archosauriform, represented by a semi-articulated skeleton most likely belonging to a single individual. It includes a series of presacral vertebrae with associated ribs, gastralia, pelvic elements, and several hundred dermal ossifications recovered from a single horizon. The new taxon exhibits a highly unusual postcranial morphology, including elongated cervical centra with extremely low neural spines; dorsal ribs with an extensive marrow cavity and an additional lamina connecting the capitulum and tuberculum; and an ilium with a combination of primitive and derived features. The most remarkable feature is the dermal armour. Multiple osteoderm morphotypes are present, including a unique type of ornamented osteoderms with symmetrical, radially arranged ridges. Being dissimilar to the osteoderms of doswelliids, aetosaurs, or other archosauriforms, these elements suggest a previously unrecognised dermal armour architecture. The discovery of this new taxon with such unique morphology expands the known morphological disparity of archosauriforms during the Middle Triassic and highlights the importance of the Miedary beds in understanding the early radiation of vertebrates in the Triassic terrestrial ecosystems.

Acknowledgements: We thank everyone involved in the excavations in Miedary and the technicians who prepared the material. This project was supported by the National Science Centre, Poland, grant no. 2019/35/N/NZ8/03806 awarded to Ł.Cz. and no. 2020/39/O/NZ8/02301 awarded to T.Su.

**VERTEBRATE BROMALITES FROM THE MIDDLE TRIASSIC (LADINIAN)
SHALLOW MARINE DEPOSITS OF MIEDARY, SOUTHERN POLAND**

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Keywords: *bromalites, Ladinian, Brackish, palaeodiet, palaeoecology*

Vertebrate bromalites, including coprolites, have been reported previously from several Triassic sites in Poland. These localities, interpreted as both terrestrial and marine environments, offer a rare window into the diets and ecological interactions of Triassic terrestrial and marine vertebrates. The current study focuses on bromalites collected from the Middle Triassic deposits of the Miedary site, recording part of a shallow, restricted, brackish-water reservoir during a significant period of regression in the Germanic Basin. Recent skeletal studies reveal a diverse ecosystem, including a likely nearly equal proportion of fishes (osteichthyans and chondrichthyans) and various tetrapod groups, including amphibians and reptiles (archosauromorphs, nothosaurids, and more). To elucidate the diets of these varied producers in a brackish-water realm, more than 800 bromalite specimens have been collected from multiple levels. To assess the preserved inclusion variety, μ -CT scanning, surface microscopic analysis, thin sections, and organic inclusions (post-disaggregation) are being utilised. Non-spiral morphotypes (~80%) include cylinders, flat forms, inclusion-rich spherules, and large conical forms. Spiral morphotypes (~20%) include cylindrical spiral (possibly scroll), amphipolar, and heteropolar microspiral coprolites. There is a rich diversity of inclusions, including ganoid scales, bones, invertebrate prey, and likely accidentally consumed plant and fungal remains. Via bromalite morphology and inclusions, confident assignment to non-teleost fishes (spiral forms) and tetrapod producers (large non-spiral forms) can be made. The current study enables us to understand and pursue future understudied aspects of diet and parasitism, and elucidate specific trophic interactions in the brackish waters of the Triassic Germanic Basin in Poland.

Acknowledgements: We thank everyone involved in the excavations in Miedary. This research is financially supported by the National Science Centre, Poland grant 2024/53/B/NZ8/03528 to K.D.B. The excavations in Miedary were funded by the National Science Centre, Poland grant 2019/35/N/NZ8/03806 awarded to Ł.Cz. and 2020/39/O/NZ8/02301 grant awarded to T.S.

EXCEPTIONAL SOFT TISSUE PRESERVATION IN RHYNCHOCEPHALIANS FROM THE KIMMERIDGIAN OF WATTENDORF, GERMANY

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Keywords: *lepidosaur, Wattendorf, Jurassic, plattenkalk, soft tissue*

The Solnhofen Archipelago is well-known for the exceptional preservation of fossils, which sometimes includes soft tissue imprints of feathers, scales, skin, muscles, and internal organs. In rhynchocephalians, these imprints include body outlines, with some preserving individualised scales. These latter are usually preserved as patches in parts of the skeleton, and albeit descriptions of these structures are present in the literature, their external morphology remains poorly studied. The Late Kimmeridgian laminated limestones of Wattendorf, northeastern Bavaria, which represent the oldest part of the Solnhofen Archipelago, yielded new, yet undescribed, but complete, rhynchocephalian specimens. Under UV-light, these specimens show remarkable preservation of soft-tissue imprints, including the first instances of trachea and cloaca for the clade, and a complete series of caudal scales. The trachea is preserved in a sapsaurid (cf. *Oenosaurus*). It is incomplete, but shows large calcified tracheal rings and syrinx, which is placed anterior to the shoulder girdle. The cloacal vent imprint is preserved in a marine pleurosaurid (cf. *Pleurosaurus*), and its morphology is similar to that of the Permian stem reptile *Cabarzichnus* and the extant tuatara, being horizontally broad, instead of the archosaurian vertically elongated cloacal vent. The caudal series, which is preserved in a leptorhynchian (cf. *Kallimodon*), shows a prominent dorsal crest, similar to that of the tuatara, indicating that this morphology is at least ancestral in neosphenodontians. The new soft tissue preserved on the Wattendorf rhynchocephalians improves our understanding of the anatomy and evolution of this group, showing conservative morphological features shared with the extant tuatara.

**THE STRATIGRAPHICAL DISTRIBUTION OF SIMOSAURIDAE
(SAUROPTERYGIA): AN UPDATE ON THE OCCURRENCES OF THE CLADE**

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Keywords: *Eosauropterygia, Middle Triassic, Late Triassic, Middle East, Europe*

Sauropterygia, whose fossil record ranges from the Lower Triassic (Olenekian) to the uppermost Cretaceous (Maastrichtian), is a highly diversified clade of aquatic reptiles comprising Placodontia, Pachypleurosauria, Simosauridae, and Pistosauroida. Simosauridae is poorly understood relative to the other sauropterygian clades, as few relatively complete skeletons have been studied, corresponding to the only two valid species: *Simosaurus gaillardoti*, from the Ladinian (Middle Triassic) of France and Germany; and *Paludidraco multidentatus*, from the Carnian (Late Triassic) of Spain. Additional simosaurid remains, mostly of indeterminate generic attribution, are known from Europe and the Middle East. In this context, Simosauridae was suggested to be limited to the uppermost Anisian (Middle Triassic) or lowermost Ladinian in the Middle East, its putative European fossil record extending from the Anisian to the Rhaetian (Late Triassic). Nonetheless, a precise age was never provided for any of the Middle East remains. Regarding the European material, the clade confirmed record ranges from the Ladinian to the Carnian. Nonetheless, the genus *Simosaurus* was putatively reported from the Anisian of Germany and from the Rhaetian of France, but without proper justification. However, both Middle East and European attributions were made when knowledge on simosaurid anatomy was relatively poor, almost exclusively limited to *S. gaillardoti*. In this work, we discuss in detail the temporal distribution of Simosauridae considering previously documented and new material. The Anisian presence of Simosauridae in the Middle East and the youngest record of the clade in the Carnian of Europe are here confirmed. Additionally, the European Anisian occurrences are discussed.

AN EXQUISITE, THREE-Dimensionally PRESERVED ELASMOSAURID FROM THE LOWER CRETACEOUS OF COLOMBIA

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Keywords: *Elasmosauridae, Cretaceous, Colombia, 3D-preservation, Plesiosauria*

We report a beautifully preserved elasmosaurid skeleton from the Paja Formation of Colombia, one of the best documented Lower Cretaceous marine reptile-bearing sequences worldwide. Discovered by the Fundación Colombiana de Geobiología about 25 years ago but remaining undescribed until now, it represents a significant and long overdue addition to the Lower Cretaceous marine reptile record. The specimen includes an almost intact skull and an articulated axial and appendicular skeleton, showing a high degree of anatomical completeness. Digital surface models reveal anatomical characters in the cranium, neck, and limbs that are rarely accessible in flattened specimens, permitting a refined assessment of body proportions and character distribution in early-diverging elasmosaurids. The skull differs from other Lower Cretaceous elasmosaurids from Colombia in its rostral proportions, palate and rostrum anatomy, and the circumorbital morphology. The undistorted axial skeleton shows cervical proportions and vertebral traits not yet described in any of the specimens from the Paja Formation. These observations suggest that the specimen shows a combination of cranial and postcranial characters that is unique within early elasmosaurids. Phylogenetic analyses place the specimen in close proximity to the contemporaneous *Callawayasaurus*, indicating a possible South American lineage of early-diverging elasmosaurids. The specimen also expands the anatomical record of Early Cretaceous plesiosaurs and provides novel data on the early evolution of the elasmosaurid body plan, including patterns of cervical elongation and regionalization, as well as broader morphofunctional disparity during a critical time of elasmosaurid diversification in tropical Mesozoic seas.

Acknowledgements: We thank the Centro de Investigaciones Paleontológicas founders and curatorial staff who assisted in the specimen collection, preparation, and study. Funding support was provided by the National Science Centre, Poland, grant no. 2023/51/B/NZ8/00899.

A LOST MORPHOLOGY – THE UNDERESTIMATED COMPLEXITY IN TRIASSIC ICHTHYOSAUR DENTITION

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Keywords: *pt-extinction, Triassic, marine reptiles, ichthyosaur, dentition*

The end-Permian mass extinction eliminated ~81% of marine species and was followed by one of the most rapid vertebrate radiations in the fossil record. Whether marine ecosystems stabilised rapidly or remained ecologically dynamic through the Early–Middle Triassic remains debated. Here we take two approaches, examining large-scale patterns and clade-specific cases. An ecosystem-based approach using occurrences across Triassic ecosystems and ecological functional units (EFUs) quantifies functional diversity, revealing spatial and temporal variation in ecosystem restructuring and stabilisation. This dataset demonstrates a persistent presence of durophagous ichthyosaurs coexisting with large macropredators, forming stable trophic structures from the Early Spathian to Late Ladinian. These small- to medium-sized crushing and heterodont ichthyosaurs pioneered durophagous niches prior to the Middle Triassic radiation of more coastal sauropterygians, supporting a two-phase restructuring of marine ecosystems and partially decoupled diversification of pelagic and benthic hard-prey resources. However, this apparent stability occurs alongside the exceptional dental disparity of Triassic marine reptiles, even within EFUs. A key example is the mixosaurid ichthyosaur *Phalarodon* from the Middle Triassic of Svalbard, where reassessment reveals five distinct coexisting species, including several new, with unique heterodont crushing and cutting adaptations. These taxa demonstrate clear niche partitioning within a broadly defined generalist adaptive zone, blurring the line between generalist and specialist niche structuring. Notably, these specialised crushing and heterodont dentitions subsequently disappear from ichthyosaurs after the Middle Triassic and are absent from marine ecosystems for an extended interval, suggesting the loss of previously established trophic strategies through much of the remainder of the Mesozoic.

TRACKING ARCHOSAURIAN BRAIN EVOLUTION THROUGH EARLY EMBRYONIC DEVELOPMENT

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Keywords: *Archosauria, paleoneurology, microCT, development, geometric morphometrics*

Archosaurs evolved dramatically diverging sensory capabilities across their radiation into diverse lifestyles, reflected in striking differences in brain morphology. Although the drivers behind this neurological disparity could inform on the extraordinary ecological diversification of Mesozoic archosaurs, our current understanding of the ancestral archosaurian brain is limited by a poor fossil record of braincase endocasts. However, many evolutionary pathways are retained within conserved developmental sequences, which offer a unique window into the mechanisms underlying sensory evolution at the archosaurian origin. While recent studies observe brain morphological divergence in archosaurs during late embryonic development into adulthood, they fail to capture the critical stages before initial divergence. Here, we investigate the timing of initial morphological divergence in extant archosaurs to explore drivers of brain disparity. We imaged contrast-enhanced brains of early embryonic chickens, ducks and American alligators using μ CT and conducted a 3D geometric morphometrics analysis, yielding the developmentally earliest morphometric dataset of archosaur brains to date. We find that alligator and bird brain morphologies diverge immediately after brain formation and remain distinct before they converge toward a morphological bottleneck around 20% relative embryonic development. At this point, alligators rapidly enlarge their optic lobes and parallel bird development before elongating their forebrains toward the adult phenotype. This suggests immense morphological flexibility during early brain development and a “phylotypic stage” conserved among archosaurs. These results improve our understanding of the developmental drivers of brain disparity and suggest that integrating developmental data with the fossil record is critical for resolving the origins of archosaurian diversity.

Acknowledgements: We are grateful to the Rockefeller Wildlife Refuge for supplying alligator eggs for this study. This project is supported by the Yale Institute for Biospheric Studies Small Grants program.

A SMALL-BODIED CROCODYLOMORPH FROM THE UPPER JURASSIC OF PORTUGAL AND ITS IMPLICATIONS FOR ATOPOSAURID DIVERSITY

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Keywords: *Lourinhã Formation, Kimmeridgian–Tithonian, Atoposauridae, Neosuchia, postcranial.*

The Upper Jurassic Lourinhã Formation (Portugal) has yielded a diverse assemblage of crocodylomorphs, including remains of small-bodied neosuchians previously assigned, albeit tentatively, to Atoposauridae. Here we report new data on ML2688, an articulated partial postcranial skeleton from the Praia Azul Member (Kimmeridgian–Tithonian) and place it in the context of two additional specimens from the same member: ML2631 (skull table) and ML2322 (partial skeleton with cranial material, currently under study). ML2688 preserves part of the pelvic girdle, hindlimb, caudal vertebrae, and over 100 osteoderms, allowing reconstruction of the dermal armour and locomotor interpretation. The osteoderm pattern, consisting of two sacral rows and four caudal rows with ventrally deflected lateral margins, supports neosuchian affinities consistent with Atoposauridae. Body size estimates converge on ~1m total length. Osteohistology indicates a mature individual with reduced growth rates, suggesting a dwarfing-related growth strategy or environmental constraint. Comparisons with ML2631 and ML2322, together with the presence of isolated teeth and remains previously assigned to Atoposauridae, support the presence of at least one small-bodied atoposaurid in the Lourinhã Formation, potentially represented by different ontogenetic stages. However, the larger size and exclusively postcranial preservation of ML2688 prevent a secure taxonomic assignment beyond Atoposauridae indet. Functionally, elongate hindlimbs and a heavily armoured, likely stiffened tail suggest limb-based terrestrial progression over axial undulation, likely due to increased dorsal rigidity. These results expand the known morphological and ecological diversity of small neosuchians in the Late Jurassic of Iberia and highlight the importance of articulated material for understanding atoposaurid palaeobiology.

Acknowledgements: Research supported by the Grupo de Etnologia e Arqueologia da Lourinhã (Portugal; PIIHM grant), Fundação para a Ciência e a Tecnologia (Portugal; SFRH/BPD/116759/2016), Ministerio de Universidades (Spain) and European Union (María Zambrano fellowship), Comunidad de Madrid (Spain; “César Nombela” programme, 2025-T1/TEC-36393), and a Humboldt Fellowship (FU Berlin, Germany).

PTEROSAUR WINGS, A COMPLICATED STORYN. Jagielska^{1*}, T.G. Kaye², M.B. Habib³, T. Hirasawa⁴, M. Melendez⁵, M. Pittman¹¹School of Life Sciences, Address, ShaTin, Hong Kong, China (SAR)² Foundation for Scientific Advancement, Sierra Vista, Arizona, United States of America³ Department of Medicine, University of California, Los Angeles, California, United States of America⁴Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo, Tokyo, Japan⁵ Institut Català de Paleontologia Miquel Crusafont, Universitat Autònoma de Barcelona, Sabadell, Spain

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Keywords: *pterosaurs, flight evolution, soft tissue, integuments, histology*

Pterosaurs, the first and largest flying vertebrates, unlike birds and bats, have no extant descendants. Understanding their skeletal and soft anatomy, and by extension, behaviour, relies on inferences derived from ichnofossils, osteological correlates, and importantly, exceptionally preserved soft tissues. Here, we review two centuries of pterosaur soft-tissue research, corroborated by global revisits and comparative, quantifiable descriptions of historically described specimens. In our mass revisit, we collated decades of research to uncover new features associated with the membranous wings. Soft-tissue observations were corroborated with extant and extinct histological samples and laser-facilitated surface screening, aiding morphological description and functional interpretations. Structural fibres in the wings, known as actinofibrils, show a morphological and taphonomic differentiation between different membranes and appear to sort internally into non-concordant layers upon folding. We also recover fossil and histological evidence for the long-speculated retrophalangeal wedge. The tissue is morphologically unique from the rest of the membranous patagia, likely providing a tendinous dynamic control of the aerofoil leading edge. This research paints a more comprehensive and complex image of pterosaur wing, showcasing spanwise and chordwise heterogeneity.

Acknowledgements: M. Pittman was supported by The Chinese University of Hong Kong and its School of Life Sciences, which included the Postdoctoral Fellowship of Natalia Jagielska. Embryonic specimens of were provided by NIFREL (Kaiyukan), Osaka and S. Kuratani.

ANOTHER DINO BITES THE DUST: FEEDING HEIGHT PARTITION AMONG JURASSIC HERBIVORES FROM THE LOURINHÃ FORMATION (PORTUGAL)

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Keywords: *Upper Jurassic, Lourinhã Formation, dental microwear, feeding height, Dinosauria*

Dental microwear texture analysis (DMTA) has made substantial contributions to understanding feeding behaviors and potential niche partitioning in extinct vertebrates, including recent applications to dinosaur feeding biology. To examine the influence of feeding height separation among coexisting herbivorous dinosaurs from the Upper Jurassic Lourinhã Formation (Portugal), we investigated the microwear textures present on the enamel and dentine surfaces of both sauropod and ornithischian dinosaurs. The observed microwear patterns correlate well with inferred feeding height, assuming that abundance and size of dust/grit particles ingested during feeding decreases with increasing distance from the ground. Iguanodontian ornithopods' buccal enamel surface displayed greater surface complexity and a higher density of furrows, pointing to an increased intake of dust and grit, thereby suggesting a low-level feeding habit. On the other hand, sauropod enamel preserves abrasion patterns that reflect a lesser intake of exogenous particles, suggesting a general preference for taller plants, with the exception of two flagellicaudatan teeth. More specifically, microwear patterns observed on the buccal and occlusal enamel surfaces of sauropod teeth suggest that flagellicaudatans had a preference for low-to-mid-level browsing, camarasaurids were mid-to-high browsers, and titanosauriforms and turiasaurians high browsers. Moreover, dentine microwear appeared to reflect biomechanical signals, distinguishing iguanodontians, which were capable of sophisticated chewing, from clades with more limited oral processing. Collectively, these results highlight vertical niche partitioning within the Lourinhã Fm ecosystem, which may have driven the observed high herbivore taxonomic diversity.

Acknowledgements: AS, FC, and FMR were supported by the National Funds through the FCT—Fundação para a Ciência e a Tecnologia, I.P., through the doctoral grants 2020.05854.BD (AS), SFRH/BD/148035/2019 (FC), SFRH/BD/146230/2019 (FMR), and COVID/BD/153554/2024 (FMR). AS, FC, and FMR were further supported by FCT—Fundação para a Ciência e a Tecnologia, I.P through the Research Unit UIDB/04035/2025 (GeoBioTec; <https://doi.org/10.54499/UIDB/04035/2025>) and the Project PTDC/CTA-PAL/2217/2021 (BioGeoSauria). Emanuel Tschopp was funded through a Humboldt Fellowship for Experienced Researchers during the time of study (UHH-LIB Hamburg).

NEAR-COMPLETE PATAGONIAN PARANKYLOSAUR UNCOVERS TAIL WEAPON DISTINCTIVENESS AND MINIATURISATION

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Keywords: *Parankylosauria, La Colonia, Maastrichtian, Patagonia*

Knowledge of dinosaurs from high latitudes remains poor owing to a paucity of relevant fossil material. Gondwanan discoveries are crucial to overcoming this prevailing knowledge gap because of the larger land coverage at these latitudes during the Mesozoic, especially more accessible Patagonian and Australian outcrops. Here we describe a new small, long-limbed ankylosaur known from a near-complete skeleton that we recovered from the Maastrichtian La Colonia Formation of Argentinian Patagonia. The holotype preserves a skull roof with dermal armour, most of the axial column, the limbs, and extensive body armour, including a distinctive tail weapon. Evo-devo analysis uncovers distinctive features in the tail weapons of parankylosaurians compared to the iconic ones of ankylosaurids. Through body mass and clade-level analyses we recover a pattern of parankylosaurian miniaturisation. This new taxon allows use to characterise Parankylosauria as a distinct, long-lived early-diverging Gondwanan clade with bizarre tail weapons and miniaturisation, highlighting the importance of continued fieldwork at higher palaeolatitudes.

Acknowledgements: Fieldwork was possible thanks to the Secretaría de Cultura de la Provincia del Chubut. Fieldwork was supported by Agencia Nacional de Promoción Científica y Tecnológica, Argentina (PICT 2015-0678 and PICT-2018-02443 to JO), National Geographic Society (NGS-92822R-22 to DP) and The Chinese University of Hong Kong (MP).

SAUROPOD TRACKWAYS IN THE UPPER JURASSIC-LOWER CRETACEOUS LA PUERTA FORMATION, BOLIVIA

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Keywords: *sauropod footprints, tetrapod ichnology, vertebrate tracks, Potosí dinosaur footprints*

A new quadrupedal tracksite is described in siliciclastic layers of the Upper Jurassic-Lower Cretaceous La Puerta Formation, Potosí, Bolivia, with four distinctive trackways and several areas exhibiting intense dinoturbation (trampling). The tracked bed is about 1 meter thick and consists of interbedded, horizontally and trough cross-laminated, medium- to very coarse-grained sandstones, with well-developed current ripples and horizontal-to-vertical burrows roughly 1 cm in diameter. The exposure occurs along the northeast limb of an anticline that forms the Condoriri Mount. The four trackways correspond to sauropod dinosaurs based on the dimensions of the pes tracks, the presence of pes-manus sets, the relative dimensions of the pes and manus tracks, the position of the manus prints ahead of pes tracks in manus-pes sets, the manus prints about as far from the midline as the hindfoot prints, and the overall morphology of the manus prints. The calculated trackway widths indicate both narrow and wide gauges, but the gauge is inconclusive, and several factors affect the reliability of this parameter for the studied trackways. The parallel trackways are oriented in the same direction of locomotion, suggesting some form of gregarious behavior. In addition to the four trackways, the slope has wide areas of intense dinoturbation, most likely containing sauropod tracks, although one tridactyl (theropod) track was also found. The measured parameters of the trackways indicate adjustments in limb position, angles, rotation, and distance from the trackway midline, suggesting stressed locomotion on a soft substrate. The paleoenvironmental conditions suggest a semi-arid distal alluvial plain with ephemeral braided currents and intermittent eolian reworking.

Acknowledgements: This research was funded by the Geoscience Research Institute (grant GRI54-CON). Official permits were granted by the Condoriri Community. We thank Roberto Cruz, of the Office of Tourism of the City of Potosí, for local arrangements with transportation, lodging and research permits.

WALKING ON GASTROPODS -THE FIRST SAUROPOD TRACKS FROM THE CAMPANIAN OF FRANCE (GREASQUE, PROVENCE)

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Keywords: *sauropod ichnology, small sauropod, continental limestone, Cenomanian, France*

The European dinosaur bone record from the Campanian is poor and scattered compared to other Late Cretaceous stages (e.g., Maastrichtian); however, the ichnological record is almost non-existent, with only a few sites known from Spain (La Maçana) and Italy (Altamura). Here we report the first sauropod tracks from the Campanian of France, found near the town of Gréasque (Department du Bouches-du-Rhône, Provence, France). Three parallel trackways and one isolated ?pes track, attributed to sauropods were found on two different levels. The section comprises an alternation of organic-matter-rich continental lacustrine marly limestones, with bituminous marls. The tracks were left on the marly limestones packed with cerithioid gastropods assemblage indicate a palustrine setting. Other fossils include plant remains, turtle fragments, fish scales, ostracods, and unionid bivalves. Sauropod pes tracks are oval, small (average PL: 22.5 cm), shallow and with a generally poor morphological quality; manus tracks are crescent-shaped, wider than long. The best preserved and longest trackway, S1, is composed of eleven non-continuous pes tracks, and only three clear manus pes. Three other track sites have been found nearby and are currently being investigated. The size of the tracks is comparable with either subadult specimens of one of the titanosaurian species found in the area (e.g., *Atsinganosaurus*, *Garrigatitan*) or adult individuals of a smaller species yet to be found. While poor preservation prevents further analyses, this discovery opens the horizon for further research in the region, which combined with the ongoing palynological analyses, will provide further information on the Campanian palustrine ecosystem.

Acknowledgements: We thank the staff of the Musée d'Histoire Naturelle of Aix-en-Provence, and the municipality of Gréasque for their support for and in the field. We are hoping the Museum will be reopened soon.

THE OVERPRINTING INDEX (OI): A NOVEL APPROACH TO UNDERSTAND SAUROPOD MANUS MORPHOLOGY

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Keywords: *quantitative ichnology, Manus track integrity, Manus-pes distance, Sauropod locomotion, trackway pattern*

Sauropod ichnotaxonomy represents a significant challenge due to the conservative track morphology shared among various ichnotaxa, which makes them difficult to distinguish. While manus (front foot) exhibits greater morphological variability and can be more diagnostic. Their utility is, however, frequently compromised by overprinting (pes imprinting over the manus). To address this, we analyze the relative manus-pes distance, measured as the ratio between the pes-manus centroids distance (dPM) and the pes length (PL), and introduce the Overstepping Index (OI). The OI can be used to assess manus track integrity and ensure ichnotaxonomic reliability and provides a quantitative measure of overstepping. To ensure its reliability we analyzed 118 pes-manus track couples from 12 sauropod and sauropodomorph ichnotaxa (*Breviparopus taghbaloutensis*, *Brontopodus birdi*, *Brontopodus plagnensis*, *Calorckosauripus lazari*, *Galinhapodus gomesi*, *Iniestapodus burgensis*, *Lavinipes cheminii*, *Liajingpus shunan*, *Occitanopodus gandi*, *Otozoum*, *Parabrontopodus mcintoshi*, *Tetrasauropus unguiferus*) from the Triassic to the Cretaceous. Beyond its use as a preservational parameter, our results demonstrate that the OI also captures and quantifies locomotional and behavioral changes (OI vs. trackmaker speed; OI vs. trackway gauge). These trends contribute to enhancing our understanding of limb placement during locomotion in both straight and turning paths.

THE ROSTRAL NEUROVASCULAR SYSTEM OF TITANOSAURS: PALEOBIOLOGICAL IMPLICATIONS AND SOFT TISSUES RECONSTRUCTION

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Keywords: *Sauropoda, neurovascular system, dental replacement, corneous beak*

The morphological description of the rostral neurovascular system of the skull has been conducted for only a limited number of fossil taxa, including *Tyrannosaurus*, several species of metriorhynchid crocodyliforms, and mosasaurs, thus significantly restricting available data for dinosaurs. This system consists of an intricate network of intraosseous canals branching within the maxilla, premaxilla, dentary, and nasal bones, housing the terminal branches of the trigeminal nerve and the peripheral blood vessels of the perioral region. Its characterization is essential for understanding the biology, physiology, and behavior of a fossil taxon, as it provides insights into cranial thermoregulation, sensory perception, development of specific perioral tissues, and tooth replacement strategies. The present study describes this system for the first time in sauropod dinosaurs, based on a previously undescribed titanosaur specimen from the El Nerets site (Upper Cretaceous, Catalonia, Spain). Micro-CT scans were performed on the preserved premaxilla, maxilla, and dentary bones and the resulting data were processed through image segmentation of the internal bone cavities. Its characterization and morphological description defined how the neurovascular system interacts with and supplies the alveolar region, supporting a high tooth replacement rate, and provide evidence for substantial perioral keratinization in this taxa. In addition, a preliminary reconstruction of the trigeminal nerve branching within the perioral region was performed.

Acknowledgements: This research is part of the R+D+i project PID2024-161658NB-I00, funded by MCIN/AEI/10.13039/501100011033/FEDER/UE and the grant CNS2023-145700 funded by MICIU/AEI/10.13039/501100011033 and the European Union NextGenerationEU/PRTR. Additional funding was provided by the CERCA Programme/Generalitat de Catalunya.

**DIGGING SAUROPODS? BARKING UP THE WRONG TREE - AN EXAMPLE
FROM THE LATE CRETACEOUS POTOSI BASIN (EL MOLINO FORMATION,
MARAGUA, BOLIVIA)**

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Keywords: *El Molino Formation, Late Cretaceous, Maragua Syncline, Bolivia, nesting site*

The Late Cretaceous deposits of Bolivia contain a diverse record of fossil vertebrate tracks, and extensive surfaces within the El Molino Formation (Campanian –Maastrichtian) preserve evidence of animal behavior, such as turning theropods, running ankylosaurs, and herding titanosaurs. At Mullurina Mayu (Maragua), we describe a titanosaurid track-bearing surface in the El Molino Formation that contains an unusual sedimentary structure. This structure is a bowl-shaped depression, longer than wide (4.2 m x 3.2 m), with a maximum depth of 60 cm, characterized by a sharp coherent rim, irregular margin, and deeper internal basin. It occurs within a massive claystone bed exposed over 522 m², interpreted as an overbank deposit, based on the presence of desiccation cracks and overlying caliche-bearing marls. The structure's walls preserve several groups (bundles) of parallel, ~30 cm long linear grooves (1 cm wide, spaced ~1.8 cm apart) within elongate (track-like) impressions, while the basin floor yields linear traces resembling claw marks. These bundles are syndimentary, occur within single track depressions, and show two dominant orientations (NE-SW and ESE-WNW). Several hypotheses could explain the basin-like structure, including scouring, weathering, and animal excavation. However, the absence of scour marks or other abiotic sedimentary features, combined with the distribution and morphology of the scratch-like traces, leads us to interpret them as traces produced by foot movement within soft sediment. They may represent skin-slip striations produced during excavation (digging). Considering the associated titanosaurid trackways, these traces could be sauropod-made and may even be extrapolated as evidence of nest building.

Acknowledgements: We would like to express our gratitude to the local Ayllu communities for granting access to the site and supporting field activities. We also acknowledge the funding provided to the senior author by Professional Palaeo Consulting (Switzerland).

A NEW DIMINUTIVE NEOSAUROPOD FROM THE MIDDLE JURASSIC OF INDIA: SYSTEMATICS AND HISTOLOGY

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Keywords: *Neosauropoda, Kachchh Basin, Middle Jurassic, histology, phylogeny*

Neosauropoda (macronarian and diplodocoid sauropods) are one of the most diverse and successful groups of saurischian dinosaurs and are well-represented globally from the Late Jurassic to the end-Cretaceous. However, the clade is underrepresented in the Middle Jurassic, and the phylogenetic interrelationships of its early-diverging taxa remain poorly understood. Here, we present the systematics of a new, diminutively-sized (ca. 7 m), neosauropod dinosaur represented by a partial postcranial skeleton from the ?Lower to Middle Jurassic (?Pliensbachian to Bajocian) strata of the Kachchh Basin, India. The new taxon shows a unique combination of characters, including several autapomorphies in the axial and appendicular skeleton. Phylogenetic analyses recover the new genus as an early-diverging non-titanosauriform macronarian. The presence of a neosauropod in eastern Gondwana, along with the Laurasian occurrences *Dashanpusaurus*, *Lingwulong*, and *Yuzhoulong*, indicates a global distribution of neosauropods by the Middle Jurassic, thereby supporting the conclusions of recent studies on early neosauropod relationships. Histological investigation of the femur, ulna and metacarpal, and the presence of a non-traumatic, non-contagious pathology in the left tibia, indicate that the specimen represents a senescent individual. The discovery of the new taxon, represented by a rare senescent individual, and its attribution to Macronaria enhances our understanding of the early diversity and distribution of Neosauropoda.

Acknowledgements: Industrial Research and Consultancy Centre (IRCC), IIT Bombay (Seed grant # RD/0522-IRCCSH0-028); Council of Scientific and Industrial Research (CSIR; doctoral fellowship # 09/0087(13891)/2022-EMR-I); Daniela Schwarz (reviewer).

SMALL COELUROSAURIAN THEROPOD DIVERSITY FROM THE UPPER CRETACEOUS OF TRANSYLVANIA BASED ON ISOLATED TEETH

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Keywords: Romania, Campanian-Maastrichtian, Theropoda, Coelurosauria, teeth

Upper Cretaceous continental deposits of Transylvania (western Romania) preserve a rich vertebrate fossil record, known as the Hațeg Island fauna. This assemblage includes fishes, herpetofauna, testudines, crocodyliforms, pterosaurs, dinosaurs and mammals, representing one of the best-known Late Cretaceous vertebrate biotas in Europe. Theropod dinosaurs are represented by sparse and fragmentary remains, with the paravians *Balaur* and *Elopteryx* being the best-known taxa; however, the overwhelming majority of theropod fossils recovered consists of small, isolated teeth. In this work, we revise the Transylvanian theropod diversity based on isolated teeth, using the collection housed at the University of Bucharest as a starting point. The analysed specimens come mainly from localities from the Hațeg and Rusca Montană basins (ranging from uppermost Campanian? to upper Maastrichtian); additional specimens from the upper Campanian Petrești L0/C locality (Transylvanian Basin) were also included in the analysis, resulting in a total sample of 100 teeth. Scanning Electron Microscopy imaging, morphometric and cladistic analyses were conducted to systematically and quantitatively characterise the teeth. Ten different morphotypes were identified, including two assigned to Dromaeosauridae indet., three to cf. *Richardoestesia* sp. and three to cf. *Paronychodon* sp. One Paraves indet., and one potentially attributable to Avialae were also identified. Previously published Transylvanian theropod teeth were also reviewed and incorporated into these morphotypes. The recognised diversity of morphotypes suggests a relatively rich and taxonomically varied assemblage of small theropods, though the lack of more complete cranial material limits precise taxonomic assignments and hinders the assessment of potential heterodonty and convergence biases.

Acknowledgements: Research is supported by project PID2024-158833OB-I00 funded by MICIU/AEI/10.13039/501100011033/FEDER,UE. MPP is supported by the Basque Country University (postdoctoral grant POSTUPV24/81). EI is supported by the Basque Government (postdoctoral grant POS_2025_1_0025). GB, JM, GK and ZCs-S are supported by the Hungarian National Research, Development and Innovation Office project NKFIH/OTKA FK 146097.

WING MUSCLE ATTACHMENT IN EARLY PARAVIANS AND THEIR IMPLICATION FOR EARLY FLIGHT STROKES

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Keywords: *Paraves, flight evolution, muscle reconstruction, feathered dinosaurs, Mesozoic*

The ability to fly is one of the most striking features of birds. When birds fly, flight is only made possible by the lift and thrust produced by wing movements. The ability to control and change wing shape in a complex flight stroke motion in modern birds should also have been present to some extent in their close relatives, the theropod clade Paraves. However, the relationship between stroke motion and flight capabilities is poorly understood among early paravians. Here, the key muscle positions of wing muscles are reconstructed in several early paravian species (*Microraptor*, *Anchiornis*, *Archaeopteryx*, *Sapeornis*, *Jeholornis* & *Confuciusornis*). After reconstructing relative positions of muscles, including the wrist and manus, further calculations are done based on traditional morphometrics. This project uses projected length between muscle attachments and the degree of protrusion of the humerus head to examine effects of anatomical differences on wing movements. Results reveal similarities in degrees of deltopectoral crest protrusion among earlier paravians (*Microraptor*, *Anchiornis* & *Archaeopteryx*) but show significant difference in the derived *Confuciusornis*. Past research has lacked a comprehensive view on muscular contributions to wing shape change beyond force production. Further study shall aim to narrow down possible motions of the wing in early bird relatives under these newly established parameters, providing additional nuances to paravian aerial locomotion and give new evidence towards determining flight capabilities of extinct species.

Acknowledgements: Thank you to Prof. M. Habib for valuable discussions and critical input regarding the manuscript. This PhD project is funded through the International Joint Supervision of PhD Students Scheme, co-sponsored by The Chinese University of Hong Kong and University of California, Los Angeles.

**FORMATION AND PALEOECOLOGY OF A HIGH-DENSITY AVIAN-DOMINATED
TRACK ASSEMBLAGE AT THE UPPER CRETACEOUS CARRERAS PAMPA
TRACKSITE (TOROTORO NATIONAL PARK, BOLIVIA)**

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Keywords: *avian trackways, Iguanodontidae, Maastrichtian, vertebrate ichnology*

Avian trace fossils are scarce yet important within the Upper Cretaceous vertebrate ichnological record. Recent discoveries in the Maastrichtian El Molino Formation at Torotoro National Park, Bolivia, include abundant avian trackways from Carreras Pampa (CP), recently documented as the world's largest dinosaur tracksite. We present preliminary morphometric, preservational, and paleoecological results from an avian-dominated area on the CP9 track-bearing surface within Carreras Pampa. The surface and tracks were documented using 3D photogrammetry, orthomosaics, drone imagery, and GIS mapping. The track-bearing layer was analyzed using thin sections and SEM. We recorded 648 avian tracks across 284 m², with local densities up to 6 tracks/m². About 150 tracks form 30 trackways assigned to one dominant morphotype (M1) and a minor variant (m1). M1 tracks are medium-sized and anisodactyl; well-preserved specimens show tetradactyly, narrow digits, metatarsal pads, and occasional claw marks. The m1 variant is more asymmetrical, lacks webbing, and shows longer pace and pronounced inward rotation. These features support referral to Iguanodontidae, suggesting shorebird-like trackmakers. Trackway distribution is semi-parallel, locally overlapping, and predominantly westward-directed, in contrast to nearly perpendicular NNW–SSE theropod trackways. Limited overprinting of associated ichnites suggests birds were among the final trackmakers, with repeated surface occupation and behavior likely structured by ecological barriers in a marginal, shallow-lacustrine setting. Preservation was controlled by saturated-substrate conditions and early calcite cementation associated with nested ostracod-rich grains in the uppermost laminae. Thus, CP9 preserves large-scale evidence of gregarious shorebird-like behavior and represents one of the most extensive known Upper Cretaceous avian ichnoassemblages worldwide.

Acknowledgements: Funding provided by the Geoscience Research Institute, project GRI-TT-2025.

REVISITING HISTORICAL *LAGERSTÄTTEN* SPECIMENS: NEW INSIGHTS INTO THE DIVERSITY OF EURYSTERNID TURTLES (THALASSOCHELYDIA)

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Keywords: *Europe, Late Jurassic, morphology, Testudinata*

Thalassochelydia represents the earliest group of turtles to successfully colonize marine environments achieving substantial taxonomic and ecological diversity, particularly during the Late Jurassic in Europe. However, the evolutionary relationships and taxonomy of the group remain poorly resolved. This is largely due to historical biases: many taxa were described in the 19th century based on partial specimens from lithographic limestones, which obscure key anatomical features. In addition, numerous species have not been re-examined since their original descriptions, and many exquisitely preserved specimens remain unstudied. Here, we present the first part of a comprehensive reassessment of eurysternid turtles, a central yet problematic subgroup within *Thalassochelydia*. Our approach integrates morphological revision with advanced imaging techniques, including UV photography, multispectral imaging, and computed tomography, providing access to previously unavailable anatomical information from *Lagerstätten* material. We notably re-examined material from the French lithographic localities of Canjuers and Cerin, together with selected German specimens from the Solnhofen archipelago. Our results reveal high diversity and provide substantial new morphological insights. This work includes revisions of several historical eurysternid taxa not studied since the 19th century, the identification of at least one new species, and the reassignment of additional material to poorly understood taxa. Study of exceptionally preserved specimens from German *Lagerstätten* further indicates high eurysternid diversity and morphological disparity. These results refine current knowledge of eurysternid diversity and morphology and provide a robust framework for resolving the evolutionary history of Late Jurassic marine turtles.

GAIT VARIABILITY AND BIOMECHANICAL RECONSTRUCTION IN EARLY MAMMALIAFORMS: INSIGHTS FROM JURASSIC TRACKWAYS OF PATAGONIA, ARGENTINA

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Keywords: *mammaliaform locomotion, La Matilde Formation, gait transitions, Dynamic Similarity Theory, Middle Jurassic.*

The Middle Jurassic La Matilde Formation of Patagonia, Argentina provides an exceptional record of early mammaliaform activity preserved on volcanoclastic substrates. Whereas previous studies have emphasized taxonomic diversity, this research utilizes exceptionally long trackways of *Ameghinichnus patagonicus* to reconstruct biomechanical parameters. We analyze a unique sequence of approximately 93 steps documenting clear transitions from walking to bounding and vice versa. We introduce a novel approach based on the dynamic similarity theory exploiting stride length at these gait transitions, yielding an estimated hip height of 1.4–2.3 cm. Regression equations based on extant mammals yield an estimated body mass of 110–220 g and femoral adduction angle suggest a posture with more erect forelimbs than hindlimbs, suggesting locomotor adaptations comparable to those of modern terrestrial non-cursorial mammals. The spatial association of these trackways with *in situ* roots, interpreted as araucariaceous based on closely related standing trunks and variable raindrop impressions confirm the preservation of a true tracking surface (sediment-air interface). The primary nature of this surface ensures that the ichnological data represents the original locomotor record, free from significant post-depositional deformation. This high-resolution ichnological record allows for the validation of motion models using fossil trackways as "ground truth" bridging the gap between footprint morphology and functional morphology. Our findings offer a rare behavioral snapshot of early mammaliaforms, demonstrating how gait variability and substrate interaction can reveal the functional ecology of extinct vertebrates in dynamic volcanic landscapes.

Acknowledgements: This research was supported by the Georg Forster Research Fellowship (Alexander von Humboldt Foundation)

RECONSTRUCTING LIFE HISTORIES OF LATE CRETACEOUS EUTHERIANS: TRAITS FROM BONES AND TEETH

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Keywords: *cement, dental replacement, recording structures, bone microstructure*

Considering a handful of isolated bones or teeth, we may forget that fossil mammals were once born, lived, and eventually died, the same way as modern ones. Each specimen has its own story, and can be characterized by growth rate, maturation period, and lifespan. In reconstructing these life histories, we have to draw clues mostly from bone and dental tissue. However, the hard tissues that form the mammalian skeleton and teeth hold a lot of information preserved in their structure. First, the recording structures (tissue accretions) document a variety of periods, from daily deposition events to the annual ones. Second, the dental eruption sequence can be informative on maturation and general lifespan pattern (e.g., via Schultz's Rule). We studied dental replacement pattern (macro scale) and the fine accretion layers of the cementum at the base of the crown (micro scale) in juvenile (the former) and adult (the latter) specimens of the Late Cretaceous Mongolian stem placental *Kennalestes gobiensis*, using a propagation phase-contrast synchrotron tomography. *Kennalestes* dental replacement according to Schultz's Rule follows that of long-living animals, where all premolars are replaced before the eruption of the ultimate molar. The number of the cementum accretion lines of an adult animal (4-6) also indicates at least a few years' lifespan, which is much longer than today's shrew and closer to some rodents or tenrecs. It suggests that Late Cretaceous eutherian mammals might have had growth rates and life histories similar to those of small modern Afrotheria or Glires.

Acknowledgements: I thank Dr. Kathleen Dollman from the European Synchrotron and Radiation Facility (ESRF), Grenoble, France, for synchrotron scanning.

**PALAEOHISTOLOGY HELPS UNRAVELLING A HIGH TAXONOMIC DIVERSITY
IN AN EARLY CRETACEOUS FISSURE FILLING FROM GERMANY**

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Keywords: *Lower Cretaceous, histology, dinosaurs, deep paleokarst*

Early Cretaceous continental deposits are rare in Central Europe. An exception is a locality in Balve-Beckum in western Germany, providing an insight into a Barremian-Aptian upland fauna. There, vertebrate remains including fishes, amphibians, reptiles and mammals are preserved in karst caves. These are typically disarticulated, mostly fragmented bones and teeth, making the identification of the diverse faunal remains challenging. The reliability of identifying individual elements varies between groups: the site has yielded several amphibian and mammal taxa, while other groups are known in less detail so far. This is where a microstructural analysis of the bones, especially of large animals, becomes important for taxonomic identification on higher clade level. Here we describe thin sections from 15 bone fragments in order to determine whether such differentiation is possible. Despite a large variety of preservational stages on morphological level, the studied bones retained excellent characters on a microscopical level. We used characters such as degree of remodelling, vascularization pattern and tissue type to group the sectioned bones and broaden their taxonomic position, allowing a general classification on clade level. The thin sections were divided into seven groups based on the variation of their palaeohistological characters. By combining morphological and histological characters we could assign a sectioned bone to represent various groups of archosaurs in general or differentiate between dinosaur groups that are already known from the locality, namely iguanodontians, hypsilophodontids, ankylosaurs, ornithomimosaurs, tyrannosaurids, dromaeosaurids and titanosauriforms. This study shows that macroscopically unidentifiable material can still be scientifically valuable by studying it microscopically.

**A TALE OF TWO RIVERS– CONTRASTING PALAEOONTOLOGICAL AND
TAPHONOMICAL FEATURES OF TWO UPPERMOST CRETACEOUS FLUVIAL
SUCCESSIONS AT SEBEȘ-GLOD LOCALITY
(TRANSYLVANIAN BASIN, ROMANIA)**

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Keywords: *Maastrichtian, Sebeș-Glod, taphonomy, fluvial system*

The Sebeș-Glod (SbG) fossiliferous locality, in the southwestern Transylvanian Basin (Romania), comprises Maastrichtian continental, palaeo-channel and floodplain deposits distributed across five sub-localities (SbG/A–E). The locality has yielded diverse vertebrate assemblages (titanosaurs, hadrosauroids, theropods, crocodyliforms, pterosaurs) and it is best known as the type-locality of the theropod *Balaur bondoc* and the azhdarchid *Eurazhdarcho langendorfensis*. Our study aimed to compare the palaeontology and taphonomy of two sub-localities, SbG/B and SbG/D, in order to refine palaeoenvironmental interpretations. In addition, we investigated detrital zircon assemblages for U-Pb geochronometry and source-area identification. Taphonomic analyses were conducted focusing on fossil fragmentation, weathering, abrasion, articulation, and spatial distribution, alongside sedimentological observations. SbG/B is characterized by higher-energy palaeo-channel deposits interbedded with floodplain sediments, whereas SbG/D includes small- to medium-sized channels associated with SbG/B-type floodplain beds, being dominated by crevasse-splay deposits indicative of lower-energy conditions - contrasting depositional settings that strongly influenced fossil preservation. At SbG/B, isolated fossils are usually fragmented and abraded, suggesting significant transport and reworking; smaller elements (e.g., vertebrae) frequently lack processes, while larger specimens are often broken. The assemblages are dominated by smaller, disarticulated remains, with few larger elements, consistent with prolonged exposure and advanced sorting. Meanwhile, SbG/D yielded a range of small to large fossils that are generally more complete, occasionally articulated, and preserve fine surface details, indicating shorter transport and more rapid burial. These differences indicate pronounced variability in taphonomic processes between two closely spaced sub-localities, documenting a dynamic fluvial system with variable energy levels during the latest Cretaceous on Hățeg Island.

**PLANT DIVERSITY AND DEPENDENCY DROVE ECOSYSTEM DYNAMICS
PRIOR TO THE CRETACEOUS-PALAEOGENE EXTINCTION WITH DIETARY
DIVERSITY AIDING SURVIVORSHIP**

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Keywords: *palaeoecosystem modelling, ecosystem dynamics, extinction*

There is fierce debate concerning the taxonomic diversity of dinosaurs before the Cretaceous-Palaeogene mass extinction caused by the Chicxulub impact. While some studies have suggested dinosaurs were in overall taxonomic decline, others suggest the opposite, with potential regional variation. The decline in diversity has been associated with less resilient ecosystems (i.e., more prone to structural change) prior to the impact. Here we assess the stability of dinosaurian ecosystems using the R package *cheddar* to model the food webs of the Hell Creek Formation in the last two million years of the Cretaceous. This analysis identifies previously recognised shifts in floral composition prior to the K–Pg boundary and suggests these changes may have affected dinosaur ecology. Dinosaurian gregarious behaviour likely impacted ecosystem structure, and we find evidence that *Tyrannosaurus* likely had some degree of gregarious behaviour due to its slow growth rate, as otherwise juveniles and sub-adults would be highly vulnerable to predation by the contemporary *Nanotyrannus*. Gregarious behaviour likely made species less susceptible to predation prior to the impact, but with the reduction in resources after the impact, gregarious species were more vulnerable to extinction. Terrestrial Hell Creek food webs appear to have been strongly plant-dependent, and limited evidence for alternative resource use suggests that floral disruption at the K-Pg boundary may have increased competition among surviving herbivorous taxa. Mammals relied on more diverse food sources, likely aiding survivorship. The ability to assess ecosystems prior to ecological perturbation can highlight regional variation in resilience and collapse mechanisms.

Session 3: MESOZOIC VERTEBRATE EVOLUTION AND FUNCTIONAL MORPHOLOGY**ASSESSING THE NECK MOBILITY OF *TANYSTROPHEUS* THROUGH BIOMECHANICAL ANALYSES**

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Keywords: *finite element analysis, Triassic, Archosauromorpha, Blender, cervical anatomy*

Extremely elongate necks have convergently evolved in several amniote lineages. The development of such a feature brings with it advantages in obtaining food items, but also biomechanical challenges, such as flexibility, stability, lift, and inertia. These characteristics are highly affected by the morphology and number of cervical vertebrae, which were especially numerous in aquatic forms (50+ in some plesiosaurs and trachelosaurids). In contrary, in a particularly long-necked aquatic Triassic archosauromorph *Tanystropheus* the neck was composed of relatively few (13) cervical vertebrae, some of which are extraordinarily elongated, slender and accompanied by rod-like, overlapping ribs. This unique anatomy makes *Tanystropheus* one of the most extreme examples of neck elongation in tetrapod evolution. Understanding its function provides insights into the limits of neck elongation in amniotes and the evolution of morphological novelties in Triassic reptiles. Here we present the first quantitative biomechanical analysis of the *Tanystropheus* neck using a digital model based on three-dimensionally preserved bones. We assessed its range of motion and performed finite element analysis on the individual cervical ribs and the neck model in different configurations. Our results indicate that the neck of *Tanystropheus* was not extremely stiff, as previously postulated. The cervical ribs were relatively flexible, and may have transmitted both compressive and tensile forces during movements of the neck. *Tanystropheus* and some plesiosaurs likely shared a comparable range of motion of the neck. This study elucidates the bauplan of an extremely specialised animal and brings us closer to understanding the patterns of achieving neck elongation in vertebrates.

Acknowledgements: We thank everyone involved in the excavations in Miedary, technicians that prepared the studied specimens, as well as the curators and colleagues that made our collection visits possible. This study was supported by the Polish National Science Centre grant 2020/39/O/NZ8/02301 (awarded to T.S.).

EXPLORING THE SKULL OF *EOABELISAURUS MEFI* (EARLY JURASSIC, ARGENTINA): OSTEOLOGICAL DESCRIPTION AND NOVEL INSIGHTS INTO THE CRANIAL ANATOMY OF EARLY CERATOSAURUS.

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Keywords: *Dinosauria, Averostra, Cañadón Asfalto Formation, Toarcian, Patagonia*

Ceratosauria is one of the main lineages of Theropoda (Dinosauria) that splits in three main clades: Ceratosauridae, Noasauridae and Abelisauridae. However, there is still no consensus on their interrelationships and the placement of some early ceratosaurs, including *Eoabelisaurus mefi*. *Eoabelisaurus*, from the Toarcian Cañadón Asfalto Formation (Chubut, Argentina), is the most complete pre-Late Jurassic ceratosaur. It was originally described as the oldest-known member of the Abelisauridae, but this assignment remains disputed. So far, this important taxon has only received a preliminary description. Here we present an update on the cranial osteology of *Eoabelisaurus* and evaluate the importance of its character combination for our understanding of the early evolution of Ceratosauria. *Eoabelisaurus* shows several cranial autapomorphies, such as a posterodorsal bulge on the lacrimal, or paired foramina below the occipital condyle. The taxon also exhibits a unique combination of characters, many of which are present in other, often unrelated ceratosaurs, such as a paracondylar recess extending up to the half-height of the foramen magnum (shared with *Ceratosaurus*), or a marked step in the jugal process of the postorbital (shared with brachyrostran abelisaurids). A revised phylogenetic analysis of ceratosaurs still recovers *Eoabelisaurus* as the earliest branching abelisaurid, but when only analyzing cranial characters, a position inside Ceratosauridae is as parsimonious as the position at the base of abelisaurids. Thus, a detailed comparison of its cranial morphology with that of other ceratosaurs will certainly provide new insights into the cranial morphological evolution in the early evolutionary history of this group.

Acknowledgements: Financial support by the European Commission under the Marie Skłodowska-Curie Postdoctoral Fellowship Programme (HORIZON-MSCA-2021-PF-01- 101062912) and the DFG-Projects RA 1012/9-1 and CU 525/2-1. Thanks to Eduardo Ruigomez for access to the specimen at the Museo Paleontológico Egidio Feruglio (MPEF), and Ethel Denning for the 3D surface scans of the holotype.

**LIKE FATHER, LIKE SON: THE BODY DIMENSIONS OF SUBADULT
*TARBOSAURUS BATAAR***

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Keywords: *Tarbosaurus*, body dimensions, center of mass

Tarbosaurus bataar is a large representative of the Tyrannosauridae, a clade of carnivorous dinosaurs including the famous *Tyrannosaurus rex*. An almost complete skeleton of a subadult *T. bataar* (ZPAL MgD-I/3) was found in 1964 in the Late Cretaceous Nemegt Formation exposed at the Tsagaan Khushuu locality, Mongolia. This skeleton is ideal for digitally reconstructing the whole body and testing questions about musculoskeletal biomechanics across growth and phylogeny in Tyrannosauridae. Each bone of the individual was digitized, so the bone meshes could be articulated in a straightened ‘reference pose’. The only missing elements consist of the premaxillae, dentary, and distal part of the tail, which were supplemented from a similar-sized individual of *Ta. bataar*. 3D shapes of body segments were constructed in order to calculate segmental mass properties and estimate the center of mass (CoM). The obtained results were compared to previous models of an adult *Tyrannosaurus rex* and *Nanotyrannus lethaeus*, (previously considered a juvenile *Ty. rex*). There was a dorsal shift of the CoM position in the ontogeny of large tyrannosaurids, as it occurs in extant archosaurs. The skeletal and body dimensions of the subadult *Tarbosaurus bataar* are in general similar to adult *Tyrannosaurus rex*, but different from *N. lethaeus*. Subadult *Tarbosaurus* and adult *Tyrannosaurus* had a proportionally longer trunk, shorter fore- and hindlimbs, and shorter head and neck. We infer that the body proportions present in subadult individuals of large tyrannosaurids did not change substantially as the individuals grew to their adult size.

Acknowledgements: Funding for this work was received from the National Science Centre, Poland, grant no. 2019/35/B/NZ8/02292. We are grateful to all participants of the Polish–Mongolian paleontological expeditions (1965–1971) conducted as part of cooperation between Poland and the Mongolian Academy of Sciences.

DIETARY RECONSTRUCTION OF *NEMEGTOSAURUS MONGOLIENSIS*: IMPLICATIONS FOR ITS CONVERGENCE WITH DIPLODOCOIDEA

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Keywords: *dinosaurs, sauropods, paleoecology, dentition, Cretaceous*

Nemegtosaurus mongoliensis, known from the Late Cretaceous of Mongolia, is a titanosaurian, the only sauropod clade that survived until the end of the Mesozoic Era. Its holotype skull (ZPAL MgD-I/9) was discovered in 1965 during the Polish–Mongolian paleontological expeditions in sediments directly at the boundary of the Nemegt and Baruungoyot Formations. Previous research on the Late Cretaceous Mongolian sauropods focused primarily on their osteology and phylogeny, herein we explore the paleobiology of *N. mongoliensis*. This titanosaur possessed a narrow-crowned dentition restricted to the anterior portion of the snout, a feature convergent with Diplodocoidea – clade of sauropods that went extinct more than 20 Ma before the end of the Cretaceous. The environments represented by the two Geological Formations cooccurred for some time (during the Maastrichtian) but represent two distinct habitat types: a humid inland delta (Nemegt Formation) and a semi-arid environment with ephemeral watercourses (Baruungoyot Formation). We performed a dental microwear texture analysis using CLSM (confocal laser scanning microscope) of the *N. mongoliensis* teeth. The obtained data were compared to other sauropods analyzed thus far and provided insights into the diet of *N. mongoliensis* and the environmental conditions where it lived. The results indicate that the diet of *Nemegtosaurus* was highly variable (dietary generalist) and involved the ingestion of significant amounts of abrasive particles (e.g., sand grains), suggesting that its primary habitat was the semi-arid environment represented by the Baruungoyot Formation.

Acknowledgements: The project was funded by the “Excellence Initiative – Research University” program for the University of Wrocław, and the statutory activities of the Department of Paleozoology and the Institute of Paleobiology. We would also like to thank Katarzyna Przestrzelska for conservation work, and all participants of the Polish–Mongolian paleontological expeditions (1965–1971), conducted as part of cooperation between Poland and the Mongolian Academy of Sciences.

**‘HE’S NOT ALL THERE’: SUSPENSION-FEEDING IN THE NIOBRARA SEAWAY
AND THE NOT-ALWAYS-OSSIFIED FISH THAT DID IT**

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Keywords: *Niobrara*, *pachycormid*, *Platylithophycus*, *Coniacian*, *Bonnerichthys*

The Niobrara Formation of the western United States has been heavily explored by paleontologists since Cope’s first expedition in 1870. Recent reviews of historical Niobrara collections combined with fieldwork with good stratigraphic data have greatly expanded our picture of the diversity of fish, revealing an unexpected number of suspension feeders. Strangely, given their notoriously poor ossification, suspension feeding bony fish were some of the very first fossils discovered, with Cope describing the axe-like pectoral fins of “*Protosphyraena*” (now *Bonnerichthys*) *gladius*. *Platylithophycus* was discovered in the early 20th century and misidentified first as an alga and later as a sepiid (echoing the bizarrely divergent misinterpretations of other fragmentary and poorly ossified suspension-feeder remains). These remains were reevaluated and redescribed respectively as a suspension feeding pachycormid (in 2010) and elasmobranch (in 2018). *Bonnerichthys* appears to be restricted to the Santonian-Campanian portion of the Niobrara, with the single *Platylithophycus* specimen localised to the middle Santonian. Recent discoveries of isolated suspension feeder gill baskets from the Coniacian have erroneously been assigned to *Platylithophycus*, however inspection under ultraviolet illumination shows that they actually belong to a bony fish. Similar ghost baskets have been identified previously in the much older *Leedsichthys*. Coincidentally, small isolated pachycormid hypurals matching the morphology of *Bonnerichthys* have also been discovered in these intervals. The morphological nature of these head and tail parts indicate that they may belong to the same older and much smaller suspension feeding pachycormid, bridging the Western Interior Seaway time interval between *Bonnerichthys* and the Turonian *Rhinconichthys*.

Acknowledgements: We would like to thank Mike Triebold for supporting these collecting and donation efforts, as well as Mike Everhart for donating specimens and Allison Bronson for images and enlightening discussion.

Session 4: CENOZOIC VERTEBRATE EVOLUTION & PALAEOECOLOGY**RESCUE PALAEOONTOLOGY AND A NEW URSID-BEARING KARST CAVE
FROM NORTHERN APENNINES (LUCCA, ITALY)**

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Keywords: *karst cave, ursids, photogrammetry, Pleistocene*

The karst systems of the Tuscan area of the northern Apennines represent a key archive of Late Quaternary vertebrate remains. Known since the early nineteenth century, these caves, such as Tecchia di Equi, Grotta all'Onda, and the karst cavities of the Monti Pisani have yielded abundant cave bear remains and other extinct mammals. However, many of these cave assemblages were collected without systematic excavations and are chronostratigraphically poorly constrained. Accordingly, assessing faunal associations, such as the co-occurrence of two bear species and potential human-bear interactions, remains challenging. The new ursid-bearing locality of “Buca delle Fate” cave (BdF), Coreglia Antelminelli (Lucca, Italy), represents a rare setting to test niche partitioning between ursid lineages and to target future radiocarbon, isotopic and biomolecular analyses. Preliminary osteological analysis identifies both *Ursus arctos* and *Ursus spelaeus* within the same stratigraphic layer, in a clay-rich deposit with gravels and disarticulated bones. The ursid material is represented by complete hemimandibles, partially preserved crania and postcranial remains belonging to juvenile, subadult and adult individuals. As an active karst system, BdF presents major challenges for palaeontological recovery because hydrologically driven reworking is rapidly destroying spatial and stratigraphic information. We combined stratigraphic logging with metrically controlled close-range photogrammetry of the fossiliferous deposit, to generate repeatable 3D models of deposit architecture and a full 3D record of the diagnostic ursid elements, enabling future quantitative comparisons with Tuscan reference collections.

Acknowledgements: We thank the Soprintendenza ABAP per le province di Lucca, Massa Carrara e Pistoia for permits and the Gruppo Speleologico Lucchese for logistical support. This project is supported by the Università di Pisa under the ProArcheo - Call for co-funding of Archaeological and Geo-paleontological Research at the University of Pisa.

**THE VERTEBRATE PALAEOONTOLOGICAL COLLECTION AND EXHIBITIONS
OF THE G.A.M.P.S. (FLORENCE PROVINCE, ITALY): A PRECIOUS TESTAMENT
TO THE TUSCAN NEOGENE-QUATERNARY MARINE AND TERRESTRIAL
PALAEOENVIRONMENTS OF TUSCANY**

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Keywords: *museology, Italy, Pliocene, marine mammals, geoheritage*

Museums that effectively convey the geological and palaeontological heritage of their local territories remain relatively rare. In this context, the permanent exhibition of the Gruppo AVIS Mineralogia e Paleontologia Scandicci (G.A.M.P.S.) in Badia a Settimo (Scandicci, Florence Province, central Italy) is particularly noteworthy. Established in 2014, the exhibition houses extensive mineralogical and palaeontological collections, serving as a central platform for public education and academic collaboration with research institutions. The extensive fossil vertebrate collection mainly originates from the Pliocene (5.3 – 2.6 Ma), a period when Tuscany was shaped as a number of shallow marine basins stretching at the foot of the Northern Apennines under warm, humid climatic conditions where a broad diversity of mostly thermophilic species could thrive. Notable marine mammals on display include several skeletons of the dugongid *Metaxytherium subapenninum* and replicas of the monodontid *Casatia thermophila* from Arcille (Grosseto), and specimens of the delphinid *Etruridelphis giulii* and monachine seal *Pliophoca etrusca* from the Siena Province. A dedicated gallery displays a nearly complete balaenopteroid whale skeleton from Castelfiorentino (Florence), alongside a rich assemblage of elasmobranch teeth, including those of the frilled shark *Chlamydoselachus lawleyi* from the Sienese hills. Terrestrial mammal remains mainly derive from the recently explored La Serra and Fauglia localities of the Pisa Province, offering promising insights into the palaeoenvironments and biochronology of Italy. By integrating research, conservation, and innovative display solutions, the G.A.M.P.S. exhibition comprises an exemplary model for the promotion and communication of the Tuscan geoheritage.

**THE *LAGERSTÄTTE* OF CHIAVON (VICENZA, N ITALY): A FORGOTTEN
TROPICAL ICHTHYOFAUNA OF THE VENETO REGION**

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Keywords: *teleostei, Lagerstätte, Paleogene, northern Italy*

The Paleogene *Lagerstätten* of northeastern Italy preserve a remarkable diversity of exceptionally well-preserved fossil fishes, including the Ypresian shallow-water and bathyal assemblages of Bolca (Verona and Vicenza), Solteri (Trento), and Monte Solane (Verona), as well as the Rupelian coral-reef-associated fauna of Perarolo (Vicenza). These sites play a pivotal role in documenting the early Cenozoic radiation of teleosts, a time marked by the major evolutionary expansion of acanthomorphs and other teleostean lineages.

Within this framework, the Chiavon site (Vicenza province) represents a historically important yet still understudied fish-bearing *Lagerstätte*. First reported in the mid-nineteenth century, Chiavon yielded a diverse and distinctive ichthyofauna that, in some respects, parallels that of Bolca. Although several taxa were described in early studies, a modern revision of the assemblage is still lacking. Fossil material collected during the nineteenth and twentieth centuries is dispersed across several Italian museums and the Naturhistorisches Museum in Vienna. These collections have remained largely neglected for more than a century, as the last comprehensive study dates to 1889, with some significant specimens of the old collections last examined in 1863 or never studied in detail.

The ongoing taxonomic revision has revealed an assemblage dominated by clupeiforms, gonorynchiforms and percomorphs (e.g., Carangidae, Sparidae). Furthermore, its lower Oligocene assignment, proposed by Fabiani in 1915 after years of intense debate, requires modern biostratigraphic reassessment. More refined and robust chronological constraints for the Chiavon assemblage are essential to assess the significance of its ichthyofauna within the broader evolutionary history of Paleogene Tethyan fish communities.

NEW DATA ON THE VILLAFRANCHIAN VERTEBRATE FAUNA OF KOS ISLAND (DODECANESE, GREECE) FROM A HISTORICAL COLLECTION

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Keywords: *Kos Island, Greece, vertebrate fauna, Early Pleistocene, Villafranchian*

The island of Kos is located in the Southeastern Aegean and has been a site of paleontological research for over 150 years. Early paleontological explorations were conducted by Forsyth-Major, Desio, and Airaghi between 1885 and 1935, while recent studies by Willmann, Van der Meulen, and the present authors have updated the stratigraphic context of both historical and newly discovered fossil occurrences. Alongside these published records, important historical material was found to have remained undocumented. During a large-scale digitization project at the Museum of Geology and Paleontology of Athens, an unpublished collection of vertebrate remains from Kos Island collected by Prof. Nikolaos Symeonidis during the 1970s was uncovered. According to archival documentation, the material originates from at least two fossiliferous sites situated in the broader area between the villages of Antimacheia and Kardamena. The collection reveals a diverse Early Pleistocene vertebrate fauna consisting of 12 taxa. We report the first evidence of the castorid *Castor* sp. from the fossil record of Kos. Other identified taxa include the proboscideans *Anancus arvernensis* and *Mammuthus meridionalis*, the machairodontid *Homotherium* sp., the rhinocerotid *Stephanorhinus* cf. *etruscus*, the equid *Equus* cf. *stenonis*, the bovids *Leptobos* sp. and *Gazella* sp., as well as the cervids small sized *Cervus* sp. and *Croizetoceros* sp. Representatives of the herpetofauna include the testudinid *Testudo* sp. and the geoemydid *Mauremys* sp. This faunal assemblage suggests that Early Pleistocene eustatic lowstands created recurrent land bridges with the Anatolian Peninsula, which enabled the dispersal of the Villafranchian megafauna into the present Aegean island of Kos.

NEW SPECIMEN AND CT SCAN DATA OF A FOSSIL GAVIALOID FROM THE YPRESIAN OF THE ISLE OF SHEPPEY, UK

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Keywords: *Crocodylia*, *Gavialoidea*, *endocranial anatomy*, *Eocene*, *London Clay*

Crocodylian interrelationships remain highly debated, and especially the phylogenetic placement of fossil gavialids and “tomistomines” are uncertain, as their phylogenetic tree has seen major changes in topology in recent studies. Description of new materials and improved character sampling among early taxa is crucial in resolving these phylogenetic issues and in clarifying the evolutionary history of Gavialoidea. Here, we describe a newly found longirostrine crocodylian skull and an associated lower jaw and osteoderm from London Clay deposits of the Isle of Sheppey, UK. Anatomical comparison to a range of extinct and extant crocodylians reveals that it likely belongs to *Kentisuchus spenceri*, which is known from the same locality and of a similar geological age. The new specimen is well-preserved and highlights new morphological characters for this taxon, such as the presence of a quadratojugal spine and the fusion of the two nasal bones, the latter being unique among crocodylians. Segmentation of micro-Computed Tomography (μCT) scan data reveals additional endocranial characters, including the absence of a pneumatic recess in the parietal, which it shares with the extant *Tomistoma schlegelii*. Our study thus provides relevant new anatomical data that can be used in future phylogenetic studies and could aid resolving long-standing issues of gavialoid systematics.

Acknowledgements: Funding was provided by FWO grant 11PM124N to SACMB.

HIDDEN DIVERSITY UNCOVERED: MICROCT REVEALS NEW PLIOCENE SALAMANDRIDS FROM THE CAMP DELS NINOTS KONSERVAT-LAGERSTÄTTE (SPAIN)

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Keywords: *Pleurodelini, Spain, Pliocene, micro-Computed Tomography, Konservat-Lagerstätte*

Caudates, one of three extant amphibian lineages, are a diverse clade that depends on aquatic environments for reproduction and development and serve as important palaeoecological indicators. Fewer than 10% of Neogene caudates are preserved as articulated skeletons, with Lagerstätte occurrences even rarer, and most described as two-dimensional remains that underestimate their true morphological diversity. The exceptional preservation at Camp dels Ninots Konservat-Lagerstätte offers a rare opportunity to examine these taxa in greater anatomical detail. We used micro-computed tomography scans (μCT) to identify the Pliocene-aged CN caudates and compare these with species within every generic group within known Salamandridae across Eurasia. We found that the CN salamandrids are most closely related to species referred to the extinct genus *Chelotriton*, with close affinities to the Asian salamandrid genera *Echinotriton* and *Tylotriton*. As the most recent articulated specimens of *Chelotriton*, these CN species offer a valuable opportunity to investigate morphological factors that may have contributed to their extinction in Europe, and to constrain the timing of divergence between *Chelotriton*, *Echinotriton*, and *Tylotriton* during the Cenozoic. The CN *Chelotriton* species also represent the most recent occurrence of the genus in Spain, previously thought to have gone extinct during the Miocene, suggesting a longer persistence, potentially linked to later climatic stability. However, their absence from modern European faunas, despite records from the late Pliocene of France, indicates that subsequent climatic shifts may have ultimately driven their extinction.

Acknowledgements: Marie Skłodowska-Curie Actions Postdoctoral Fellowship (EU project 101207917–PlioCaudates, RMF). Spanish Ministry of Science and Innovation Project EX2OPP (PID2024-157622NB-I00, H-AB). AGAUR Fellowship 2022FI_00383 (FG). Generalitat de Catalunya projects CLT009/22/00043 and 2021-SGR01238 (AGAUR); 2023PFR-URV-01238 (URV); CERCA Programme; “María de Maeztu” excellence accreditation (CEX2024-01485-M). ERC-2021-STG META-MOPHOSIS SERI-funded(M822.00039, A-CF).

SQUAMATE ASSEMBLAGE FROM THE LATE MIOCENE OF GRYTSIV (UKRAINE) AND ITS IMPLICATIONS FOR PARATETHYAN BIOGEOGRAPHY

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Keywords: *Colubroidea, eastern Paratethys, Grytsiv, Late Miocene, palaeoecology*

The Late Miocene locality of Grytsiv (MN 9), in western Ukraine, preserves one of the most taxonomically diverse squamate assemblages known from the Eastern Paratethys margin. We present new lizard and snake material representing at least eight taxa, including Lacertidae, cf. Scincidae, Anguinae, Scolecophidia, Booidea, and at least two colubroids (*Natrix* sp., cf. *Dolichophis* sp.). These findings extend the eastern range of several lineages typically associated with Central European Neogene faunas. The ecological structure of the Grytsiv assemblage suggests warm-temperate, seasonally dry conditions, within a heterogeneous landscape combining open habitats with localised freshwater environments. Unlike the pronounced faunal turnover documented in western European mammal communities during the Vallesian Crisis, the Grytsiv squamate assemblage shows no clear evidence of disruption. We interpret this persistence as reflecting ecological flexibility of squamates and the buffering effect provided by habitat heterogeneity along the Eastern Paratethys margin. Grytsiv thus underscores the importance of Eastern European records for understanding spatially variable responses to Late Miocene environmental change and offers a valuable framework for integrating squamate data into continental-scale biogeographic reconstructions.

Acknowledgements: I.3.4 Action of the Excellence Initiative – Research University Programme at the University of Warsaw (Project PARADIVE to Kenneth De Baets, Institute of Evolutionary Biology, University of Warsaw), Narodowe Centrum Nauki grant OPUS 2022/47/B/ST10/02686 awarded to M. T., and OPUS 2023/49/B/ST10/02631 to G. L. G.

**CRANIAL OSTEOLOGY AND ONTOGENETIC ASSESSMENT OF A PARTIALLY
ARTICULATED SUB-ADULT *MALPOLON* SP. (SERPENTES: PSAMMOPHIIDAE)
FROM THE EARLY PLEISTOCENE OF QUIBAS (SE SPAIN)**

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Keywords: *Colubroidea, cranial anatomy, Jaramillo subchron, ontogeny, south-eastern Iberian Peninsula*

Cranial remains of snakes are rarely preserved in the fossil record, dominated by isolated vertebrae, thus often hampering reliable taxonomic and ontogenetic interpretations. Despite *Malpolon* representing one of the best-documented psammophiid genera in the European fossil record, most occurrences are based almost exclusively on vertebral material, limiting our knowledge about important morphological features related to the skull. Here we describe a partially articulated colubroid from the Early Pleistocene of Quibas (SE Spain) preserving a partially disarticulated portion of the skull and vertebrae, representing an exceptional occurrence for fossil colubroids. The specimen is investigated through microCT scanning, detailed osteological description, and comparative analysis with extant taxa. Quantitative analyses of trunk vertebrae are combined with an ontogenetic framework based on a developmental series of *Malpolon monspessulanus*. Although vertebral metrics fall slightly outside the typical range of adult *Malpolon* specimens, the integration of cranial morphology and ontogenetic data supports the interpretation of the Quibas specimen as a subadult individual of *Malpolon* sp. This study highlights the importance of incorporating ontogenetic perspectives when interpreting fossil snakes and cautions against taxonomic overinterpretation based solely on isolated vertebral remains especially when they belong to juvenile specimens.

CONVERGENT EVOLUTION OF VERTEBRAL COMPLEX STRUCTURES AMONG SNAKES FROM THE CENOZOIC OF EUROPE

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Keywords: snakes, Erycidae, Charinidae, Tropidophiidae, vertebral morphology.

A few snake taxa from the Cenozoic of Europe, spanning from the early Eocene up to the Quaternary, possess an unusual and rather complex vertebral morphology (particularly in their caudal region), comprising additional articulations and apophyses. These are the early Eocene “*Calamagras*” *gallicus*, the early–middle Eocene *Rageryx*, the middle–late Eocene *Cadurceryx*, the Oligo-Miocene *Bransateryx*, the Miocene *Albaneryx*, and the Miocene–Quaternary *Eryx*. All these have been traditionally considered as belonging to “erycines”, a traditional taxonomic concept that supposedly united the extant Old World *Eryx* and New World *Charina* and *Lichanura*, all sharing, among other features, the presence of highly complex structures in their caudal vertebrae. However, most recent phylogenetic analyses, aided mainly by molecular evidence, have strongly challenged their monophyly: *Charina* and *Lichanura* comprise the family Charinidae (the sister group of Ungaliophiidae), while *Eryx* is much distantly related, forming the monotypic Erycidae. This complex topology leaves major questions on the affinities of the extinct European forms, as it is not clear whether some of these represent charinaids or erycids (or something else). The most peculiar of these extinct taxa, *Cadurceryx*, was recently revised: detailed assessment of its anatomy and intracolumnar variation demonstrated that this taxon possessed complex vertebral structures not only in the tail region (as in erycids and charinaids) but throughout the entire vertebral column. Moreover, *Cadurceryx* was tentatively assigned to Tropidophiidae, thus aptly implying that the evolution of complex structures in vertebrae has convergently evolved in distantly related snake groups across the Cenozoic of Europe.

Acknowledgments: I acknowledge funding from the research project no. 2023/49/B/ST10/02631 financed by the National Science Center of Poland (Narodowe Centrum Nauki).

COMPLEX BIOGEOGRAPHICAL PATTERNS REVEALED BY NEW SPECIES OF FOSSIL SNAKES FROM THE OLIGO-MIOCENE OF SOUTH AMERICAA.F. Alfonso Rojas^{1*}, J.J. Head¹¹ Department of Zoology, and University Museum of Zoology, University of Cambridge, Downing Street, CB2 3EJ, Cambridge, U.K.

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Keywords: *Miocene, Pebas System, Colubroidea, Alethinophidia, biogeography*

The Miocene of South America represents a pivotal interval in the establishment of modern snake faunas. By this time, several extant booid lineages including *Eunectes*, *Epicrates*, *Boa*, and *Corallus* were already present, and fossils of colubroids, the most diverse clade of living snakes, had begun to appear across the continent. During the first two decades of the 21st century, numerous Oligocene and Miocene localities in Bolivia, Peru, Colombia, Venezuela, and Panama have yielded an expanding record of fossil snakes.

Here we present multiple colubroid fossils, including at least two new species, as well as a new lineage of a widespread non-caenophidian alethinophidian snake. These colubroid fossils provide unambiguous support for molecular biogeographical hypotheses proposing the arrival of colubroids to South America from North America prior to the Miocene, with a potential dispersal route via Central America. The fossils also display a broad range of vertebral morphologies, indicating that colubroids were already a diverse clade by the Miocene, particularly within the Pebas System. Additionally, a new species of large-bodied non-caenophidian snake recovered from multiple depositional environments across northern South America suggests the existence of an ecologically diverse lineage capable of dispersing from Andean settings to the Greater Antilles.

Acknowledgements: We acknowledge our collaborators from Bolivia, Colombia, Peru, Panama, Venezuela for granting us access to the fossils. AFAR is funded by The Gates Cambridge Trust and President's Student Research Award from The Paleontological Society. JJH is funded by NERC NE/W007576/1

VIRTUAL ENDOCASTS OF *HYRACHYUS MODESTUS* AND THE NEUROSENSORY EVOLUTION OF EARLY RHINOCEROTOIDEA

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Keywords: *Perissodactyla*, *Rhinocerotoida*, *Hyrachyus*, *neocortex*, *endocast*

Rhinocerotoida are a key clade within Perissodactyla, whose early evolutionary history is closely tied to major ecological and climatic shifts during the Paleogene. Nevertheless, the timing and nature of the neuroanatomical changes that led to brain evolution of the modern rhinoceroses remain poorly understood. It is unclear whether early forms exhibited brain features similar to the extant rhinos or retained more plesiomorphic traits of stem perissodactyls. Using a new 3D endocast, we examine the endocranial anatomy of *Hyrachyus modestus* from the middle Eocene of Wyoming. We made comparisons with living rhinos (*Ceratotherium simum*, *Diceros bicornis*), the fossil rhinocerotoid *Amyrnodon advenus* (middle Eocene), and the phenacodontid “condylarth” *Phenacodus primaevus* (early Eocene). The objectives of this study are to describe brain morphology, cranial nerves, and vascular structures, quantify key endocranial features, and assess the emergence of rhinocerotoid neuroanatomical traits within an evolutionary framework. Our results indicate that *H. modestus* retains a relatively basal endocranial structure, sharing with *P. primaevus* an elongated brain, moderately prominent olfactory bulbs, and limited neocortical expansion, with a partial dorsal exposure of the midbrain. However, it also exhibits some derived features, as a gyrencephalic neocortex and partial differentiation of the trigeminal pathways. In contrast, *C. simum* and *D. bicornis* show a more globular brain with expanded cerebral hemispheres and a more developed venous sinus system, and *A. advenus* displays an intermediate condition. These findings support *Hyrachyus* as a transitional genus between stem and early perissodactyls and provide new insights into the early evolution of the rhinocerotoid brain.

Acknowledgements: CERCA Programme/Generalitat de Catalunya; Ayuda RYC2023-042630-I financiada por MICIU/ AEI /10.13039/501100011033 y por el FSE+, H2020-MSCA-IF-2018-2020, 792611, ERC Starting Grant 756226, Philip Leverhulme Prize. HORIZON-TMA-MSCA-PF-EF 101202227 to OC.

CAN THE OTIC REGION RESOLVE INTRAFAMILIAL RELATIONSHIPS? A CASE STUDY WITH CAMELIDS

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Keywords: *artiodactyl, Camelidae, phylogenetics, otic region*

Over 100 extinct species of camelid have been described, but most hypothesized camelid relationships have not yet been tested using modern morphological phylogenetic methods. Recent work on other families has indicated that the internal otic region is useful for resolving intrafamilial relationships. To test whether this is true for camelids, we compiled a petrosal, bony labyrinth, and ear ossicle dataset of 28 living and extinct camelid species that we subjected to species-level and specimen-level parsimony and Bayesian phylogenetic analysis. Our results suggest that, while the internal otic region can recover some important relationships, additional lines of evidence are needed. In the species-level analyses, only the genus *Camelus* was recovered as monophyletic with additional support for Camelini and Camelinae in the Bayesian results. In our specimen-level analyses, none of the living taxa were recovered as monophyletic, although all *Camelus* specimens were consistently grouped together with one specimen of *Titanotylopus*. Of the extinct taxa with multiple specimens, only the species *Stenomylus gracilis* was monophyletic. None of the analyses supported the currently hypothesized relationships among the extinct camelids aside from extinct camelines within Camelinae. Based on our dataset, some aspects of the internal otic region are highly conserved and other aspects, particularly of the petrosal bone, are extremely variable. Because of this, there may simply be too few character states shared by only closely related taxa to produce meaningful results. Going forward, we suggest that these internal otic data are best used when combined with characters from other parts of the skeleton.

Acknowledgements: This research was partially funded by an NSERC Discovery Grant awarded to JM Theodor, and an AMNH Theodore Roosevelt Memorial Grant, an SVP Mary R. Dawson Predoctoral Fellowship Grant, a Pal. Soc. H. Richard Lane Student Research Award, and an ABS Student Research grant awarded to SV Robson.

TOOTH MORPHOLOGY REVEALS CONTRASTING EVOLUTIONARY HISTORIES OF LEPORIDS AND OCHOTONIDS (LAGOMORPHA)

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Keywords: *allometry, geometric morphometrics, disparity, Leporidae, Ochotonidae*

The two major lagomorph groups show significant differences in distribution, body size, and evolutionary history. While ochotonids reached great diversity during the Oligocene and Miocene, there is currently only one genus, mostly restricted to the harsh environments of Central Asia. In contrast, leporids have diversified extensively since the Pliocene, achieving great diversity and rapidly expanding across a wide variety of environments on most continents. However, the factors underlying these different trajectories remain poorly understood. We studied the morphology of the p3 premolar to determine whether its shape and size evolved differently across lagomorph groups throughout their evolutionary history. We built an informal supertree including all described fossil and extant species, using published phylogenies and taxonomic information, resolving polytomies stochastically in Python (*TACT*) and scaling the tree with the R package *paleotree*. Using 2D geometric morphometrics on the occlusal surface of p3, we quantified tooth shape and size, and their disparity through time. Our results show that the stem species exhibited high shape disparity but small sizes. Within the ochotonids, which maintained small sizes, Prolagidae exhibited less shape diversity, while stem Ochotonidae initially explored diverse tooth shapes but later reduced disparity. Leporids, despite their very low shape diversity, expanded their size range, abandoning small sizes and reaching much larger sizes. These results show contrasting evolutionary trajectories within Lagomorpha, where high morphological disparity does not necessarily lead to evolutionary success, highlighting the role of body size in leporid expansion. This reflects the complex interaction of ecological, functional, and climatic factors driving lagomorph evolution.

Acknowledgements: We thank the curators and collection managers of the AMNH, USNM and MACV. This is a contribution by the research group UCM 910607, financed by the MICIU through projects PGC2018-094955-A-I00, PID2020-116220GB-I00, PID2022-138275NB-I00, PID2024-155435NB-I00. A.Q. is funded by CT58/21-CT59/21 from the UCM. I.M. is funded by the Deutsche Forschungsgemeinschaft (DFG) – 579767752.

COMPARATIVE MASTICATION ANALYSIS OF PALEOGENE HYRACOID DENTITIONS REVEALS STRONG DIET-INDEPENDENT FUNCTIONAL TRENDS

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Keywords: *Hyracoidea, mastication, tooth function, Paleogene*

Hyracoidea were predominant herbivores in the Paleogene faunas of Africa ranging from rabbit to rhino size. Examination of the masticatory process and dental features of extant and Paleogene hyraxes provides insight into their dietary adaptations and ecological role in the environments. Based on the mapping of wear facets and orientation of striations, a digital simulation of the masticatory cycle is reconstructed using the Occlusal Fingerprint Analyser software. The existence of a buccal cutting edge along the upper molar-premolar row as a key character of extant hyraxes can be determined as a functional element in all studied fossil hyracoids. As evident from a predominant phase I of the power stroke, with contact between the buccal cutting edges of lower and upper molars, this structure is utilized in extant hyraxes for a lateral ingestion of the food. This mode of food ingestion by the buccal edges of the molars is unique to hyraxes and has not been observed in any other herbivores so far. A similar function can be inferred for the studied Paleogene hyracoids by introducing a shear-cutting function along the ectoloph of the molars into the mastication process, irrespective of differing dietary adaptations in the remaining dentition. This usage is further supported by the observed wear stages and microwear patterns on the buccal cutting edges, supporting a continuous self-sharpening function through all wear stages, as established for extant hyraxes.

Acknowledgements: Funding was provided by the German Research Foundation (DFG) – Project MA 1643/27-1.

A EUROPEAN BEAR-DOG IN OREGON & THE TIMING OF GIANT AMPHICYONID MIGRATION

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Keywords: *Amphicyonidae*, *Oligocene*, *John Day Formation*, *migration*

The migration of two giant amphicyonid genera from Eurasia, *Ysengrinia* and *Amphicyon*, represents one of the most important additions to the Oligo-Miocene carnivoran fauna of North America. Fossils from the Great Plains suggest that this migration took place in two waves early in the Miocene, with *Ysengrinia* arriving no earlier than 23.0 Ma and *Amphicyon* no earlier than 18.8 Ma. An isolated metacarpal from the Oligocene (29.0-28.5 Ma) John Day Formation of Oregon, however, may indicate a much earlier arrival of giant Eurasian amphicyonids to North America. It lacks the elongation and strong distal keels that typify the metapodials of large temnocyonines and daphoenines, the two major lineages of endemic amphicyonids. Conversely, it is less robust, though longer, than the metapodials of the mustelid *Megalictis*, the other large-bodied carnivoran of Oligocene North America. It is, however, comparable in size and morphology to material of *Amphicyon major* from Sansan, France, potentially pushing back the date of migration for this genus by at least 5.5 Ma. Even more remarkably, this would predate all reported Eurasian *Amphicyon* of which we are aware, even the published occurrences from the Oligocene localities of Rott, Germany, Rickenbach, Switzerland, and Benara, Georgia. Further comparative work including European specimens is necessary to determine whether the John Day metacarpal can be definitively assigned to *Amphicyon* or any other genus of amphicyonid. Alongside reassessment of giant amphicyonid fossils from the Oligocene of Eurasia, this will help clarify the timing and biogeography of an important carnivoran migration event.

Acknowledgements: The fossil described here was found in the territory of the Confederated Tribes of the Warm Springs.

CT-BASED ANALYSIS OF CRANIAL EVOLUTION IN MEDITERRANEAN HIPPOPOTAMUSES

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Keywords: *Hippopotamidae*, *endocast*, *insularity*, *CT scanning*, *paleoneurology*

Computed Tomography (CT) and 3D morphometric analysis provide a non-destructive framework for investigating different cranial features. Here, we focus on hippopotamuses by comparing virtual crania and endocasts of the two extant species, *Hippopotamus amphibius* and *Choeropsis liberiensis*, with the insular species *Hippopotamus pentlandi* from the Pleistocene of Sicily (Italy), as well as with other fossil representatives of the genus *Hippopotamus*. *H. pentlandi* exhibits unique features among insular dwarf hippopotamuses. Unlike other insular species, such as *H. madagascariensis*, which retain juvenile cranial proportions, *H. pentlandi* exhibits a cranial morphology more consistent with the late-stage ontogeny of continental counterparts. Insular hippopotamuses also tend to show high convergence and frontation in their orbital position. This trait is also observed in *H. pentlandi* but to a lesser degree, implying divergent morphological pathways among insular dwarf hippopotamuses. Building on these observations, we also generated high-resolution CT-based 3D reconstructions of the endocranial cavity of *H. pentlandi*. CT scans were acquired at the Laboratory of Biomedical Imaging of the Institute of Clinical Physiology – CNR in Pisa and at the Department of Animal Medicine, Production and Health, University of Padua. Image segmentation of the endocranial cavity was performed with Slicer3D (<https://www.slicer.org/>). Although severely damaged, the extracted endocast reveals some peculiar features of internal morphology and allows new considerations on fossil and extant representatives of the genus. By integrating internal cranial anatomy with broader phylogenetic and biogeographic questions, this study aims to clarify the position of *H. pentlandi* relative to living hippopotamuses and to evaluate how insular conditions shaped neuroanatomical evolution in Mediterranean Hippopotamidae.

Acknowledgements: This work is supported by “StrEngthEning the ItaLIan network of the European research InFrastructure EuroBioImaging”, acronym “SEELIFE” (Project No. IR0000023, CUP B53C22001810006), funded by the European Union’s NextGenerationEU under the MUR call 3264/2021 PNRR M4/C2/L3.1.1.

PLEISTOCENE HIPPOPOTAMIDAE DIVERSITY IN EUROPE: UNTANGLING AN EVOLUTIONARY STORY TROUGH A MULTIPROXY APPROACH

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Keywords: *H. antiquus*, Middle Pleistocene, cranial variability, microwear analysis

The Hippopotamidae family was once a key component of the European megafauna. Despite this, the morphological and phenotypic variability of European hippopotamuses has not been fully untangled. Within this research context, a comprehensive examination of Pleistocene specimens from Central and Western Europe enables a reevaluation of phenotypic variability in hippopotamuses, indicating possible mandibular trends among the later representatives of *Hippopotamus antiquus*. In contrast to the pre-Jaramillo (approximately 1 million years ago) mandibles of *H. antiquus*, those from the Middle Pleistocene exhibit a lower slenderness index, suggesting a shift towards a slenderer mandibular structure. More commonly, remains attributed to late representatives of *H. antiquus* possessed higher orbits, a shorter and more pronounced sagittal crest, a reduced post-orbital area, and prominent condyles, while their mandibles displayed a slender mandibular corpus and remarkably small second lower incisors. This study also highlights a peculiar difference among male and female mandibles within the same population of *H. antiquus* and *H. amphibius*, further evidencing that an accurate evaluation of the cranial variability must also take sexual dimorphism into account. Dental microwear analyses further support a potential dietary transition or shift between early and late populations of *H. antiquus*. Pre-Jaramillo forms appear to have primarily consumed soft, possibly aquatic plants, whereas the later populations likely incorporated a greater proportion of herbaceous vegetation into their diet.

Acknowledgements: RM was supported by the Fundação para a Ciência e a Tecnologia (FCT) (2021.08458.BD, Research Unit UIDB/04035/2020), SYNTHESIS+ [DE-TAF-TA4-063 2022], and PALASS [PA-SB202402]. DF was supported by a Humboldt Research Fellowship (Alexander von Humboldt Foundation). LP was supported by the University of Pisa (Fondi di Ateneo 2024, No. 579999).

THE DWARF *HIPPOPOTAMUS CREUTZBURGI* FROM THE PLEISTOCENE OF CRETE: CRANIODENTAL MORPHOLOGY, SEXUAL DIMORPHISM, AND DIGITAL RECONSTRUCTION

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Keywords: *Hippopotamidae*, *insular evolution*, *Pleistocene*, *skull*, *digital reconstruction*

Hippopotamus creutzburgi is the dwarf hippo that lived on Crete during the Early and Middle Pleistocene. Fossil material from Katharo Plateau was examined and compared to other extinct insular hippos from the Mediterranean and Madagascar, the extant hippopotamid species, and its hypothetical ancestor, *H. antiquus*, to assess its craniodental morphology. Although the species underwent a body-size reduction, its skull is not a simple scaled-down model of those of its mainland relatives. Instead, it follows the general mammalian trend where smaller cranial size correlates with a relatively shorter muzzle. *H. creutzburgi* has a muzzle length comparable to that of the Malagasy *H. madagascariensis*, while its palate is proportionally narrower, similar to *H. lemerlei*. The mandible is slender and displays pronounced sexual dimorphism, with a robust morph, interpreted as male, showing a longer symphysis and enlarged canines, and a more gracile morph interpreted as female. The upper molars are proportionally wider than those of other hippopotamids, and lower incisor wear patterns indicate a limited lateral masticatory movement, similar to *H. antiquus* and *H. amphibius*. However, the dorsoventral flattening of the fossils from Katharo Plateau obscures the overall cranial shape. To visualize the undistorted skull, a digital retrodeformation approach was applied. Specimens were digitized using photogrammetry. Retrodeformation was carried out in Blender, utilizing animation-based tools and Boolean modifiers to dissect, undistort, reassemble, and combine elements from multiple specimens into a complete cranium with anatomical accuracy. This reproducible methodology enables the reconstruction of deformed fossils without compromising the physical integrity of the original specimens.

DENTAL MICROWEAR ANALYSIS REVEALS TROPHIC NICHE PARTITIONING AMONG PLIO-PLEISTOCENE PROBOSCIDEANS FROM THE APENNINE PENINSULA

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Keywords: *gomphotheres, mammoths, browsing, Valdarno, Piedmont*

Proboscideans play a key role in habitat modification and are crucial for palaeoenvironmental and palaeoclimatic reconstructions. Dental Microwear Analysis (DMA) was applied to mastodon (*'Mammuthus borsoni'*), gomphothere (*Anancus arvernensis*) and mammoth (*Mammuthus meridionalis*) teeth from the Italian Pliocene–lowermost Pleistocene to investigate dietary patterns and associated environmental changes. Several hundred dental casts were obtained from multiple cusps per tooth and subsequently analysed under a stereomicroscope. The final dataset comprises two teeth of *'M. borsoni'* (Pliocene, Piedmont), 74 teeth of *A. arvernensis* (Pliocene–lowermost Pleistocene, Tuscany and Piedmont), and 15 teeth of *Mammuthus meridionalis* (lowermost Pleistocene, Tuscany). The limited sample of *'Mammuthus borsoni'* exhibits a higher frequency of pits than scratches, consistent with a pure browsing behaviour. Large puncture pits and gouges are associated with hard-object feeding (e.g., seeds), along with cross scratches from oblique mastication. *Anancus arvernensis* displays a marked variability, especially in the frequency of scratches relative to pits, resembling microwear patterns from extant elephants. Hypercoarse scratches are consistent with bark consumption, and large puncture pits are widespread, indicating a browse-dominated mixed-feeding diet. *Mammuthus meridionalis* exhibits more pits than scratches, frequent large puncture pits and gouges, and rare hypercoarse scratches. Approximately half of the mammoth samples fall within the 'dirty browsing' ecospace, suggesting dust ingestion. These results support trophic niche partitioning among the three genera and are consistent with increasing aridity from the Pliocene to the early Quaternary in Italy.

Acknowledgements: The authors wish to express their gratitude to the curators of the palaeontological collections for access to the analysed fossil teeth. This research was supported by the EAVP Research Grant 2025 and by The Palaeontological Association (Research Grant PA-RG202602).

STILL IN THE SHADOW OF THE DINOSAURS: EVIDENCE FOR AVIAN PREDATION DRIVING NOCTURNALITY IN SMALL MAMMALS

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Keywords: *mammals, nocturnal bottleneck, predation, biotic interactions*

This study investigates the extent of evolutionary pressure by predatory birds on small mammals. Using neontological datasets of predatory bird and small mammal body masses, diets and activity patterns, we show that small mammals are significantly more likely to be nocturnal than the larger-sized species. We apply allometric scaling laws to estimate potential prey body size distributions of vertebrate-feeding hypercarnivorous birds. Using species-level mammal phylogenetic trees we investigate the timelines of temporal niche change in mammals. Our results suggest that bird predation pressure has been restricting a significant fraction of small mammals to the nocturnal niche, giving support to the nocturnal bottleneck hypothesis.

Acknowledgements: This study was supported by the grant S-MIP-24-62 BretEvoGeneralized.

TIMESCALES OF LARGE MAMMAL MACROEVOLUTIONA. Spiridonov^{1*}, S. Lovejoy², S. Bekeraitė¹¹Department of Geology and Mineralogy, Vilnius University, Vilnius, Lithuania²Physics Department, McGill University, Montreal, Quebec, Canada.

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Keywords: *mammals, macroevolution, Haar fluctuations, structure functions*

Evolution is a multiscale process operating over a wide range of time and space scales. Recent studies have shown that there is a possibility that macroevolution (i.e., diversity of changes by means of origination and extinction of species) can exhibit different scaling regimes at different time scales. Here we analyze the time series of large terrestrial mammal (Carnivora, Perissodactyla and Artiodactyla) species diversity using Haar fluctuations which are used in constructing the so called structure functions, which show how the average magnitude of fluctuations depends on the time scale of measurement. The analysis revealed three regimes of large mammal macroevolution: first at shorter time scales, peaking around 2 – 2.5 Ma intervals, with distinct variability patterns. The short-term variation is followed by stabilization at around 4 Ma intervals, then at longer time intervals up to tens of Myrs the positive scaling regime ensues. It implies the dominance of long-term trends. These time scales are interpreted as elements of the macroevolution timescale and are identified as: “turnover pulse”, “short-term” or “transient diversity stabilization”, and “long-term diversity drift”.

Acknowledgements: The study was supported by the project S-MIP-24-62 "BretEvoGeneralized".

**DEEP-TIME PALEOENVIRONMENTS IN EASTERN AFRICA: ECOMETRIC
ANALYSIS OF A 30-MILLION-YEAR RECORD OF LARGE MAMMAL
HERBIVORES FROM THE TURKANA BASIN**

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Keywords: *Turkana Basin, Cenozoic, paleoenvironments, large herbivorous mammals, dental ecometric prediction*

The East African Rift (EAR) has historically been a hub for scientific endeavor and the focus of extensive research into evolutionary dynamics in response to profound environmental changes, as well as early human evolution. Among the regions within the EAR, the Turkana Basin preserves the longest near-continuous stratigraphic sequence, with fossiliferous deposits ranging from the Oligocene to the Holocene. While numerous studies provide a relatively detailed picture of the Late Miocene to Pleistocene environments in the region, earlier periods are still poorly understood; the few existing proxies from these older strata suggest an intricate landscape with high habitat heterogeneity. We apply predictive modeling using dental functional traits of large herbivorous mammal communities to reconstruct paleoenvironmental conditions throughout the Turkana Basin's extensive stratigraphic sequence. This ecometric approach integrates functional traits from native Afrotheria (incl. Embrithopoda, Hyracoidea, Proboscidea), Paleogene immigrants (incl. Primates, Anthracotheriidae), and taxa arriving during the Great Old World Biotic Interchange, such as bovids, suids, and giraffids. We use multiple predictors including several types of machine learning models combined into computational ensembles for robust and precise prediction of the paleoclimatic conditions and paleohabitats of the region through time. Our results provide new insights into long-term environmental shifts across key phases in Earth history including the collision of the Afro-Arabian and Eurasian landmasses, the Mid Miocene Climatic Optimum, the Messinian desiccation event, and the widespread proliferation of C4 grasslands in the terminal Cenozoic. Within this pivotal region, we elucidate variation and temporal trends in paleoenvironments underpinning faunal and early human evolution.

Acknowledgements: Research Council of Finland, project no. 354228 to IŽ; The Finnish Society of Sciences and Letters to IŽ and AKP; Turkana Basin Institute Ape and Human Evolution Research Fund to JG and AKP; Research Council of Finland, project no. 340775 to JJS.

RECONSTRUCTING MIOCENE CLIMATE CHANGE IN THE SIWALIK USING HERBIVORE COMMUNITY DENTAL TRAITS

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Keywords: *ecometrics, paleoecology, Miocene, paleoclimate reconstruction, Siwaliks*

The Siwalik fossil record preserves one of the most continuous terrestrial archives of environmental change in South Asia during the Miocene, a period of major climatic and ecological transitions. However, the timing and nature of these changes remain debated because of complex links between Himalayan uplift, monsoon evolution, and regional ecosystems. Here we reconstruct climatic trends in the Siwaliks of Pakistan (~18-6 Ma) using dental traits of large herbivorous mammals. Community-level dental traits provide functional indicators of vegetation structure and environmental conditions, enabling quantitative paleoclimate inference. Our results reveal a progressive ecological transition from humid forested environments in the Early Miocene to increasingly open and seasonally dry habitats in the Late Miocene. Community dental traits show a marked increase in hypsodonty and other aridity-adapted morphologies after ~12 Ma, consistent with declining precipitation and the spread of more open-adapted vegetation. These patterns align with other vegetation proxies indicating increasing aridity and the expansion of grass-dominated ecosystems. Our results, provide independent trait-based evidence for a long-term drying trend in the Siwaliks during the Miocene and clarify the ecological context of faunal turnover and vegetation change associated with the emergence of South Asian monsoonal ecosystems. Although this transition broadly coincides with Late Miocene ecological restructuring across the Old World, the Siwalik record suggests gradual and regionally modulated trajectory. These differences likely reflect the influence of monsoon dynamics and Himalayan uplift on South Asian ecosystems, highlighting the importance of regional terrestrial archives for understanding how global climatic shifts are translated into local environmental change.

Acknowledgements: Research was funded by the EDUFI and the Nordenskiöld Society in Finland, as well as the Research council of Finland (grant no 340775 to JS; grant no. 354228 to IŽ). We thank the "Siwalik Work Group" for localities data. Ecometrics data was collected from published sources by SZ, IŽ, LL and JS.

EXPERIMENTAL AND ACTUALISTIC BONE WEATHERING: INSIGHTS FROM A MEDITERRANEAN ECOSYSTEM (DOÑANA NATIONAL PARK, SPAIN)

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Keywords: *bone weathering, experimental taphonomy, actualistic taphonomy, Mediterranean ecosystems, Doñana National Park*

Bone weathering, defined in 1978 by Anna K. Behrensmeyer, is a key taphonomic process for inferring exposure time and paleoenvironmental conditions. The existing framework is largely delivered from African savanna contexts and has remained poorly evaluated in Mediterranean climates. This study integrates experimental and actualistic data from Doñana National Park (Huelva, Spain) to assess bone weathering variability across different spatial and temporal scales. An experimental assemblage of ungulate bones has been monitored over eight years, with annual recording of weathering stages and associated climatic variables (temperature, humidity, precipitation, and solar radiation). In parallel, a modern bone assemblage comprising 2.8842 elements (MNI = 280) collected through systematic transects across ten distinct habitats within Doñana National Park has been analyzed. Weathering stages distributions were evaluated in relation to environmental, taxonomic, and anatomical variables using statistical analyses. Results show that, within the experimental framework, weathering progression is slower at Mediterranean climatic regime compared to African tropical savannas. The natural assemblage exhibits a heterogeneous distribution of weathering stages, with significant differences across habitats, taxa, body mass, ontogenetic stage, and skeletal element type. Comparison between both approaches suggests that the experimental study capture the general weathering trends under the climatic context of Doñana National Park, but that weathering patterns in natural systems are modulated by other more specific factors such as (micro)habitat conditions and organismal traits. This study provides an integrative framework combining experimental and actualistic taphonomy, contributing to refine the interpretation of bone weathering in Mediterranean ecosystems and its application in vertebrate paleontology.

Acknowledgements: We thank ICTS-Doñana for providing the meteorological data and the Scientific Collections of the EBD-CSIC for letting us conduct our experiment in their Doñana enclosure. This study is part of UCM 910607 Research Group. Funding was provided by MSCA-700196 project (European Union's Horizon 2020) and PID2022-138275NBI00 project (Spanish Government).

TAPHONOMIC EVIDENCE FOR THE SOUTHERNMOST PLEISTOCENE HYENA DENNING AND CANNIBALISM IN ASIA: YAI RUAK CAVE, PENINSULAR THAILAND

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Keywords: *Pleistocene, cave, Spotted hyena, cannibalism, Peninsular Thailand*

This paper presents a detailed taphonomic analysis of a late Middle Pleistocene carnivore-accumulated bone assemblage from Yai Ruak Cave, Krabi Province, southern Thailand, representing the southernmost evidence of Pleistocene hyena denning activity currently known in Asia. The assemblage includes an associated rhinoceros mandible and vertebral cache, together with the first documented evidence of cannibalism by *Crocota crocota ultima* in the region. Surface modifications, including bite marks, polishing, digestion etching, furrowing, and extensive fragmentation, indicate intensive carnivore processing of skeletal remains. Stratigraphic concentration, spatial clustering, and layered accumulation patterns suggest repeated or prolonged occupation of the cave by hyenas over time.

Patterns of selective bone destruction, variation in bite mark size, and evidence of caching behaviour strongly support the interpretation of the site as a long-term family den occupied by both adult and juvenile individuals. These findings provide rare insight into the behaviour, palaeoecology, and behavioural flexibility of late Pleistocene hyenas, including their exploitation of large megafauna within tropical Southeast Asia. More broadly, the study expands the known biogeographic range of spotted hyenas in Asia and highlights the importance of tropical cave deposits for reconstructing predator-prey dynamics, trophic webs, and previously unrecognised carnivore behaviours in underexplored regions of Southeast Asia.

Acknowledgements: We thank geologists from Mineral Resources Office Region 4, Department of Mineral Resources, Surat Thani: Mana Rugbumrung; technicians Niwat Wattanayomnaporn, Manatthawut Chusaeng; Krabi Caving Club; Satapat Kumpitak; Chulalongkorn University; Pattamon Yontraksakul; Katakrit Chaisuwan; Plai Phraya SAO; funded by Fossil Management Fund 2022 (DMR), K.S., Winifred Violet Scott Fund, H.E.A awarded.

Session 5: FOSSILLEGAL 2026

‘FOSSILLEGAL’: TEN YEARS ONJ.J. Liston^{1*}¹Earth Sciences, Utrecht University, Princetonlaan 8A, 3584 CB Utrecht, The Netherlands.

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Keywords: *ethics, geoscience training, social media, academic entitlement, fossil protection*

In 2016, the European Association of Vertebrate Palaeontologists held the 1 day ‘FossilLegal’ symposium as part of its 14th annual meeting, hosted in Haarlem by the Teyler’s Museum. The symposium attracted a diverse range of speakers, predominantly directly invited by the organizer, with the objective of putting opposing perspectives relating to ethical issues within vertebrate palaeontology in direct juxtaposition for the audience. From public institutions withholding specimen access to private collections available to science, international partnerships to academic exploitation of intellectual capital and scientific resources in other territories, the weaknesses of legislation intended to protect fossil material and the ethical blindness of some academic publishers, it was a heady mix of polarizing issues whose discussion was often avoided in order to avoid professional disagreements. The event yielded an unexpected degree of consensus, understanding and agreement, prompting other organisations, including the Society of Vertebrate Paleontology, to attempt to follow the example, with limited success. Only a few months after FossilLegal, Donald Trump became US President and social media began to change, bending towards algorithms that provoked anger and threats of violence. This meant that when the next big vertebrate fossil issues emerged, the online discourse on social media would prove much darker and more destructive. This session attempts will review the new post-FossilLegal ethical landscape for vertebrate palaeontology, both in terms of progress and risks, and suggest means of mitigation for emerging issues going forward.

FROM COLONIAL LEGACY TO GLOBAL INTEGRATION: HOW WAR TRANSFORMED UKRAINIAN VERTEBRATE PALAEONTOLOGY

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Keywords: *colonial legacy, palaeontology, Ukraine, war, internationalization*

Science is deeply shaped by historical and social contexts, and vertebrate palaeontology in Ukraine provides a striking example of how colonial legacies and war can transform a discipline. Our study analyses 1,968 publications spanning 1721–2025 to investigate how Russian imperialism and subsequent conflicts have influenced Ukrainian palaeontology. Unlike the ‘parachute science’ often documented in the Global South, Russian colonial practices reshaped Ukrainian palaeontology conceptually, linguistically and institutionally, suppressing Ukrainian scientists, restricting language use and relocating specimens to metropolitan museums. Breakpoint modelling reveals distinct phases in publication output, with sharp declines during Stalinist repressions, World War II and the 2014 occupation of Crimea. Language dynamics closely mirror political pressures: Russian dominated until 2014, while English became the primary medium thereafter, reflecting rapid international integration. Collaboration networks show a long-standing dominance of Ukrainian and Russian institutions, but after 2014 Ukrainian researchers increasingly forged independent global partnerships, while Russian influence declined. Specimen deposition patterns highlight the removal of Crimean fossils to Russian museums, in violation of international conventions. These findings demonstrate how colonialism and war have profoundly shaped the trajectory of Ukrainian vertebrate palaeontology, while the resilience and internationalization of Ukrainian science since 2014 mark a decisive break from entrenched structures. By situating palaeontology within broader socio-political processes, our work underscores the importance of acknowledging historical biases and highlights the transformative role of conflict in reshaping scientific landscapes.

CHALLENGES AND CHANCES IN COLONIAL VERTEBRATE PALAEONTOLOGY COLLECTIONS

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Keywords: *colonial natural history collections, digitisation, tangible evidence*

Ongoing debates surrounding colonial natural history collections and the generally increasing awareness of colonial heritage are changing our perspectives on the collections we scientifically use and manage. The objects in these collections need to be understood simultaneously as both scientific and cultural objects, which leads to very different demands on them, including acknowledging and incorporating perspectives from people in the countries of origin of the specimens into our daily collection-based work. It is understood that colonial natural history collections need to open up in a specific way in order to increase their transparency and accessibility, for which digitisation, recognised as a potent research method, is the first step. Digitising a colonial collection requires a comprehensive strategy that focuses on contextualisation, avoids perpetuating colonial narratives and is transparent about possible biases within the records. In our work with the colonial Tendaguru collection, digitization includes 3D digitisation of the physical objects and proper metadata, paradata and provenance data assessment, collection, storage and accessibility strategies, with adherence to the FAIR and CARE Data Principles. Beyond digitisation, using non-destructive approaches of documenting specimen data, e.g., CT scans of unprepared material, helps to preserve a unique record of colonial field practices. Active preservation and documentation of historical field practices should become an integral part of the research and collection management strategies used to preserve colonial collection specimens as life documents of palaeontological excavations under colonial conditions and thus increase the awareness of fellow scientists for the multiple perspectives one can have on a dinosaur bone.

Acknowledgements: This research is funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) - Project number 511945957 (SCHW-1452/10-1). We thank the many African workers, who over many hours of hard and exhaustive work excavated, labelled, packed and transported the colonial Tendaguru material on which this study is based.

**Session 6: COLLECTION, METHODS AND INNOVATION IN VERTEBRATE
PALAEOLOGY**

**AN ARCHOSAUMORPHA STRATIGRAPHIC DATABASE AND ITS
APPLICATIONS**T. Forêt^{1*}, S. Jouve¹, M. Laurin¹, J. Cubo¹, G. Didier²¹Centre de Recherche en Paléontologie-Paris, Sorbonne Université, Museum National d'Histoire Naturelle,
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Keywords: *Archosauromorpha, database, Triassic, stratigraphy, body Size*

The Triassic is a key period in the diversification of many vertebrate groups, including Archosauromorpha. Although the timing of events like the Triassic/Jurassic Extinction Event is well-documented, the relative timing of the associated responses remains relatively unclear. Although a wide array of methods provides stratigraphic information about terrestrial paleoenvironments, such data remain scarce and keeping up-to-date information may be difficult. Finally, given that body size is a key indicator of macroevolutionary patterns, keeping track of this information is essential. To answer these questions, we assembled a new dataset on Triassic-Early Jurassic Archosauromorpha, structured into two components: (1) stratigraphic occurrences of species-level archosauromorph fossils, with up-to-date bibliography; (2) paleontological data, including taxonomic affinities and anatomical measurements related to body size (e.g., femur length...), used to evaluate morphological disparity, a proxy for biological diversification. The dataset covers all nominal species of Archosauromorpha from their origin to the Sinemurian. The database contains 506 archosauromorph species and provides information about 130 lithostratigraphic units. We explored possible applications of our database. First, gathering information from published literature, we generated a population of supertrees including the species of this database. Then, we applied Phylogenetic Comparative Methods to investigate the factors influencing the diversification of Archosauromorpha at key Triassic events. Bias associated to the Signor-Lipps effect may lead to erroneous interpretations regarding the clade's response to an extinction timing and dynamics, we performed an analysis, using the Fossilized Birth Death model, allowing to estimate diversification and extinction rates and computing the extinction age distribution of different clades.

PROBLEMS OF TRACK-TRACKMAKER CORRELATION IN PHYLOGENETIC APPROACHES TO TRACKWAY DATA

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Keywords: *ichnology, phylogenetics, ichnotaxonomy, Mesozoic, Palaeozoic*

To seek trace fossil classifications based on morphological differences, that are in turn caused by morphological distinctions between trace-producing animal groups, is a common procedure in vertebrate footprint ichnology. The concept of synapomorphy-based correlation of trace fossil taxa (ichnotaxa) and trace-producing animal taxa (orthotaxa), should in theory allow for a phylogenetically-informed interpretation of trace fossil data. In practice, however, with the aim to infer character evolution, the relative paucity of characteristic features in trace fossils and extramorphological variation are complicating such approaches. Other problems can be the scarcity of complete articulated autopodia, evolutionary convergence and unclear phylogeny. As a consequence, some ichnogenera (or higher-level groupings like „chirotheriid“ and „grallatorid tracks“), especially those with long stratigraphic ranges and multiple occurrences, often represent paraphyletic groupings. Despite the case that young records of such an ichnotaxon can be consistently related to a specific monophyletic orthotaxon, older records might represent a different related orthotaxon and the causative set of features shared by both be symplesiomorphic. This aspect is often ignored in studies that try to prove the early origin of an animal group (orthotaxon) based on an older record of a supposedly correlating ichnotaxon. Here we reconsider methodological approaches of relating ichnological data to vertebrate phylogenies – to derive best practices for future studies. Among others, we recommend the use of stratigraphically, geographically and morphologically homogeneous subsets of well-established ichnotaxa instead of ichnotaxa per se for trace-tracemaker correlation. We strongly advice against correlations without a clear ichnotaxonomy and without optimal morphological preservation. Furthermore, we encourage the consideration of alternative correlations and alternative phylogenies when evolutionary change in ichnological features is tackled – to find hypotheses that are more robust than those that rely on only one scenario.

VISUALIZING AND QUANTIFYING BIOAPATITE PRESERVATION IN DENTAL FOSSILS OF VERTEBRATES

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Keywords: *bioapatite, rare earth elements, cathodoluminescence, energy dispersive X-Ray spectroscopy, fossil vertebrates.*

Assessing the preservation quality of fossil hard tissues such as bone, dentine, enamel or enameloid is fundamental for research that utilizes this material as a source of biogeochemical data. Isotopic and elemental proxies derived from fossil bioapatite rely on specimens which have not experienced significant late-diagenetic alteration to accurately reflect palaeobiology or the environmental conditions in the past. In this study, we combine high-precision major, trace and rare earth element (REE) compositional data obtained through in-situ geochemical analysis with optical micro-cathodoluminescence (CL) imaging to visualize potential biomineral preservation in fossil vertebrate remains. We show how optical micro-CL can provide a useful, at-a-glance indication of REE replacement and discuss how this technique can be used to supplement quantitative geochemical analysis. In addition, we compare mineralized tissues, enamel, enameloid, and dentine, from aquatic vertebrates from the Devonian (Svalbard) and Cretaceous (Australia) – dental scales, dental plates and teeth – to assess the impact of histology on REE distribution. We present REE profiles, obtained through Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), which are indicative of the level of diagenetic alteration. The distribution of REE overlaps the CL imaging, as well as secondary and minor element concentrations mapped using Energy Dispersive X-Ray Spectroscopy (EDS). We conclude that optical CL imaging aligns with quantitative geochemistry, and can be used as a more accessible, non-destructive (or less-destructive) way to screen for diagenesis, allowing us to evaluate the preservation levels across different histologies of fossil teeth.

THE SHAPES OF SHARK TEETH: FROM MORPHOMETRICS TO AI

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Keywords: *morphometrics, classification, CNNs, automation, chondrichthyes*

In Chondrichthyes, isolated teeth constitute the majority of available fossil evidence due to their cartilaginous skeletons. Identifying and classifying these teeth consistently is a long-standing challenge in the field, and one that computational approaches may help to solve. Traditional methods describe tooth shape using a combination of manual and mathematical tools. In geometric morphometrics, often, the positions of comparable anatomical points are manually recorded across specimens. Meanwhile, landmark-free methods, such as tools within elastic shape analysis, capture the continuous outline of the tooth. The differences between shape descriptors, whether landmarks or outlines, can be quantitatively compared across taxa. Classical machine learning algorithms have shown promise when applied to such descriptors for automated classification. Expanding on this, deep convolutional neural networks (CNNs) can classify directly from raw images using learned visual features. Here, we systematically compare multiple approaches for automatically capturing and classifying fossil shark tooth morphology. We demonstrate that automated classification is achievable with high accuracy, although classifier performance varies with dataset composition and morphological complexity. The two shape-description approaches, which were combined with classical machine learning tools to perform classification tasks, each had distinct strengths depending on tooth geometry. Among classification tools, effectiveness depended on sample size and species diversity. Notably, CNNs applied directly to images achieved the highest overall accuracy across our tests. These findings suggest that combining automated deep learning tools with expert palaeontological knowledge could offer a powerful route to digitising and analysing large fossil collections, with important implications for future taxonomic practice.

Acknowledgements: We would like to thank Emma Bernard (Natural History Museum) for providing access to the collections. This research is part of the Master in Science Biological Sciences: Computational Biology course at University College London.

QUANTIFYING SHAPE VARIATION IN FOSSIL AND EXTANT SQUALIFORM SHARKS USING ELASTIC SHAPE ANALYSIS

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Keywords: *outline analysis, square-root velocity framework, Centrophoridae, Somniosidae*

Modern sharks have survived several mass extinction events, demonstrating remarkable resilience against extrinsic factors. Reconstructing their evolutionary history and the underlying mechanisms of their success requires a good taxonomic resolution through time. Available information, however, remains constrained by a fossil record consisting predominantly of isolated teeth. It is well established that taxonomic identification of isolated teeth presents a challenge that is particularly pronounced in groups with highly similar tooth morphologies, such as in Squaliformes. A method that helps address this challenge is outline-based elastic shape analysis. Contrary to the current standard of quantitative tooth shape analysis, which relies on the identification and consistent placement of homologous landmarks across the entire dataset, elastic shape analysis enables a landmark-free comparison of tooth shape variation across extant and fossil teeth. Here, we implement elastic shape analysis using the square-root velocity framework to quantify differences in tooth shapes of extant and fossil representatives of two squaliform families, Centrophoridae and Somniosidae. The input data were outlines of teeth that, for extant Squaliformes, first had to be digitally isolated from microcomputed tomography (μ CT) scans. Together with the fossil teeth, we automatically extracted the tooth shape, utilizing various computer vision and deep learning tools. This study aims to assess how fossil teeth relate to morphospaces defined by extant taxa, and explore whether patterns of clustering, overlap, or expansion emerge. Establishing such patterns will provide a basis for improving taxonomic identification of isolated fossil teeth and for evaluating shark diversity through time.

Acknowledgments: We would like to thank Frederick Mollen for generously providing the squaliform tooth material that was essential for establishing the comparative framework of this study, and Cathrin Pfaff for the countless hours of CT scanning done for this project.

DIETARY RECONSTRUCTION AND DISPARITY THROUGH TIME OF SOUTH AMERICAN FOSSIL METATHERIANS USING DENTAL TOPOGRAPHY AND MACHINE LEARNING METHODS

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Keywords: *mammalian evolution, dietary adaptations, competition, discriminant analysis, machine learning*

South American metatherian diversity was high during the Eocene but dropped during the Oligocene. Besides global climate change at the Eocene-Oligocene Boundary (EOB), the arrival and diversification of platyrrhine monkeys during the Oligocene is another potential factor for the decrease in metatherian diversity. Here, we use dental topographic methods and a training set of lower molars of extant marsupials (43 species, 12 families) and primates (52 species, 13 families) of known diet to reconstruct the diet of 44 extinct “primate-like” metatherians from Paleocene to Miocene South American localities. Our goal is twofold: 1) test whether South American metatherian dietary adaptations and breadth changed from pre-EOB to post-EOB; and 2) test whether fossil metatherians filled dietary niches currently occupied by platyrrhines. We compared training accuracy of the extant sample using molar curvature, relief, and molar size between three machine-learning algorithms: linear discriminant analysis; quadratic discriminant analysis, and random forest (RF). RF performed the best based on overall accuracy (74%) and F1-score (70%) and was used for fossil reconstructions. The pre-EOB metatherian sample ($n = 31$) is reconstructed as including folivores, insectivores, frugivore-insectivores, and hard-object feeders. The smaller post-EOB sample ($n = 13$) includes only insectivores and insectivore-frugivores, reflecting the disappearance of species that have large molars with low curvature and relief. When comparing this to extant platyrrhine monkeys, platyrrhine frugivores and hard-object feeders occupy this vacated dental niche previously occupied by pre-EOB metatherians. However, as our post-EOB sample is limited, further sampling is needed to ensure our results are not sample-specific.

Acknowledgements: This research was funded by the Natural Environment Research Council (NERC, NE/T000341/1) and the Dutch Research Council (NWO, VI.Veni.232.136). We thank Alan Mappin (University of Salford, UK) for help scanning specimens.

**MICROWEAR AND DENTAL MORPHOMETRIC ANALYSIS OF A POST-LGM
MAMMUTHUS PRIMIGENIUS FROM JIČÍN(CZECH REPUBLIC)**

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Keywords: *Mammuthus*, mammoth, skeleton, microwear, diet

The fossil record of *Mammuthus primigenius* from the Czech Republic is extensive. Large butchering and hunting sites such as Dolní Věstonice, Předmostí, Mikulov, Bukov and even smaller ones such as Stadice or Brno-Stýřovice have provided a substantial amount of mammoth material. Among them in 1973 a mammoth skeleton was excavated at a construction site in Jičín. The specimen has since been stored in the paleontological collections of Museum of Eastern Bohemia. In 2006 the mammoth skeleton was dated to roughly 13,200 BC using AMS radiocarbon dating, making it one of the youngest records of mammoth in Central Europe. The skeleton from Jičín consists of both tusks, two upper third molars(M³) an almost entirely complete but fragmentary mandible with two third molars (M₃), several vertebrae, multiple fragments of ribs, a fragment of the sacrum, several fragmentary limb bones along with numerous other fragmentary remains. The dental morphometric data acquired from the left M³, shows dental traits typical of derived *M. primigenius* such as high lamellar count, high lamellar frequency and moderate to thin enamel. A microwear analysis carried out using casts of this molars enamel, with two 0.16mm² surfaces observed at 35x magnification, reveals a higher than usual number of pits than in late *M. primigenius*, along with a typically high number of scratches. This suggests that the studied individual was a grazing dominated-mixed feeder, at least very shortly before its death.

Acknowledgements: I would like to thank to Florent Rivals for allowing me to study under him and teaching me to analyse microwear at IPHES Tarragona. I would also like to thank Jan Juráček (Museum of Eastern Bohemia) for allowing me to study the material from Jičín.

**DESCRIPTION OF THE INTERVERTEBRAL CARTILAGE VOLUME OF THE
CAUDAL SERIES IN
CROCODYLIANS: IMPLICATIONS FOR PALAEONTOLOGY AND
BIOMECHANICS.**

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Keywords: *Crocodylia, morphology, biomechanics, palaeontology, caudal series*

Relatively little is known about the intervertebral cartilage and flexibility of Archosaurs. Extant crocodylians possess procoelous (ball-and-socket-type) intervertebral articulations, which are internally separated by a thin intervertebral disk, and surrounded by a fibrous ring (*Annulus fibrosus*), all of which is enclosed within a synovial joint capsule. Although these structures have been described before, quantitative measurements were lacking. To investigate how the caudal intervertebral cartilage can influence tail biomechanics in crocodylians, three specimens were dissected and examined. For data acquisition a well-preserved skeleton was also examined. A maceration technique (slow-cooking 85 °C, 3h) proved effective at removing tissues while leaving cartilage intact. Measurements of vertebral centra and cartilage revealed several consistent patterns: the longest centra occur around the transition point (where the transverse processes disappear) while the most elongated centra relative to width and height are found toward the terminus of the tail. The *Annulus fibrosus* is generally thicker than the intervertebral disk, suggesting that the ring, rather than the disk, limits flexibility between vertebrae. The fibrous ring thickness to centrum length ratio is highest near the tail base (15-20 %) and decreases steadily toward the tip (3-6 %), contradicting the estimate of 5-10 % of joint-cartilage used in fossil reconstructions. Thicker cartilage near the tail base likely allows greater flexibility, while less cartilage in the distal tail corresponds to decreased mobility. The results of this study can be transmitted to other archosaurs with procoelous caudals (titanosaur sauropods, various crocodylomorphs), we suggest that their tail lengths and mobility may need reconsideration.

Acknowledgements: This work has been funded by the Deutsche Forschungsgemeinschaft (DFG): project 470751746 ‘Moving monoliths: analyzing the stance and locomotion of sauropod dinosaurs’.

BIOMECHANICAL TRENDS IN THE THORACOLUMBAR VERTEBRAE OF NILE CROCODILE (*CROCODYLUS NILOTICUS*) ACROSS EARLY GROWTHR. Lefebvre^{1*}, J. R. Hutchinson¹¹Structure and Motion Laboratory, The Royal Veterinary College, Hawkshead Campus, Hawkshead Lane, AL9 7TA, Hatfield, United-Kingdom.

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Keywords: *axial skeleton, stiffness, allometry, crocodile, ontogeny*

The skeleton is crucial for weight-bearing function in terrestrial and semi-aquatic vertebrates. This importance especially applies to the thoracolumbar vertebrae (located in between the two limb girdles). These vertebrae are popularly assumed to be closely tied to the evolution of locomotion in crocodiles as part of the ‘bracing system’, a hypothesis linking vertebral structure, motion and locomotor abilities. Intervertebral joint stiffness is crucial in this paradigm, involving a trade-off between supporting weight and resisting motion. Previous studies focused in detailing this theoretical framework and seeking osteological correlates for palaeobiological inferences across crocodylomorph evolution. Some vertebral measurements were identified as useful predictors of stiffness, yet most of these seem size-related, opening the question of what the relation between those metrics and size variation is in crocodiles. We use linear data representing a thoracolumbar series of juvenile Nile crocodiles of different sizes, for which morphological traits were measured and intervertebral joint stiffness estimated. We aimed to establish the links between vertebral morphology, joint stiffness and size. We show that morphological variation is primarily size-related, but that an intra-individual craniocaudal gradient is also clearly noticeable. Statistical modelling indicates an association of morphological traits with size, body mass and vertebral type. A significant interaction of those factors suggests that the different vertebral types do not follow the same allometric trends. Our covariance analysis between stiffness and morphological data delineates how biomechanical properties vary along the column during growth, clarifying how stiffness can affect locomotion during ontogeny, and how those variations have crucial functional implications.

BIOMECHANICAL LIMITS OF HOPPING IN THE HINDLIMBS OF GIANT EXTINCT KANGAROOS

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Keywords: *Biomechanics, Hopping, Kangaroos, Sthenurines, Hindlimb*

The locomotor abilities of animals depend upon their body size. Today, kangaroos are the largest hopping mammals, but some of their Pleistocene relatives were larger still—up to ~250 kg, more than twice as heavy as any modern kangaroo. So, is there an upper size limit of bipedal hopping? Previous analyses have recovered an upper limit of ~140–160 kg based on allometry, but have suggested that incorporating changes in hindlimb scaling patterns among giant species would alter these conclusions. Here, we test this proposal by integrating scaling data from modern kangaroos with direct observation of the hindlimb bones of giant fossil kangaroos. We test two potential limiting factors on hopping—bone strength, and tendon size. We find that (a) the metatarsals of giant fossil kangaroos would be capable of resisting the bending moments involved in hopping, and (b), the calcanea (heel bones) of giant kangaroos could accommodate tendons large enough to resist the loads generated during hopping. While hopping may not have been their primary mode of locomotion, our findings suggest that it may have formed part of a broader locomotor repertoire, for example for short bursts of speed.

Acknowledgements: Christine Janis, Roger Benson, Tim Ziegler and Roger Benson for providing specimens/measurements used in this study. The Traditional Owners of the land on which some of this work was conducted, the Wurundjeri people of the Kulin nation. This study was funded by the BBSRC: DTP3 2020-2025 entry – BB/T008725/1.

**NEUROSENSORY EVOLUTION IN THALATTOSUCHIAN
CROCODYLOMORPHS: INTEGRATING SOMATOSENSORY AND VISUAL
ADAPTATIONS ACROSS ECOLOGICAL TRANSITIONS**

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Keywords: *Crocodylomorpha*, *endocranial anatomy*, *macroevolution*, *Metriorhynchidae*, *Thalattosuchia*

Thalattosuchians, an extinct lineage of Mesozoic crocodylomorphs, underwent a remarkable evolutionary transition from primarily semi-aquatic teleosaurids, through increasingly ocean-adapted metriorhynchoids, to the fully pelagic metriorhynchids. Understanding how such a major habitat shift affected their sensory systems provides valuable perspective on vertebrate adaptations. Here, we present a comparative analysis integrating digital endocranial reconstructions from computed tomography (CT) scans of 22 skulls of crocodylomorph species, including extant crocodylians and a diverse range of thalattosuchians. Focusing on somatosensation and vision, we gain new insights into sensory evolution in the group using statistical comparative methods. Our findings reveal that thalattosuchians, especially pelagic metriorhynchids, evolved significantly smaller trigeminal ganglia relative to skull size than non-marine crocodylomorphs, suggesting reduced investment in facial mechanoreception. Interestingly, visual structures (orbit and optic nerve canal dimensions) scale proportionally with skull size across thalattosuchians, reflecting proportional scaling rather than enlargement. This pattern suggests that metriorhynchids maintained visual reliance and any functional enhancement was likely achieved through optical or neural optimisation rather than cranial modification. These findings challenge assumptions of uniform sensory trade-off during aquatic transitions and highlight the importance of lineage-specific constraints in shaping evolutionary trajectories.

Acknowledgements: We thank curators at the Natural History Museum (London), Museo de La Plata, Texas Memorial Museum, and Ohio University Vertebrate Collection for specimen and CT data access. This work was funded by the Leverhulme Trust (RPG-2017-167); SLB acknowledges the Swedish Research Council and the University of Edinburgh for institutional support.

SYNCHROTRON DATA PROVIDE NEW INSIGHTS INTO THE ORIGIN OF THE BIRD RESPIRATORY SYSTEM

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Keywords: *Archosauria, Dinosauria, pneumaticity, respiration, synchrotron*

The unique respiratory system of birds is key to their remarkable evolutionary success, but exactly when it evolved is unknown. This respiratory system comprises a lung, air sacs, and diverticula that hollow out (pneumatize) parts of the postcranial skeleton. Osteological correlates, known as postcranial skeletal pneumaticity, of this system have been identified in bird-line archosaurs (ornithodirans) among neotheropod and sauropod dinosaurs and in pterosaurs. However, recent work has suggested that pneumaticity is absent in the earliest dinosaurs, implying three independent origins of pneumatic diverticula within ornithodirans. Contrastingly, the presence of vertebral fossae, laminae and foramina in a Middle Triassic archosauriform (*Erythrosuchus*) has underpinned the proposal that pneumatic diverticulae evolved much earlier, prior to the origin of archosaurs and ornithodirans. These questions have been unresolved due to the ambiguous morphological data available, including external vertebral anatomy and low-resolution computed tomographic scans. We examined vertebral morphology and histology using synchrotron imaging in multiple Triassic archosaurs, including *Erythrosuchus* and a silesaurid, a close relative of dinosaurs. In the silesaurid we provide evidence for the presence of pneumosteam, a specialized histological tissue formed in bone in contact with pneumatic diverticulae, as well as internal pneumatic fossae connecting to the exterior via foramina. In *Erythrosuchus* our data show that external fossae connect to substantial and complex internal chambers, consistent with pneumaticity. Our results support hypotheses that key components of the bird respiratory system were present not only in the common ancestor of all bird-line archosaurs but potentially also ancestrally for Archosauria.

Acknowledgements: funding provided by the Leverhulme Trust RPG-2023-051 and European Synchrotron Radiation Facility proposal ES 1455.

Flash talks



Flash talk A**NEW DATA ON TOOTH REPLACEMENT IN *NEMEGTBAATAR GOBIENSIS*
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Keywords: *djadochtatherioids, teeth, μ CT imaging, Mongolia, Late Cretaceous*

Tooth replacement is an important aspect of ontogenetic changes during mammalian growth. Unfortunately, this process has been rarely documented in fossil records, as it requires the ontogenetic series of individuals showing changes at different age stages. Here, we present new data on the dental replacement in *Nemegtbaatar gobiensis*, a basal member of the multituberculate superfamily Djadochtatherioidea. The material housed at the collection of Mongolian mammals at the Institute of Paleobiology Polish Academy of Sciences comes from the Polish-Mongolian Paleontological Expeditions (1964 – 1971). Based on well-preserved specimens representing successive stages of tooth replacement studied with μ CT scanning, we reconstructed a sequence of dental eruption. In the youngest specimen (A) the I2/i1 are in the process of erupting. All upper premolars are still deciduous, and there is a diastema between dP1 and dP3 because dP2 was shed; the M2/m2 are erupting. In slightly older specimen (B) only cheek teeth are preserved. The dP1 and dP3 are still present, along a fragment of dP2 and the erupting P2. The last molars are still erupting. In specimen (C), the P1 and last molars are erupting, whereas the P2 is already fully erupted. The subadult specimen (D) shows fully erupted P1 and P2, with P3 in the process of eruption. The M2 and m2 are fully erupted. In summary, our study provides the first detailed description of the tooth replacement and sequence of dental eruption in Djadochtatherioidea representative *Nemegtbaatar*, which is the antero-posterior and alternating sequence of premolar replacement: P2 → P1 → P3.

Acknowledgements: We are grateful to Dr. Katarzyna Janiszewska for scanning the material at the Institute of Paleobiology, Polish Academy of Sciences.

Flash talk B**ONTOGENETIC SCALING IN THE HUMERUS OF *PALAEOLOXODON FALCONERI* FROM PLEISTOCENE SICILY: A THREE-DIMENSIONAL GEOMETRIC MORPHOMETRIC APPROACH**L. Kamran^{1*}, V. Herridge¹, A. Rosso²¹School of Biosciences, University of Sheffield, Alfred Denny Building, Western Bank, S10 2TN, Sheffield, England.²Department of Biological, Geological and Environmental Sciences, University of Catania, Corso Italia 57, 95129, Catania, Italy

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Keywords: *allometry, geometric morphometrics, insular dwarfism*

Insular environments often drive dramatic evolutionary changes in body size, a pattern encapsulated by the “island rule,” in which large mainland species tend to undergo dwarfism while smaller species evolve gigantism. Proboscideans exemplify this phenomenon, displaying extreme variation in body mass across closely related taxa. *Palaeoloxodon falconeri* represents one of the most striking cases of insular dwarfism, having evolved on Pleistocene Sicily from the large-bodied mainland species *P. antiquus*, with an estimated body-mass reduction of ~97%, positioning it as an ideal model for the examination of scaling in a lineage subject to biomechanical constraints. Despite extensive study of allometric relationships in proboscideans, most previous work has relied on two-dimensional linear metrics. This study uses three-dimensional geometric morphometric (3D GM) methods to examine shape–size relationships and test for allometry, while reassessing scaling patterns in comparison with previous studies using 2D methods that reported isometric scaling. Landmark-based morphometric analysis of 3D-scanned humeri spanning the full ontogenetic series of *P. falconeri*, from infancy to adulthood, revealed no evidence of ontogenetic allometry, indicating a lack of shape-size covariation, which is consistent with previous findings based on 2D linear metrics. The observed humeral shape may reflect retention of robust limb proportions inherited from large-bodied ancestors, relaxed mechanical constraints associated with reduced body size, or functional adaptation to insular environments. These findings highlight the potential of 3D GMM to quantify shape variation in extinct taxa, complementing traditional morphometric approaches and providing new insights into the relationship between size and shape in insular dwarf lineages.

Flash talk C**GEOCHEMICAL VARIATIONS IN MEGALOOOLITHID EGGSHELLS DURING THE LATE MAASTRICHTIAN ALONG IBERIAN PLATE**

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Keywords: *stable carbonate isotopes, paleoenvironment, megaoolithus, fusioolithus,*

Fossil eggshell provides a record of the evolution, habitat, and lifestyle of egg laying amniotes, including dinosaurs. The chemical and isotopic composition, together with anatomical features of the eggshell represent functional adaptations to a range of different habitats and nesting environments and record the ecology of the egg laying taxa. Correctly interpreting these features requires both a deep understanding of the eggshell taphonomy and the precise characterization of the burial environment. Among the fossil eggs, the most intriguing is the sauropodomorph egg. Their record starts in the Early Jurassic, but is scarce until the Upper Cretaceous, where a bloom of sauropod related ootaxa is recorded. During the two last decades several new localities have been found in the Maastrichtian of the Iberian Peninsula, highlighting the Catalanian and Aragonian paleontological sites in the Pyrenees and the Guadalajara sites of the Iberian Range. All of them are preserved in alluvial or palustrine mudstones with extensive pedogenetic alteration. Among the most common features of the paleosol, carbonate nodules and neoformation of clay minerals, both useful as climate indicators. This provides an extraordinary opportunity to evaluate the usefulness of sauropod eggshells as climate, ecological and behavioral proxies. To elucidate which features are bio- or climate-induced, the variations on the chemical (Ca, Sr, Fe, Mn) and isotope composition ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) of eggshells assigned to sauropod related ootaxa and collected in different Iberian localities have been analyzed. The stable carbonate isotopes ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) indicate a climate forcing over the egg-bearing deposits and eggshells, but a diachronism between the sedimentation, pedogenesis and egg-laying is observed in some sites. Besides, compositional shifts related to paleogeographic changes have been emerged from the regional distribution.

Acknowledgements: This work was supported the PR17/24-31911, funded by Comunidad de Madrid & Universidad Complutense de Madrid and PID2024-158833OB-I00 of the Ministerio de Ciencia, Innovación y Universidades de España.

Flash talk D**FOSSIL RECORD OF THE GENUS *HYSTRIX* IN THE PLEISTOCENE OF THE IBERIAN PENINSULA**H. Bal-García^{1,2*}, C. Fernández Rodríguez³

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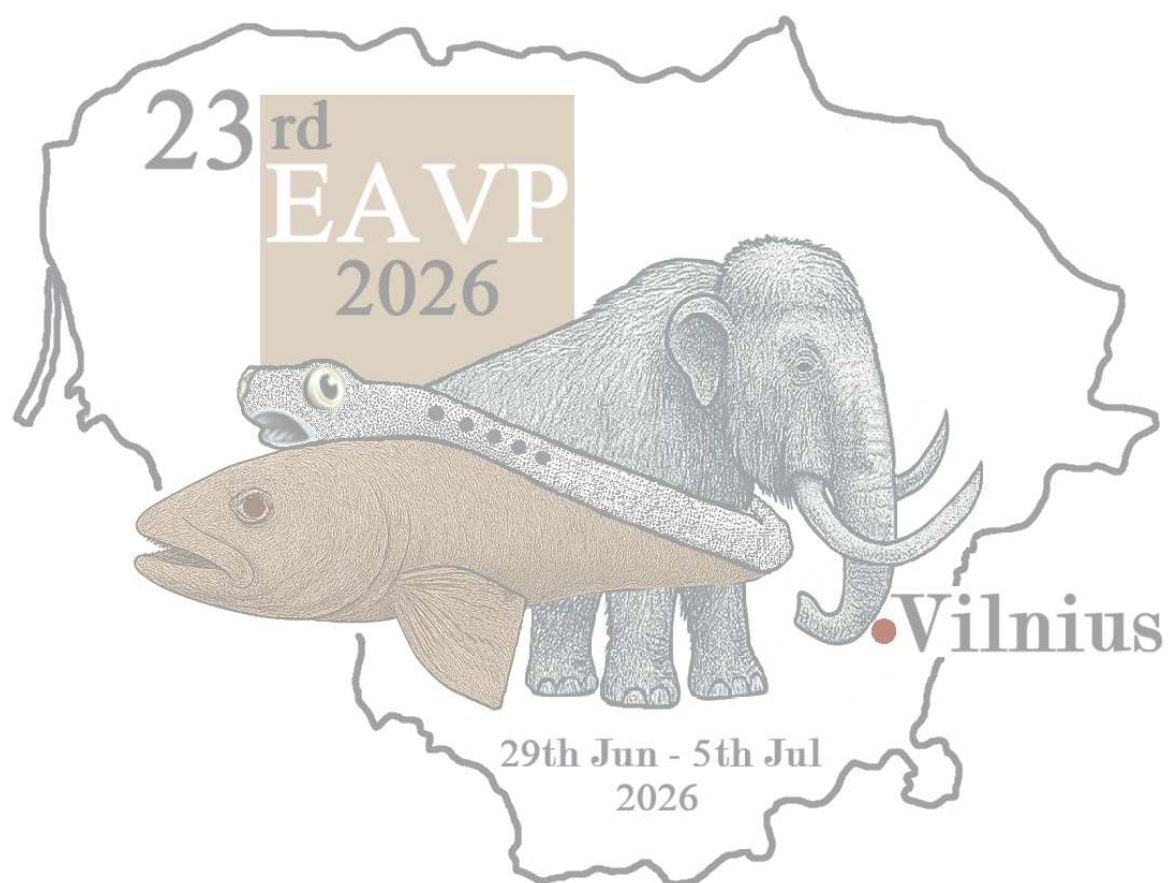
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Keywords: *Galicia, Iberia, Late Pleistocene, Hystrix, Palaeoecology*

The identification of a specimen of *Hystrix* cf. *vinogradovi* at the Late Pleistocene (MIS 3) archaeopalaeontological site of A Valiña (Castroverde, Lugo, NW Iberia) constitutes the first and only evidence of this taxon in the Cantabrian sector of the Iberian Peninsula. With the aim of understanding the biochronological and palaeoecological implications of the presence of this animal in NW Iberia, a compilation of fossil evidence for the genus *Hystrix* in Spain and Portugal has been conducted for the first time. This study analyses the characteristics of each of these archaeopalaeontological assemblages and examines their faunal composition from both climatic and environmental perspectives. The results consistently indicate that the presence of this genus in the Iberian record is primarily associated with the occupation of cavities by non-human predators, with little to no representation in sites showing a significant anthropogenic component. Furthermore, the palaeoecological characterisation of these sites suggests that the traditional interpretation maintained in the Southern European literature of the porcupine as a mesophilous species strongly linked to Mediterranean climatic conditions should be reconsidered.

Posters



Poster 1

A RECONSTRUCTION OF ENVIRONMENTAL CONDITIONS ASSOCIATED WITH EARLY VERTEBRATE COLONIZATION OF LAND BASED ON THE LOWER DEVONIAN RECORD OF THE HOLY CROSS MOUNTAINS, POLANDK. Grygorczyk^{1*}, P. Szrek²¹GeoPlanet Doctoral School, Polish Geological Institute – National Research Institute, Marine Geology Branch, 5 Kościerska Street, 80-328, Gdańsk, Poland.²Polish Geological Institute – National Research Institute, 4 Rakowiecka Street, 00-975, Warsaw, Poland.

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Keywords: *Lower Devonian, Emsian, terrestrialization, early vertebrates, environmental conditions*

The colonisation of terrestrial environments was a long and continuous process, began as early as the Ordovician; however, in the case of vertebrates (tetrapods), the oldest direct evidence of this process comes from the Middle Devonian. Vertebrate incursions into non-aquatic environments likely began earlier, in the Early Devonian, representing an initial experimental phase in the evolution of terrestrial adaptations. This process was not restricted exclusively to the lineage leading to tetrapods, but also involved their sister group - dipnoan fish - for which traces of locomotory activity in extremely shallow-marine to subaerial environments have been documented (Ujazd and Kopiec sites, Holy Cross Mountains, Poland). A key factor enabling and potentially stimulating these processes were specific environmental conditions. Terrestrial environments at that time likely enabled vertebrates to expand beyond aquatic habitats. They may also have significantly promoted this process by offering potentially vacant ecological niches, increased food availability, and reduced predation pressure, thereby providing relatively safe conditions for exploration. The present study documents a range of evidence from the fossil record from Kopiec site that provide a basis for further palaeoenvironmental interpretations. These include palaeosols, iron-crusts horizons, fragmented aerial parts of plants, plant root systems, and numerous trace fossils of invertebrate and vertebrate activity. This assemblage of indicators constitutes the first direct evidence for the presence of subaerial conditions that were not only seasonal but long-lasting (multiseasonal). The results highlight the importance of Early Devonian transitional ecosystems as a key stage in the evolution of strategies for terrestrial exploration by vertebrates.

Poster 2

**PERAMORPHOSIS ON EXAMPLE OF LATE DEVONIAN *DASBERGINA*
TRIGONICA LINEAGE**P.L. Świś¹*

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Keywords: *conodonts, Devonian, ontogeny, heterochrony, peramorphosis*

Herein presented study reconstructs the anagenetic evolution of the conodont lineage *Dasbergina marburgensis* → *D. trigonica* from the Kowala section (Holy Cross Mountains, Central Poland) using a stratophenetic and morphometric approach. Biometrical analysis of P₁ elements reveals a continuous, directional transformation in platform morphology, including progressive development of rostral and caudal branches, changes in platform outline, and modification of the basal cavity.

Integration of growth increments preserved within the elements enabled calibration of ontogenetic stages and detailed reconstruction of organogenesis. The timing of branch formation shifts systematically through the stratigraphic sequence, with earlier initiation of structures in younger populations. These heterochronic changes indicate a peramorphic pattern of development within the lineage.

The results demonstrate a clear morphological continuum consistent with anagenesis and provide an alternative framework for high-resolution stratigraphic correlation in the latest Famennian. This study highlights the value of combining morphometrics with ontogenetic data to refine evolutionary interpretations in conodonts and improve biostratigraphic resolution.

Poster 3

**CHANGING TREES: HISTORICAL SHIFTS IN EARLY ELASMOBRANCH
PHYLOGENETIC PLACEMENT**M. Amadori^{1*}, E. Villalobos-Segura¹, J. Kriwet^{1,2}¹Department of Palaeontology, University of Vienna, Josef-Holaubek-Platz 2, 1090, Vienna, Austria.²Vienna Doctoral School of Ecology and Evolution (VDSEE), Djerassiplatz 1, 1030, Vienna, Austria.

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Keywords: *Chondrichthyes, systematics, evolution, Paleozoic, Mesozoic*

Elasmobranch fishes (sharks, rays and skates) are among the oldest extant vertebrate lineages and are key to our understanding of the early gnathostome evolution. Their early evolutionary history is largely reconstructed using fossil taxa, many of which have been assigned to various stem or crown groups. Previous phylogenetic hypotheses placed numerous Paleozoic, as well as early Mesozoic, taxa within the stem elasmobranchs, forming the basis for multiple, although sometimes discordant, interpretations of their early diversification patterns. However, the stability of the phylogenetic relationships so far recovered and their evolutionary implications remain ambiguous with the actual taxonomic composition of the stem group and early evolution of the crown members representing fundamental mysteries yet to be resolved. Here, we preliminarily reassess the phylogenetic context of stem and early crown elasmobranchs through time using morphological datasets from fossils and extant taxa. Our results reveal that the phylogenetic placement of several historically important groups has shifted substantially in recent analyses, with taxa previously considered stem members now recovered within, or closer to, the crown group. These new outcomes demonstrate that early elasmobranch phylogeny is more dynamic than previously assumed and that more key groups require further systematic reassessment. The revised placements also influence our interpretations on character evolution, as well as on modes and timing of crown member diversification. Ultimately, our findings underline the sensitivity of deep-time phylogenies to character selection and taxon sampling and highlight the necessity for a continuous reassessment of fossil lineages to refine broader evolutionary frameworks.

Acknowledgements: This research is funded by the Austrian Science Fund (FWF) [10.55776/PAT1454425] to M. Amadori.

Poster 4

**TESTING THE SUITABILITY OF FOSSIL HOLOCEPHALAN TEETH AS
PALAEOTEMPERATURE ARCHIVE**E. Manzanares^{1*}, A. Smith², Z. Johanson¹, C. Underwood³, R. J. Twitchett¹¹Natural History Museum, Cromwell Rd, London, SW7 5BD, UK.²British Geological Survey, Nicker Hill, Nottingham, NG12 5GG, UK.³School of Natural Sciences, Birkbeck, University of London, Malet Street, WC1E 7HX, London, UK.

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Keywords: *isotope, whitlockite, holocephalan, Chondrichthyes, palaeotemperature*

Crown group holocephalans, also known as chimaeras, are a group of chondrichthyans, today mostly deep sea, with dentitions consisting of three pairs of dental plates that grow through their life. Their dental plates are composed of a trabecular dentine of hydroxyapatite surrounding hypermineralized whitlockite. Unlike fossil shark teeth, which are capped by diagenetically resistant enameloid and are routinely used in stable oxygen isotope analyses, the suitability of whitlockite in holocephalan teeth as a palaeotemperature archive has not been researched. To investigate this for the first time, we sampled 10mg of powder from the whitlockite and dentine of four species of crown group holocephalans: *Edaphodon* cf. *bucklandi* and *Edaphodon minor* (Eocene, London Clay Formation, UK), *Ischyodus dolloi* (Paleocene, Thanet Formation, UK); and *Ischyodus* sp. from the Upper Cretaceous (Chalk Group, UK). The $\delta^{18}\text{O}_{\text{phosphate}}$ values of *Edaphodon* samples range from 19.3 to 21.6‰, with the whitlockite data giving estimated seawater palaeotemperatures of ca. 23–26°C, using standard assumptions. Similarly, *Ischyodus* samples record $\delta^{18}\text{O}_{\text{phosphate}}$ values of 19.3 to 20.8‰, with inferred whitlockite seawater palaeotemperatures of 26°C (Paleocene) and 20°C (Cretaceous). In all cases, estimated palaeotemperatures are within published temperature ranges for the relevant UK formations and locations, derived from other proxies, and most are towards the cooler end as expected for deeper-dwelling fish. These preliminary results indicate that $\delta^{18}\text{O}_{\text{phosphate}}$ analysis of holocephalan whitlockite has the potential to be a source of palaeoenvironmental information for deeper sea settings, although more extensive studies are still needed.

Acknowledgements: This is a contribution to the Natural History Museum's Evolution of Life Research Theme. We thank Emma Bernard for facilitating access to the NHM fossil fish collection and destructive sampling of specimens. This work was supported by the Engineering and Physical Sciences Research Council [SeaCACHE, grant number EP/Y014790/1].

Poster 5

GOGOLIN FORMATION – REVISTING THE OLDEST RECORD OF THE MESOZOIC MARINE REPTILE COMMUNITIES IN CENTRAL EUROPEA. Rytel¹*¹Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818, Warsaw, Poland.

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Keywords: *Muschelkalk, Anisian, Middle Triassic, Sauropterygia, Poland*

During the Early Mesozoic, in the aftermath of the end-Permian mass extinction, several distinct lineages of aquatic reptiles radiated. These included the Ichthyosauromorpha, Sauropterygomorpha, Tanysauria, and Thalattosauria. Tracking their diversification during the Middle Triassic, when they all coexisted, is especially important for understanding the ecomorphological disparity present between these forms, which later led to the demise of some of them, and evolutionary success of the others. In Central Europe the marine Middle Triassic communities are recorded predominantly within the Muschelkalk sediments, which yielded the first finds of some well-known aquatic reptile genera (e.g., *Nothosaurus*, *Pistosaurus*, *Placodus*). The chronostratigraphically oldest portion of these facies outcrops in Poland, with the Gogolin Formation (latest Olenekian?-early Anisian) being an especially productive source of vertebrate fossils. The aim of this work was to examine the widespread material originating from this unit and to revise the marine reptile fauna known from it. Several historic taxa have been described from the Gogolin Formation, which still remains their sole or predominant source. These include *Cymatosaurus latifrons* (Pistosauroidae), *Dactylosaurus* (Pachypleurosauria), *Hemilopas* (Saurosphargidae), *Lamprosauroides* (Trachelosauridae), *Proneusticosaurus* (?Pachypleurosauria), *Protanystropheus* (Trachelosauridae), and *Saurosphargis* (Saurosphargidae). Whereas the validity of some of these taxa has been questioned, new comparative material confirms their distinctness. Moreover, the Gogolin Formation preserved the possibly the oldest record of *Anarosaurus* (Pachypleurosauria), *Nothosaurus* (Nothosauria), mixosaurids (Ichthyosauria), *Paraplagodus* (Placodontia), and *Placodus* (Placodontia). The characteristics of the faunistic composition of the Gogolin Formation underline its importance. The marine reptile communities were already diverse in the earliest Middle Triassic of Europe.

Acknowledgements: I thank all the curators and colleagues that helped me during my collection visits. This study was supported by the Polish National Science Centre grant no. 2024/53/N/ST10/02463.

Poster 6

HISTO-VARIABILITY WITHIN POLISH AETOSAURSE.M. Teschner^{1*}, T. Sulej²¹Institute of Geological Sciences, University of Wrocław, Cybulskiego 32, 50-205, Wrocław, Poland.²Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818, Warsaw, Poland.

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Keywords: *Aetosauria, Krasiejów, long bones, palaeohistology, Triassic*

Aetosaurs were a group of quadruped archosaurs restricted to a Late Triassic occurrence with an almost worldwide distribution. Southern Poland is famous for its rich Triassic fossil record. Among important localities are Krasiejów and Woźniki which both preserve aetosaurian material available for palaeohistological analyses. Palaeohistology can provide information about the animals age, mode of life or even diseases. In this study we examined an array of middle- and large-sized humeri and femora of *Stagonolepis olenkae* originating from Krasiejów and two small- and middle-sized humeri of an aetosaur from Woźniki. All bones grew with parallel-fibered bone and showed a moderate amount of vascular canals. The younger specimens exhibit mostly simple vascular canals, and the larger they become, the increased is the deposition of primary and secondary osteons. The large-sized bones show only residuals of primary bone and are mostly scattered by secondary osteons and erosion cavities. The bone building tissue resembles a lamellar zonal bone complex. Interestingly, except for one middle-sized, subadult specimen none of the Polish aetosaurs express classical growth lines in form of Lines of Arrested Growth. This could be a response on microclimatic and/or environmental conditions or represent developmental plasticity. Moreover, we can rule out the lack of deposition of annual growth marks being connected with ontogeny.

Acknowledgements: This research was funded by the Polish National Science Centre Sonatina grant no. UMO-2024/52/C/ST10/00111 and 2019/33/B/NZ8/01453 .

Poster 7

**A NEW TINY RHYNCHOCEPHALIAN FROM THE LATE TRIASSIC OF FRICK
WITH POTENTIAL BIPEDAL LOCOMOTION**F. Miedema^{1,2*}, L. Salaün^{2,3}, T. M. Scheyer³¹Universitetet i Oslo, Naturhistoriskmuseum, Kabelgaten 40, 0581, Oslo, Norway.²University of Zurich, Department of Paleontology, Karl Schmid-Strasse 4, 8006, Zurich, Switzerland.³Université de Rennes, Géosciences, UMR CNRS 6118, 35000, Rennes, France.

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Keywords: *Rhynchocephalia*, *Late Triassic*, *ecomorphology*, *micro-CT data*, *3D reconstruction*

Rhynchocephalia is currently represented by only one species: *Sphenodon punctatus*. The clade likely originated in the Middle Triassic and diversified quickly into a variety of consumer niches in both terrestrial and aquatic habitats throughout the Late Triassic and Early Jurassic. More derived rhynchocephalians (Acrosphenodontia) are characterized by acrodont dentition, enlarged laterally placed palatal dentition and more triangular teeth. Here we present a new early diverging rhynchocephalian from the Late Triassic of Switzerland. Most early diverging rhynchocephalians are mainly known from disarticulated material or even just partial jaws or teeth. The holotype of the new taxon is based on a complete 3d-preserved skull, including the entire braincase and palate, and most of the anterior postcranium, including most of the axial skeleton and portions of the forelimb and hindlimb. The morphology is completely revealed by micro-CT scanning as the specimen is too delicate within the matrix for preparation. It presents a mosaic of plesiomorphic and derived characters, including a combination of pleurodonty and acrodonty, large but unaligned palatine dentition and a lack of the splenial. Our phylogenetic analyses recover it consistently in a clade with the coeval *Parvosaurus* as sister to Acrosphenodontia. *Parvosaurus* is indeed very similar in morphology, but there are a few differences especially in the lower jaw and dermal cranium that differentiate the two. The Swiss taxon has a remarkably long hindlimb compared to the forelimb, which is strongly associated with bipedal locomotion in squamates, leading to the hypothesis that it was at least facultatively bipedal.

Acknowledgements: We would like to thank Ursina Bachmann, Ben Pabst and all volunteers of the excavations at Frick for specimen collection. We thank the Sauriermuseum Frick for the prolonged loan of the specimen and Alexandra Wegmann and Jonathan Pople (PIMUZ) for CT-scanning.

Poster 8

THE ROLE OF APICOBASAL RIDGES IN GRIPPING PREY - TEETH MECHANICS OF *NOTHOSAURUS* AND MODERN MARINE PREDATORS

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Keywords: *Apicobasal ridges, Nothosaurus, marine predators, FEA, teeth*

In the Triassic Period, marine reptiles, especially in a few groups (Sauropterygia; Archosauromorpha; Ichthyosauria), had special structures on their teeth called apicobasal ridges. Although common in the geological past, little attention was paid to their functional significance and reasons for their lack in modern marine predators. Several potential explanations of their presence were proposed involving supporting tooth structure, tooth removal facilitation, or an increase in gripping efficiency. In this study, we analyzed the gripping advantage of teeth bearing the apicobasal ridges using finite element analysis (FEA) to evaluate friction between various tooth types and different prey. We used open-source CT scan data of teeth of four modern taxa (*Crocodylus porosus*, *Orcinus orca*, *Delphinus delphis*, *Zalophus californianus*) and obtained new micro-CT data on the teeth of the extinct *Nothosaurus* sp. Two versions of the latter were compared: the original model, and the model with the apicobasal ridges artificially removed. We analyzed six prey media: fish scale - ganoine and collagen, cephalopod shell, cephalopod soft tissue, and crustacean carapace. We conducted 1920 simulations in total, analyzing the interaction between teeth and rotating prey. Statistics were performed in R software using a hierarchical clustering model in Ward's method. Our results suggest that the apicobasal ridges provide increased grip on the stiff and mineralized prey surfaces but give a much lower advantage in soft tissue medium. *Nothosaurus* appear to be an opportunistic predator, effectively gripping diverse prey in Triassic marine ecosystems with a potential crustacean specialization.

Poster 9

**DO PHYTOSAUR OCCURRENCE PATTERNS SUPPORT SEXUAL DIMORPHISM
AS AN EXPLANATION FOR DIVERSITY IN SKULL SHAPE?**D. Świątek^{1*}¹Independent Researcher, Tarnów, Poland.

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Keywords: *Phytosauria, sexual dimorphism, occurrence, Triassic*

Phytosaurs were a group of mostly semi-aquatic archosauromorphs common in the Late Triassic. Big part of their morphological diversity comes from their skull shape. Three main morphotypes are distinguished (dolichorostral, altirostral and brachyrostral), which mostly correspond with skull robustness. It has been suggested (however with contention) that skulls with differing levels of robustness may represent cases of sexual dimorphism, rather than taxonomic variation – as can be the case in extant archosaurs. The more robust morphs would correspond to males and the gracile morphs to females. If such hypothesis were to be correct, one would expect both robust and gracile-skulled phytosaurs to be found most commonly in the same localities and with similar numbers between both morphs. However, if fossil record shows no such pattern at the global scale it might point to interspecific variation as the cause for their skull shape diversity. To try to test the support for both the sexual dimorphism hypothesis and the taxonomic variation hypothesis, the phytosaur global occurrence data and distribution of different skull-morphs have been analysed.

Poster 10

A DIVERSE MIDDLE TRIASSIC VERTEBRATE TRACKSITE FROM THE SOUTH-CENTRAL IBERIAN PENINSULA (ALBACETE, SPAIN)

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Keywords: *Chirotheriid, archosauromorph tracks, ichnites, , Middle Triassic, Iberian Peninsula*

The Triassic fossil record of the Iberian Peninsula has historically been underestimated and understudied, with most research on this period emerging only in recent years. In this study, we expand this record by presenting newly discovered fossil tracks near the locality of Bogarra (Albacete, Spain; south-central Iberian Peninsula). The tracks occurs at multiple stratigraphic levels within a single sandstone outcrop. This outcrop is located in the upper portion of intercalated red silts and sandstones dated to the Middle Triassic (Buntsandstein facies), which are interpreted as a muddy floodplain environment featuring meandering fluvial channels and paleosols.

The site contains over 20 footprints attributed to at least five distinct trackways assignable to terrestrial tetrapods. These tracks exhibit significant diversity in both size (with footprints lengths ranging from 10 to 30 cm) and morphology, tentatively related to various archosauromorph ichnotaxa, including *Isochirotherium* sp., *Brachychirotherium* sp., and a Chirotheriidae indet. This tracksite is particularly remarkable as it represents one of the southernmost occurrences of Triassic ichnological material in Europe, as well as the continent's southernmost multi-taxa track assemblage. Furthermore, the locality exhibits notable taphonomic variability across different levels of the outcrop, with preservation styles ranging from shallow footprints to deep, three-dimensional ichnites featuring mud collapse structures.

Acknowledgements: S. M. acknowledges the support of a FPI fellowship (reference: PREP2024-003356) associated with the project PID2024-160276NB-I00

Poster 11

**KIERSZULA - A NEW UPPER TRIASSIC VERTEBRATE-BEARING LOCALITY
FROM SOUTHERN POLAND**

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Keywords: *Late Triassic, vertebrate fauna, fishes, dinosaurs, Archosaurs*

The discovery of the Krasiejów locality in the early 2000's revealed that Poland does, in fact, have Triassic outcrops yielding abundant tetrapod assemblages comparable to those known from Western Europe. Krasiejów proved to be only the first in a series of significant locality discoveries, followed by Kocury, Lisowice, Marciszów, Poręba and Woźniki. Despite these advances, the Polish Late Triassic record remains incompletely explored, as demonstrated by the newly identified Kierszula locality presented herein. Kierszula is situated in close proximity to the previously described Poręba and Marciszów sites. The locality is preliminarily dated to the late Norian, with both animal and coalified indeterminable plant remains preserved here within greyish alluvial carbonatic, oncoid-rich conglomerates. Notably, mass accumulations of the horsetail plant *Equisetites* were found below the vertebrate assemblage in a quartz sandstone layer, constituting an important addition to the assemblage. Microfossils are abundant within the conglomerate matrix and represent major Triassic groups of fish, including Elasmobranchii, Dipnoi, Actinistia, and Actinopterygii. The microfossil fraction also includes remains of a rhynchocephalian *Planocephalosaurus* sp. Among tetrapods, isolated teeth attributable to archosaur *Smok* sp. and other indeterminate reptiles have been found. Additional macrofossil material indicates the presence of an indeterminate proterochersid turtle, a phytosaur, a paratypothoracine aetosaur, a silesaurid, and a new theropod dinosaur. A comparative assessment of this assemblage, based on the taxonomic presence/absence dataset, indicates that the Kierszula vertebrate fauna is most similar to those known from Kocury and Poręba among the Polish Upper Triassic localities.

Acknowledgements: We thank everyone involved in the excavations in Kierszula and the technicians who prepared the material. The studies on the archosaurs and dinosauriforms were supported by the National Science Centre, Poland, grant no. 2024/55/D/ST10/02106 awarded to ŁCz.

Poster 12

**EXCEPTIONAL SOFT TISSUE PRESERVATION IN AN UPPER JURASSIC
OPHTHALMOSAURIAN ICHTHYOSAUR: PRELIMINARY RESULTS**G. Serafini^{1*}, R. Lauer², B. Lauer², E. E. Maxwell³¹Dipartimento di Scienze Chimiche e Geologiche, Università degli Studi di Modena e Reggio Emilia, Via Campi 103, 41125, Modena, Italy²Lauer Foundation for Paleontology, Science and Education, Wheaton, Illinois, 60189, USA³Department of Palaeontology, Staatliches Museum für Naturkunde, Rosenstein 1, 70191, Stuttgart, Germany

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Keywords: *connective tissues, Ichthyopterygia, UV-fluorescence, skin, adipose tissue*

Soft tissue preservation in ichthyosaurs has been reported for well over a century, ranging from patches of organic material to complete body outlines. The preservation of epidermal and dermal tissues close to the *in-vivo* organization has been pivotal for the understanding of the appearance, physiology and hydrodynamic adaptations of these animals. Skin outlines are best represented in the form of phosphatic preservation of epidermal and dermal layers from classic fossil lagerstätte (e.g. Lower Jurassic Posidonienschiefer Fm., Germany). However, evidence of dermal-epidermal tissues from post-Early Jurassic ichthyosaurs are rarer, especially in deeply nested ophthalmosaurian taxa. Here we present preliminary data of a new ophthalmosaurian ichthyosaur from the Upper Jurassic of Painten (Bavaria, Southern Germany) with outstanding detail of epidermal-dermal tissue preservation. The specimen originates from Solnhofen-type Plattenkalk facies. With the exception of the missing posterior end of the skull roof, the specimen is skeletally complete and fully articulated. Preliminary osteological analysis suggests the specimen to represent a skeletally immature individual with some pathological features. The taxonomic evaluation is currently ongoing, but the ichthyosaur can be confidently identified as a platypterygiine ophthalmosaurian. UV-induced fluorescence revealed a complete postcranial body outline, including the tail fluke. We identified at least four types of non-mineralized connective tissue within the outline based on differences in fluorescence and texture: dermal and epidermal skin layers, putative subcutaneous blubber, and cartilage. These tissues can be described close to the *in-vivo* organization in different anatomical units, with distinctive and previously not reported features, bringing new insights into ichthyosaur paleobiology.

Poster 13

THE JURASSIC DINOSAURS OF PETERBOROUGH; MINI MORRISON IN THE CLAY OR TINY TENDAGURU IN THE MUD?F.M. Holwerda^{1*}, J.J. Liston¹

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Keywords: *Sauropoda, Oxford Clay, Upper Jurassic, Callovian, diversity*

The Peterborough Oxford Clay Formation, Callovian (upper Middle Jurassic) in age, is mostly known for its wealth of marine reptiles and other aquatic fauna. However, though often incomplete, it also yields components of an extensive Jurassic terrestrial ecosystem. Most notable is *Cetiosauriscus*, a sauropod of as yet unknown affiliation. Next to this, various fragments confirm the presence of more sauropods, and at least one stegosaurid, as well as a hypsilophodontid.

Furthermore, although the degree of sauropod diversity across the formation shows at a superficial conservative glance, at least two different types of sauropod, phylogenetic mapping of the various skeletal elements indicates that a far richer ecosystem is represented by these remains. Indeed, given that the range includes a non-neosauropodan eusauropod, a diplodocimorph, a macronarian, and, based on evidence from other researchers, a turiasaurid, the higher level sauropod diversity is directly equivalent to that of both the Morrison Formation and Tendaguru.

Here, we describe a few additional specimens from the Peterborough Museum, specifically terrestrial herbivorous dinosaurian material. We also review the current strict consensus as well as the higher species densities.

This proves that, though perhaps in less spectacular form, the terrestrial remains of Jurassic Northern European origin are worth a closer look in terms of reconstructing ecosystems, looking at species diversity, and connecting landmasses between North America and Europe. Already established via Jurassic strata from Portugal, this endows the Peterborough Oxford Clay sauropod remains with new global palaeogeographic significance.

Poster 14

INTERDISCIPLINARY INSIGHTS INTO MID-JURASSIC TERRESTRIAL AND COASTAL ECOSYSTEMS IN LITHUANIA

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Keywords: *palaeoenvironment, vertebrate, palynology, lignitic wood, Lithuania*

Lithuania's Jurassic record has traditionally emphasized marine fossils, such as ammonites and foraminifera, while continental deposits have remained underrepresented. Recent discoveries help bridge this gap by combining rare vertebrate remains with novel palaeobotanical evidence, shedding light on Middle Jurassic palaeoenvironments in the Baltic region. In 1979, a reptilian vertebra—potentially from a “sauropod-like” dinosaur—was discovered at the Papilė outcrop (Akmenė District). It is the only macrovertebrate fossil of ‘dinosaur age’ known from Lithuania and is currently stored at the Nature Research Centre. Recent palaeontological studies, including computed tomographic, histological, and geochemical analyses, have been applied to this significantly important fossil. In 2025, fossilized lignitic wood fragments, likely derived from a putative Middle Jurassic forest, were unearthed at the Karpėnai limestone quarry (AB “Kalcitas”, NW Lithuania). Transferred to the Nature Research Centre, these remains exhibit degraded ultrastructure, including possible compressed growth rings, bordered pits on tracheid walls (suggesting abietinean affinity), and ambiguous ray cross-fields, and are still under detailed investigation. Sediments associated with these wood fragments, along with recent analyses, have yielded well-preserved pollen and spores, including *Lithodinia jurassica* (indicative of the Callovian–Bathonian), *Chasmatosporites apertus* (Bajocian or older in NW Europe), *Podocarpidites*, *Cibotiumspora juncta*, *Cycadopites*, *Perinopollenites elatoides*, *Callialasporites trilobatus* among others. This synthesis of different Jurassic fossil sites reveals a coastal Jurassic landscape in the area, with fluvial forests dominated by ferns, gymnosperms, and conifers, likely supporting herbivorous and omnivorous reptiles. If confirmed, these findings will further refine the stratigraphic framework of the Baltic Jurassic models and underscore northern Lithuania's untapped continental potential.

Acknowledgements: The authors thank Iakov Gogin for suggestions on pollen, spore, and dinoflagellate identification; Marc Philippe for suggestions on fossil wood structure; and Algirdas Rimkus, Director of AB ‘Kalcitas’, for providing material from the quarry.

Poster 15

**IDENTIFYING NEWLY UNCOVERED STEGOSAURID MATERIAL FROM
WESTERN PORTUGAL**V. M. Buschhaus^{1,2*}, B. Camilo^{2,3,4}, F. Bertozzo^{5,2}¹Department of Paleontology, Bonner Institut für Organismische Biologie (BIOB); Rheinische Friedrich-Wilhelms-Universität Bonn, 53121 Bonn, Germany.²CI2Paleo, Sociedade de História Natural; Torres Vedras, 2560-230 Torres Vedras, Portugal.³CERENA (Center for Natural Resources and Environment), Instituto Superior Técnico, Lisbon University, Av. Rovisco Pais, 1049-001 Lisboa, Portugal.⁴DER (Department of Engineering of Mineral Resources and Energy), Instituto Superior Técnico, Lisbon University, Av. Rovisco Pais, 1049-001 Lisboa, Portugal.⁵Operational Directorate Earth and History of Life, Institute of Natural Sciences; Brussels, 1000, Belgium.

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Key words: *Jurassic, dinosaurs, Thyreophora, photogrammetry*

Stegosaurid dinosaurs are an important component of the diverse Late Jurassic faunal assemblages of western Portugal, with most of them being known from the Lusitanian Basin. Until now, three valid taxa have been identified from the Iberian Peninsula: *Stegosaurus* sp., *Dacentrurus armatus*, and *Miragaia longicollum*. However, several recovered specimens remain fragmentary and disarticulated, complicating taxonomic assignments and limiting our understanding of stegosaurid diversity in the Iberian Peninsula. Newly retrieved specimens from the quarry tvspc08 (SHN SIGAP Code) in Cambelas, Torres Vedras Municipality, may shed light on the distribution of stegosaurs from the Late Jurassic of Portugal.

In this study, we examine a set of disarticulated stegosaurid remains from a bone bed of tvspc08, which is composed of several remains of sauropods, theropods, ankylosaurids(?) as well as other vertebrate fauna from the Tithonian. The osteology of the material is described, associated with high-resolution photogrammetry, allowing for detailed three-dimensional reconstruction and morphological assessment of the specimens. This non-destructive approach facilitates the identification of diagnostic features that may not be readily observable only through traditional methods.

Our ongoing project aims to determine whether the examined material can be confidently attributed to one of the three known Portuguese stegosaur taxa or whether it represents a previously unrecognized taxon. Comparative analysis with established specimens of *S. sp.*, *D. armatus*, and *M. longicollum* is conducted to evaluate morphological similarities or variation. This study highlights the importance of integrating modern digital techniques into paleontological research and contributes to refining the taxonomy and evolutionary relationships of Laurasian stegosaurids.

Poster 16

REDESCRIPTION OF *ARCHAEORNITHOIDES DEINOSAURISCUS*, AN ENIGMATIC THEROPOD FROM THE UPPER CRETACEOUS OF MONGOLIAF. Pozauć^{1*}, Ł. Czepiński², M. Tałanda¹¹Institute of Evolutionary Biology, Faculty of Biology, University of Warsaw, Żwirki i Wigury 101, 02-089, Warsaw, Poland.²Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818, Warsaw, Poland.

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Keywords: *Dinosauria, Theropoda, Paraves, Gobi Desert, Cretaceous*

Paraves is a clade including birds (Avialae) and their closest relatives among non-avian dinosaurs. One of the areas with the richest paravian fossil record is the Gobi Desert (Mongolia) with the Late Cretaceous (Campanian) Djadokhta Formation being particularly significant because of numerous well-preserved specimens known from its deposits. Despite that, many issues related to the biology and evolution of taxa discovered there remain a matter of scientific debate. *Archaeornithoides deinosauriscus* Elżanowski & Wellnhofer, 1992 from the Djadokhta Formation, is one of the species with the most uncertain affinity among Paraves. It is known from a single specimen containing a partial skull and mandible of a juvenile individual. A redescription based on a micro-CT scan of its holotype allows a new look into its questionable taxonomic position. It also revealed bones previously undescribed in this specimen, including the vomer, the pterygoid, the parasphenoid, and elements of the hyolaryngeal apparatus. Preliminary results of the comparative anatomy suggest that this taxon belongs to Troodontidae, which will be tested by further phylogenetic analyses. Troodontids are characterized by, among all, derived morphology of their teeth, unusual among theropods. Some troodontids possess enlarged denticles on the carina, while others, such as *Almas*, *Byronosaurus*, and *Archaeornithoides*, lack them entirely. This suggests different ecological strategies within troodontids, with at least some species being omnivorous. A detailed analysis of the *Archaeornithoides* material will provide a better understanding of the complexity of the Late Cretaceous Gobi ecosystem, taking into account the diversity of potential dietary specialisations among paravians, especially troodontids.

Acknowledgements: We would like to sincerely thank Dr Katarzyna Janiszewska from the Institute of Palaeobiology, Polish Academy of Sciences, for carrying out micro-CT scans, and the organisers and participants of the Polish-Mongolian Expeditions to the Gobi Desert, organised by the Polish and Mongolian Academies of Sciences.

Poster 17

UNEXPECTED COMPLEXITY OF MOLARIFORM-LIKE DENTITION IN A CRETACEOUS LIZARD ADAMISAURUS MAGNIDENTATUS SULIMSKI, 1973K. Węgrzyn^{1*}, T. Szczygielski², J. Słowiak², P. Świś³, M. Pittman¹¹School of Life Sciences, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong S.A.R., China.²Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818 Warsaw, Poland.³Department of Chemical and Geological Sciences, University of Modena and Reggio Emilia, Via G. Campi 103, 41125 Modena, Italy.

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Keywords: *Cretaceous, Squamata, dentition, convergence*

The Cretaceous of the Gobi Desert is famous for the world's best documented sites of past biodiversity, with lizards being an abundant component of its small vertebrate fauna. Among them, the Polyglyphanodontia were a dominant Cretaceous lineage distinguished from other lizards by widespread herbivory and unusual cranial characteristics. One particularly enigmatic member, *Adamisaurus magnidentatus*, possesses massive crushing dentition unknown in other polyglyphanodontians. Unusual features of its dental biology, together with ambiguous original description, have caused taxonomic and functional confusion. Despite their distinctive morphology, the teeth of *A. magnidentatus* have never been examined using modern imaging techniques. Here we provide the first detailed re-examination of the dental anatomy of *A. magnidentatus*, revealing a surprising, and previously unrecognised array of features that substantially revise our understanding of its ecological role. Although crushing dentition is common among lizards, *A. magnidentatus* unexpectedly exceeds the known dental complexity of this group. Instead, its dentition shows a striking functional convergence with the Procolophonidae, an unusual clade of durophagous herbivorous parareptiles that went extinct at the end of the Triassic. We explore the ecological significance of this discovery to the evolution of reptilian (Sauropsida) diet. The niche of small bodied durophagous herbivores was occupied by sauropsids (non-synapsid amniotes) from the beginning of herbivory, yet nearly abandoned by reptiles following the end-Triassic extinction. We argue that this ecological niche was subsequently taken over by mammaliaforms equipped with advanced masticatory systems. *A. magnidentatus* represents the sole known example of such ecological convergence within lizards.

Acknowledgements: Special thanks to Jolanta Kobylińska for providing access to the ZPAL specimens, Katarzyna Janiszewska for performing μ CT scans, and Paweł Bącal for the SEM imaging. The presented material was collected during the Polish-Mongolian Paleontological Expeditions organized by the Mongolian and Polish academies of sciences in the late 1960s and early 1970s. This research was possible thanks to the work of all members of the expeditions, whom we would like to acknowledge.

Poster 18

**PORPHYRIN CONFETTI RECORDS THE TRANSFORMATION OF HAEM IRON
IN FOSSIL SOFT TISSUES**

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Keywords: *molecular taphonomy, haem, diagenesis, red blood cells, fossilisation*

Soft-tissue-like structures, including red-blood-cell-shaped bodies and vessel-like remnants, have been repeatedly reported from fossil bones, and iron released from haemoglobin has been widely invoked as a key agent of their preservation (e.g., Schweitzer et al., 2014). Yet the long-term fate of this iron remains unclear: does any chemical memory of the original haem persist, or is it entirely overprinted by mineralisation?

Here we address this question in osteonal red-blood-cell-like bodies and vessel infillings from a Cretaceous theropod, using a combined analytical approach that probes both iron speciation and residual organic signals: X-ray absorption spectroscopy, Mössbauer spectroscopy, and time-of-flight secondary-ion mass spectrometry. Fresh pig blood, laboratory-derived clots, and synthetic iron phases were analysed as references.

The results indicate a mixed preservation pathway rather than a binary outcome. The majority of iron in the fossil occurs as poorly crystalline ferric phases, consistent with nanophase goethite and ferrihydrite, and accounts for approximately four-fifths of the total iron signal. A smaller fraction retains local coordination environments consistent with haem-derived iron, although no intact porphyrin structures are detected. In regions of elevated iron concentration, amino-acid fragments characteristic of haemoglobin (including histidine, proline and leucine) are co-localised with iron, suggesting that peptide-derived ligands may partially substitute for the original porphyrin coordination.

Together, these observations support a model in which endogenous haem iron is progressively transformed, yet incompletely homogenised, during diagenesis. The resulting signal reflects a transitional state between biological coordination chemistry and geochemical mineral phases.

Acknowledgements: Funding provided by National Science Centre, Poland (grant no. 2023/51/B/ST10/00997). The XAS measurements were performed within project no. 232043 at the SOLARIS National Synchrotron Radiation Centre.

Poster 19

DUSK OF THE PLAGIOSAURIDS (PLAGIOSAURIDAE, TEMNOSPONDYLI) IN A PALEOENVIRONMENTAL CONTEXTJ. Zalewski^{1*}, M. Tałanda¹, T. Sulej²¹Faculty of Biology, Inter-faculty Individual Studies in Mathematics and Natural Sciences, University of Warsaw, I. Miecznikowa 1, 02-096, Warsaw, Poland²Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818, Warsaw, Poland

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Keywords: *Triassic, extinction, Central European Basin, biogeography, amphibians*

The Late Triassic is considered a pivotal moment in the evolution of tetrapods. Many lineages went extinct or lost their significance with the end of this period. One of them were temnospondyls, which disappeared from the fossil record in most parts of Pangea, including the Central European Basin (CEB, or Germanic Basin). Among those were plagiosaurids (Plagiosauridae), which experienced a decline in their taxonomic and morphological diversity in the Late Triassic. After Carnian, there is only one known subfamily — Plagiosaurinae, represented by two taxa: widely studied *Gerrothorax pulcherrimus* with numerous occurrences and hitherto endemic *Plagiosaurus depressus*. Until now, information about plagiosaurids from the Polish part of CEB was scarce. Here we summarise and provide new occurrences of Late Triassic Plagiosauridae from this region. The environmental context of their occurrences is examined with the aim of seeking patterns that may explain their ranges within CEB using Principal Component Analysis. The presence of two species in Silesia suggests an underestimated diversity of this group in the Late Triassic. Moreover, plagiosaurids inhabited diverse environments with varying energy and salinity levels till the end of their history.

Acknowledgements: I am grateful to Jonatan Audycki for organising and travelling together across museums. I thank Dr Raphael Moreno, Dr Samuel Cooper (Museum für Naturkunde, Stuttgart) and Hans Hagdorn (Muschelkalkmuseum, Ingelfingen) for guiding me through museum collections.

Poster 20

THE COST ACTION CA23124 SALTAGES: INTERNATIONAL COLLABORATION ON SALT GIANT EARTH SYSTEM PROCESSES

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Keywords: *salt giants, palaeobasins, palaeoproxies, microfossils, nannofossils*

Salt and salt giant deposits have formed in restricted evaporitic basins controlled by the opening or closure of oceanic basins throughout the history of the Earth. Evaporitic deposits formation impact the Earth systems by altering the physical and chemical properties of the ocean, affecting regional and global climate, and, further, the survival, distribution and evolution of biota, in both marine and terrestrial realms. The COST Action CA23124 *Social, biological and climatic impacts of salt ages (SaltAges)* brings together researchers working on different regions and time periods to clarify, quantify and identify the patterns of the biotic impact of basin restriction, to explore the role of salt in the evolution of human society, and to develop a network of young researchers to lead the future research and development. The work is done through five Working Groups: WG1 “Climatic and biological impacts of marine gateway reconfigurations”, WG2 “Salt and Humans”, WG3 Modelling Evaporitic Systems, WG4 “Salt Deposition through Earth’s History”, and WG5 “Education and Public Engagement”. Research on nano- and microfossil vertebrates and invertebrates is primarily conducted within WG1, WG3, WG4, and WG5. These groups combine analyses of marine faunal assemblages used as geochemical and salinity proxies with basin modelling approaches. Together, these methods are applied to reconstruct the evolution of salinity, its deposition, and the degree of marine restriction through geological time. This COST Action runs until 2028 and is open for participation to all interested researchers and stakeholders.

Poster 21

**LATE CRETACEOUS THEROPOD DIVERSITY IN SOUTHWESTERN EUROPE:
EVIDENCE FROM THE DENTAL RECORD OF "LO HUECO" (SPAIN)**M. López-Miguel^{1*}, A. Torices¹, F. Ortega²¹Departamento de Geodinámica, Estratigrafía y Paleontología, Facultad de Ciencias Geológicas, Universidad Complutense de Madrid C/ José Antonio Nováis, 12, 28040, Madrid, Spain.²Grupo de Biología Evolutiva, Facultad de Ciencias, Universidad Nacional de Educación a Distancia (UNED), 28232 Las Rozas, Madrid, Spain.

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Keywords: *theropod, isolated teeth, Upper Cretaceous, Spain, statistical analyses*

The paleontological site of "Lo Hueco" (Cuenca, Spain) is one of the most exceptional Upper Cretaceous localities in Europe. It has yielded over 10,000 fossil remains, providing one of the most abundant records of continental vertebrate faunas from the Late Cretaceous of southern Europe. The fossil record of theropod dinosaurs at this site comprises scarce, isolated postcranial elements alongside an extensive sample of isolated teeth. Previously, this material had been tentatively ascribed to abelisaurids and maniraptorans, including dromaeosaurine and velociraptorine eudromaeosaurids, as well as avialans. In this study, a sample of 150 isolated theropod teeth was analyzed using a dual methodological approach. First, a qualitative assessment was conducted through comparative morphological analyses of dental characters. Subsequently, a quantitative approach was applied, incorporating both multivariate and cladistic analyses. The results obtained from these independent methods were highly congruent, allowing for the assignment of this dental material primarily to various dromaeosaurid taxa, cf. *Paronychodon*, cf. *Richardoestesia*, and an indeterminate theropod. This faunal composition is consistent with those documented in other Upper Cretaceous localities across the Iberian Peninsula and Europe. These findings corroborate earlier research and contribute to a more nuanced understanding of the composition, diversity, and evolutionary history of European theropod assemblages at the close of the Mesozoic.

Acknowledgements: This investigation was supported by the Ministerio de Ciencia, Innovación y Universidades (Project CNS2023-144950; Proyecto Consolidación Investigadora 2023). Research at the Lo Hueco site was funded by projects from the Spanish Ministerio de Ciencia, Innovación y Universidades (PID2023-148083NB-I00) and the Junta de Comunidades de Castilla-La Mancha (SBPLY/24/180801/000044 and SBPLY/25/180801/000040).

Poster 22

DATING ABSOLUTE TIME WITH FOSSIL EGGSHELLS FROM THE HORCAJO SITE, ENCISO GROUP (CAMEROS BASIN, LOWER CRETACEOUS), LA RIOJA, SPAIN. FIRST STEPS

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Keywords: *Enciso Group, eggshell, SEM-Cathodoluminescence, SEM-EDX*

El Horcajo (La Rioja, Spain), located in the palustrine facies of the Enciso Group (Cameros Basin), has yielded numerous eggshell fragments and vertebrate remains. However, its exact age remains heavily debated. Charophyte (*Atopochara trivolis* assemblages) and ostracod biostratigraphy suggest a Valanginian–Hauterivian age, whereas stratigraphic data and dasycladales indicate an upper Barremian–lower Aptian age. To resolve this discrepancy, we will apply U-Pb calcite dating to fossil eggshells to obtain accurate burial ages. First, however, the preservation state of the eggshells must be rigorously assessed to rule out diagenetic alteration. We analyzed the samples using petrographic microscopy, SEM-cathodoluminescence (SEM-CL), and SEM-energy dispersive X-ray spectroscopy (EDX) on the shell, pores, and surrounding matrix. Micro- and ultrastructural analyses allowed us to assign the specimens to *Guegoolithus turolensis* and prismatoolithid eggshells. Crucially, SEM-CL revealed uniform luminescence across the entire shell thickness, indicating a lack of diagenetic impurities. Furthermore, EDX confirmed that the eggshells are composed of essentially pure calcium carbonate (CaO 100% stoichiometric normalization). This pristine composition contrasts sharply with the infilling pores (dominated by FeO, SiO₂, and Al₂O₃) and the surrounding rock matrix (primarily SiO₂, Al₂O₃, and CaO). Having confirmed their excellent preservation, the next step is to perform mass spectrometry. This will allow us to determine the precise U-Pb burial age of the eggshells, ultimately resolving the chronological debate surrounding the El Horcajo site.

Acknowledgements: We thank project CNS2023-144950 for providing funding for the research in El Horcajo and Ayudas para Estudios científicos de temática riojana 2024 (IER).

Poster 23

**INNER EAR MORPHOLOGY AND AUDITORY SENSITIVITY IN THE
PACHYCEPHALOSAURIA**Wiktoria Wieliczko^{1*}, Sergi López-Torres¹, Justyna Słowiak²¹ University of Warsaw, Faculty of Biology, Biological and Chemical Research Centre, Institute of Evolutionary Biology, Warsaw, Poland²Institute of Paleobiology, Polish Academy of Sciences, Warsaw, Poland.

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Keywords: *Pachycephalosauria*, *inner ear*, *Prenocephale prenes*, *Stegoceras validum*

Pachycephalosauria is a clade of medium-sized, herbivorous ornithischian dinosaurs that inhabited North America and Asia during the Late Cretaceous. They are known for their distinctive domed skulls, suggesting head-butting behavior. However, their sensory capabilities, particularly hearing, remain poorly understood, limiting interpretations of their behavior and ecology. This study focuses on the holotype specimen of *Prenocephale prenes* (ZPAL MgD-I/104) from the Nemegt locality in the Gobi Desert in Mongolia. Using computed tomography and Avizo software, the inner ear was reconstructed to assess auditory sensitivity and morphology descriptions. The reconstructed structures were compared with previously published data for *Stegoceras validum* (UALVP 2). The relatively long and thin semicircular canals suggest that it exhibited rapid and precise head movements, predominantly along the up and down axis. In addition, the cochlea of *S. validum* had relatively short cochlear duct length, suggesting a greater sensitivity for low-frequency sounds, potentially useful for long-distance communication. A comprehensive analysis of the inner ear of *P. prenes* contributes to a better understanding of sensory evolution and behavior in Pachycephalosauria.

Poster 24

**NEW INSIGHTS INTO PROTOSTEGID (PAN-CHELONIOIDEA) EVOLUTION
FROM UPPER CENOMANIAN OF NORTHEASTERN ITALY**R. Guerra^{1*}, G. Serafini², M. Delfino^{3,4}, L. Giusberti¹¹Department of Geosciences, University of Padova, via G. Gradenigo 6, 35131, Padova, Italy.²Department of Chemical and Geological Sciences, University of Modena and Reggio Emilia, via Giuseppe Campi, 41125, Modena, Italy.³Department of Earth Sciences, University of Torino, Via Valperga Caluso 35, 10125, Torino, Italy.⁴Institut Català de Paleontologia Miquel Crusafont (ICP-CERCA), Edifici ICTA-ICP, c/ Columnes, s/n, Campus de la UAB, 08193 Cerdanyola del Vallès, Barcelona, Spain

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Keywords: *sea turtles, Upper Cretaceous, bone histology, Tethys, OAE2*

Here we present preliminary analyses of two undescribed sea turtle remains from the black shales of the OAE2 record (Bonarelli level) of Valdagno (Vicenza, northeastern Italy). A phylogenetic analysis based on the chelonoid matrix of Kear & Lee (2006) places these findings within the family Protostegidae. Ongoing anatomical analyses of these specimens show a unique combination of characters. The larger specimen (IG 292957) exhibits both plesiomorphic and apomorphic traits, whereas the smaller specimen (IG 292954) may represent a juvenile, with some features potentially related to ontogeny. Finally, histological investigation based on a thin section of the coracoid of IG 292954 supports this hypothesis, showing particularly large osteocyte lacunae and a lack of remodeling. Protostegidae is one of the most iconic families of Cretaceous sea turtles, although its evolution during the Cenomanian-Turonian interval (94-88 Ma) remains poorly understood due to a sparse fossil record. In the Tethys Ocean, known protostegids from this timeframe are mainly represented by the genus *Rhinochelys* and a few isolated remains from Germany. Our preliminary results on the new Italian material suggest the presence of at least one still undescribed endemic taxon from the western Tethys, increasing the knowledge of the diversity of the Cenomanian protostegids.

Poster 25

**DINOSAUR TAIL TRACES AT THE T'ANKAR PAMPA TRACKSITE
(MAASTRICHTIAN, TOROTORO NATIONAL PARK, BOLIVIA) REVEAL
UNUSUAL LOCOMOTION BEHAVIOR**

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Keywords: *theropod tail traces, trackways, tracksite, footprint*

The Torotoro National Park in Bolivia is renowned for its abundant dinosaur tracks, including trackways with tail traces. Here we present nine theropod trackways with well-preserved tail traces from the T'ankar Pampa tracksite. These trackways range from 14 m to 25.7 m in length and are straight or slightly sinuous. The tail traces consist of sinuous grooves 1–3 cm deep and 2–4 cm wide, with tapered ends. The end in the direction of locomotion may show expulsion rims. We identified three types of tail traces based on continuity between consecutive tracks: 1) discontinuous tail traces, consisting of two short traces in consecutive tracks, one departing from the anterior side of a track and another ending at the posterior side of the subsequent track, with no connection between the two traces; 2) continuous tail traces between two consecutive tracks; and 3) continuous tail traces traversing two or more tracks in a sinuous pattern. Tail traces occur in association with deep (1–3 cm) or very deep (>3 cm) tracks, indicating they formed when the trackmaker walked on soft substrate. This association suggests that tail-trace formation may reflect a specific locomotor behavior, possibly related to maintaining balance while walking on soft substrate. Trackway TP25-25 has an overall orientation of 144SE, makes two turns of 16° and 7°, respectively, and intersects three other trackways with very deep tracks and tail traces oriented roughly NE. Notably, the tail traces and turns occur exactly at the intersections with other trackways, which have very deep tracks and tail traces, suggesting possible behavioral avoidance of collisions with other trackmakers and the acquisition of balance while walking on soft substrate.

Poster 26

FIRST OCCURRENCE OF *BRASILICHNIUM* TRACKWAYS IN THE LOWER CRETACEOUS OF BOLIVIA

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Keywords: *mammal tracks, tetrapod tracks, gregarious behavior, cross-bedded sandstone,*

Bolivia has an exceptional record of dinosaur tracks and trackways, with several localities in Upper Jurassic-Upper Cretaceous strata, especially abundant in the Upper Cretaceous El Molino Formation. Here, we report the first discovery of tetrapod trackways preserved in cross-bedded sandstones of the Lower Cretaceous Sucre Formation in Bolivia. The track-bearing surface occurs within a medium-bedded quartz sandstone interval characterized by thin bedding at the base and top and pervasive horizontal iron-oxide lamination. A total of thirteen trackways and additional footprints were found in five rock slabs and on an in-situ wall in the Chataquila area west of the city of Sucre. The tracks are preserved as natural molds (concave epirelief), appearing as simple, rounded, or elliptical depressions that lack morphological detail and digital pad impressions, likely because they were imprinted under suboptimal sediment conditions. Seven trackways display sets of manus and pes prints, with very shallow manus prints lacking posterior expulsion rims and deeper pes prints featuring large expulsion rims. Posterior rims are larger than the tracks, suggesting that the trackways were formed while the trackmakers were walking up the slope. Neither manus nor pes prints show digital impressions. Six trackways lack manus prints. The parallel orientation of several trackways in the same direction of movement suggests gregarious behavior. The overall morphology of the tracks and the dimensions of the trackways are similar to those of *Brasilichnium* footprints described in comparable sedimentary facies in Brazil and Argentina, as well as at tracksites in the Northern Hemisphere.

Acknowledgements: This study was funded by the Geoscience Research Institute grants GRI-CHA-2024 and GRI-CON-2025. We thank Federico Anaya for information about the local and regional stratigraphy. We thank Omar Medina, Carlos Daza and Michel Contreras for obtaining official permits for fieldwork and for their assistance with the study.

Poster 27

**A HERD OF BASAL ORNITHOPOD DINOSAURS FROM THE
BARREMIAN-APTIAN SITE OF VIAJETE (BURGOS, NORTHERN SPAIN)**J. Rubio Nieto^{1*}, F. Torcida Fernández-Baldor², A. Torices¹¹Departamento de Geodinámica, Estratigrafía y Paleontología, Facultad de Ciencias Geológicas, Universidad Complutense de Madrid, José Antonio Novais 12, 28040, Madrid, Spain.²Museo de Dinosaurios, Colectivo Arqueológico y Paleontológico de Salas, Jesús Aparicio 9, 09600, Salas de los Infantes, Spain.

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Keywords: *Viajete, Lower Cretaceous, Castrillo de la Reina, ornithopod, Hypsilophodon.*

Ornithopoda is a clade of ornithischian dinosaurs representing one of the most successful groups within Dinosauria, particularly during the Cretaceous period. Since the term was first coined, the taxonomic definition and internal structure of the group have undergone numerous revisions. This is especially true for its smaller, basalmost members, whose phylogenetic positions remain a subject of intense debate. The Iberian record of these basal ornithopods is relatively rich and diverse, including several previously described species such as *Gideonmantellia amosanjuanae* and the recently discovered *Foskeia pelendonum*. The latter was recovered from the Vegajete locality near Salas de los Infantes (Burgos province, Spain), an area that has historically yielded abundant fossil assemblages of small ornithopods.

One of the most notable localities in this region is the late Barremian–Aptian Viajete site. In 1995, two sets of bones displaying clear dinosaurian affinities were discovered at this site. The recovered material includes fragments of the premaxilla and dentary, portions of the scapulae and ilia, multiple vertebral centra and neural arches from across the axial skeleton, and various elements of the fore- and hindlimbs. In this study, we present the first detailed anatomical description of these remains. Furthermore, we analyze their affinities with other basal ornithopod genera to establish their precise phylogenetic relationships.

Poster 28

FOSSIL VERTEBRATE COLLECTIONS HOUSED AT THE CROATIAN NATURAL HISTORY MUSEUM

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Keywords: *fossils, fishes, reptiles, mammals, museography*

The Croatian Natural History Museum (CNHM) houses fossil vertebrate collections consisting mostly of fishes, reptiles and mammals. The collections are organized according to their systematics and stratigraphy. The mammal assemblage is dominated by the Pleistocene taxa of the order Carnivora and various clades of herbivorous mammals. A diverse and rich fish fauna were collected from the Cretaceous and the Miocene deposits, with Teleostei constituting the main component of the collections. Certain objects in these collections derive from donations received at the time of the CNHM's establishment in the mid-19th century, representing some of the oldest and most valuable holdings of the CNHM today. A majority of the specimens, however, were collected during museum-led field expeditions to various localities across Croatia. The stratigraphic range of the collections spans from the Triassic to the Quaternary, representing Croatia's natural and cultural heritage and documenting evolutionary and paleoecological changes that provide further insight into the former Tethys and Paratethys regions. Fossil vertebrates from these collections have been presented to the public on numerous occasions through exhibitions in museums throughout Croatia and abroad. The most representative specimens have been incorporated into the new permanent exhibition at the Croatian Natural History Museum, which opened in October 2024.

Poster 29

**EVOGUESSER, A PROPOSAL FOR FUN AND TAXONOMIC DISSEMINATION OF
EXTINCT ANIMALS**M. Aragón-Huguet¹, M. Fuentes², J. Mora^{1*}, A. Quintero² A. Torices¹¹Departamento de Geodinámica, Estratigrafía y Paleontología, Universidad Complutense de Madrid, Calle de José Antonio Nováis 12, 28040, Madrid, Spain²Independent

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Keywords: *taxonomy, divulgation, videogame, outreach, teaching materials*

"Evoguesser" is a palaeontological outreach project inspired by the online game "Metazoa", a game where you have to find mysterious extant animals using simplified phylogenetic relationships. The app is designed to foster daily engagement by challenging players to guess a randomly selected extinct taxon based on the phylogenetic relationships between their guesses and the target taxon. Through this simple premise, the game aims not only to entertain but also to promote taxonomic knowledge, encouraging players to consult up-to-date scientific literature to find the correct answers. Each taxon featured in the game is selected and classified according to recent phylogenetic hypotheses, which are rigorously reviewed by at least two members of the development team. Those classifications are revised whenever new information is published and if it is widely accepted, the classification is updated. Initial testing has yielded promising results, with two closed testing phases and one closed beta already completed. To date, most testers have been palaeontologists and students in related disciplines, alongside a small group of amateur enthusiasts. However, upcoming development stages will focus on improving accessibility to reach a broader, non-specialized audience. As science communication becomes increasingly challenging, innovative methods are required to effectively engage the public. In this context, Evoguesser offers an original and accessible platform to stimulate interest in extinct biodiversity and evolutionary relationships.

Acknowledgements: We would like to thank all the people who have tried the game in its earlier stages of development and has helped us improve the quality and value of the project.

Poster 30

PLIOCENE INSECTIVORES (EULIPOTYPHLA) FROM THE MOREDA KARSTIC SITE (SOUTHERN IBERIAN PENINSULA)R. Minwer-Barakat^{1,2*}¹Departamento de Estratigrafía y Paleontología, Universidad de Granada, Avda. Fuente Nueva s/n, 18071, Granada, Spain.²Institut Català de Paleontologia Miquel Crusafont, Universitat Autònoma de Barcelona, 08193 Cerdanyola del Vallès, Barcelona, Spain.

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Keywords: *Soricidae, Talpidae, Erinaceidae, Neogene, Spain*

Known since the 1970 decade, the Moreda karstic infilling is one of the richest Pliocene micromammal localities from Spain. However, previous studies have focused mainly on rodents, while other mammal groups have been barely studied. Particularly, the only available information about the insectivores (order Eulipotyphla) from this site is the mention of some soricid and talpid species in previous faunal lists, but these taxa were never described in detail. The eulipotyphlan material stored at the Universidad de Granada is rather scarce; however, in the collections of the Université Claude Bernard Lyon 1, a much more abundant sample of insectivore remains has recently been found, coming from the two main levels of the Moreda karstic site (Moreda 1-A and 1-B). This is a preliminary report of the insectivores from this locality, including the material curated in both institutions. The material from Moreda 1-A allows identifying the soricids *Asoriculus*, *Myosorex* and *Blarinoides* as well as the erinaceid *Erinaceus*. The material from Moreda-1B, more abundant, includes all the mentioned taxa and some remains attributable to the soricid *Paenelimnoecus* and the talpid *Archaeodesmana*. Some of these taxa, namely *Blarinoides*, *Paenelimnoecus* and *Erinaceus*, are documented in Moreda for the first time, thus increasing the diversity of the insectivore assemblage from this site. The detailed study of these remains and their comparison with those from other nearby similar-aged localities (e.g., the rich levels from the Tollo de Chiclana section) will improve the knowledge about the eulipotyphlan faunas that inhabited southern Spain during the Pliocene.

Acknowledgements: This work has been funded by projects P20_00066 (Junta de Andalucía) and PID2024-157557NB-I00 (Agencia Estatal de Investigación, Ministerio de Ciencia e Innovación, Spanish Government).

Poster 31

EVOLUTIONARY TRENDS OF BRAIN SIZE IN PRIMATES AND THEIR KIN

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Keywords: *primates, trends in evolution, brain study,*

Understanding long-term trends in primate brain evolution is essential for explaining the emergence of complex cognition, sociality, and ecological flexibility. This study investigates whether primates and their close relatives exhibit directional changes in brain size through time, using the encephalization quotient (EQ) as a comparative metric. We compiled two datasets: a broad sample of fossil and extant primates and a hominid-focused dataset with precise temporal ranges. In our research, we focused on visualizing the materials in the form of evolutionary sequences rather than phylogenetic relationships due to the nature of the available data. Evolutionary dynamics were evaluated using the paleoTS framework in R, fitting three standard models of trait evolution—Stasis, Unbiased Random Walk, and Generalized Random Walk (GRW). Model selection based on Akaike information criterion consistently identified GRW as the best-supported model for both datasets, indicating a sustained, long-term increase in EQ across primate evolution. These results support the hypothesis that encephalization in primates follows a directional trend rather than fluctuating randomly or remaining stable. The pattern aligns with predictions from the social brain and ecological intelligence hypotheses, which propose that increasing cognitive demands favored progressive brain expansion. However, the analysis also reveals a key limitation: hominins and extant anthropoids are disproportionately represented in the literature, while early low-EQ lineages are sparsely sampled. This imbalance may amplify the apparent strength of the trend, underscoring the need for more comprehensive fossil data to fully resolve the tempo and mode of primate brain evolution.

Acknowledgements: This research is supported by a National Science Centre (Cracow, Poland) grant (number 2022/45/NZ8/03585) to SLT.

Poster 32

MACHINE-LEARNING RECONSTRUCTION OF MEDITERRANEAN EOCENE PALAEOCLIMATES: IMPLICATIONS FOR PRIMATE EVOLUTION

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Keywords: *Eocene, paleoecology, primates, machine-learning*

During the Eocene, the Mediterranean region experienced a remarkable diversification of primates, with fossil remains representing more than 30 genera. This radiation has usually been linked to global warming trends characteristic of the Eocene; however, the role of regional environmental variability in shaping these patterns remains poorly explored. Notably, the Mediterranean region underwent significant geological transformations during this period, including the progressive closure of the Tethys Sea and the uplift of the Pyrenees. Here we investigate palaeoenvironmental conditions and primate evolutionary dynamics by applying supervised machine learning approaches to Eocene mammalian assemblages from across the Mediterranean region. We focus on ecological diversity, quantified through species richness and functional traits such as diet, body size, and locomotion, which are used as predictor variables to reconstruct palaeoclimatic parameters within a spatio-temporal framework. Climatic variables related to temperature variability show the highest predictive performance, particularly annual mean temperature, mean temperature of warmest quarter, mean temperature of coldest quarter, and precipitation of driest month. Our results do not reveal clear temporal climatic trends and instead suggest that Eocene primates inhabited generally warm climates (with an average annual temperature of ~ 16 °C), although with notable regional differences, pointing to the coexistence of warmer, less seasonal environments -which likely favoured the development of relatively stable arboreal communities adapted to dense forest- alongside more open and colder environments, which could potentially promoting endemism and increased niche differentiation.

Acknowledgements: A.F.T. is funded by a predoctoral fellowship CT22/25 from the Complutense University of Madrid. F.B. was supported by the Spanish Ministry of Science and Innovation project PID2024-155134NB-I00.

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A MORPHOMETRIC APPROACH TO TWO ENIGMATIC PRIMATE DISTAL PHALANGES FROM THE MIDDLE EOCENE OF SANT JAUME DE FRONTANYÀ-3C (BERGUEDÀ, IBERIAN PENINSULA)

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Keywords: *functional morphology, hallux, pollex, claw*

The diversity and variability of euprimate phalanges remain poorly understood in both fossil and extant taxa. Here, we analyze two previously undescribed distal euprimate phalanges (IPS-7961 and IPS-7963) from Sant Jaume de Frontanyà-3C (SJF-3C), a site yielding three primate species: the adapiforms *Anchomomys frontanyensis* and *Adapis* sp., and the omomyiform *Pseudoloris pyrenaicus*. The aims of this study are: (1) to better characterize phalangeal shape and size diversity in euprimates; (2) to assess the taxonomic attribution of fossil specimens; and (3) to infer locomotor behavior based on functional morphology. Our results reveal substantial morphological variability among taxa, although pollical, hallucal, and ungual elements can be distinguished based on combined shape and size criteria. Comparisons with extant taxa indicate that IPS-7961 and IPS-7963 correspond to neither halluces nor ungual elements modified as claws (e.g., grooming claws or tegulae). Size-based comparisons with the SJF-3C primate assemblage suggest that the phalanges most likely belong to *Pseudoloris pyrenaicus*, although partial overlap with the lower size range of *Anchomomys frontanyensis* is observed, while *Adapis* can be excluded. Functional similarities with *Tarsius*, a commonly used analogue for *Pseudoloris*, support this tentative attribution, although assignment to *A. frontanyensis* cannot be fully ruled out. Multivariate analyses further distinguish robust and slender morphotypes, consistent with adaptations for agile locomotion on narrow arboreal supports.

Acknowledgements: R+D+I project PID2024-157557NB-I00 and a Ramón y Cajal grant (RYC2021-034366-I) both funded by Agencia Estatal de Investigación (MCIN/AEI/10.13039/501100011033) and the European Union NextGenerationEU/PRTR; the CERCA Programme (Generalitat de Catalunya).

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NEW ICHTHYOFAUNAL REMAINS FROM THE EARLY MIOCENE HIMALAYAN BHUBHAN FORMATION OF MIZORAM, INDIA

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Keywords: *Megatoothed sharks, Rhinidae, Himalayan, Teleosts, Selachians*

The early Miocene of India represents a tectonically influenced period of the sub-continent's history. The marine waters surrounding the Himalayas hosted diverse fish communities. This new report of a diverse ichthyofaunal assemblage from two quarries of the Himalayan Miocene Bhubhan Formation of Mizoram, India, includes taxa previously unreported from the Formation, the first report of the enigmatic megashark *Alopias grandis* in Asia, the carcharhinid *Carcharhinus perezii* and *Carcharhinus macdoti*, a species currently endemic to the Atlantic Ocean, an enigmatic tooth belonging to Rhinidae, and teleosts, *Chilomycterus reticulatus* and *Sphyræna* sp. The rhinid tooth, likely representing a new genus and species, presents additional specialisations to the occlusal surface, including anastomosing enameloid and a distinct lingual extension to the central facet in addition to the lingual crown extension (uvula) in other known Rhinidae, which acts as a contact point with teeth in the dental series. This additional lingual extension suggests a more densely packed, interlocking tooth configuration. µ-CT data on a partial dentary also reveal a likely young adult of *Chilomycterus reticulatus*, a typical reef species. The occurrence of *Alopias grandis* in the Miocene of India confirms the cosmopolitan nature of the species, similar to several other known megatoothed sharks from the Miocene, such as the otodontids and *Hemipristis serra* previously reported from the Formation. Based on a review of microfossils, invertebrate ichnology, invertebrate fossils, and the ichthyofaunal composition of the Bhubhan Formation, we propose a model of a shallow inshore palaeoenvironment with fluctuating bathymetric conditions.

Acknowledgements: SG is indebted to the Government of India, Department of Science and Technology – Anusandhan National Research Foundation (ANRF) – Startup Research Grant (SRG) scheme (SRG/2023/000141) for funding the fieldwork for the research.

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**THE EAR REGION OF DORMICE:
PART I. SEPTAL COMPASS OF THE MIDDLE EAR CAVITY IN EXTINCT AND
EXTANT GLIRIDS (GLIRIDAE, MAMMALIA)**

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Keywords: *middle ear, Glirulus, micro-CT*

The ear region of rodents is highly specialized and plays an essential role in communication and locomotor behaviour. In the rodent family Gliridae, commonly known as dormice, the middle ear cavity shows several morphological specializations. The middle ear is relatively spacious in many species and separated by distinct bony septa. This distribution can be visualised and interpreted with the ‘septal compass’ and ‘septal formula’. Within Gliridae, the subfamily Glirinae (*Glis glis* and *Glirulus japonicus*) are distinctly different from other glirids. All glirids within our study possess a posterior medial diverticulum, with the exception *Glis glis*. In addition, the unusual high number and complex distribution of bony septa in the Japanese taxon *Glirulus japonicus* does not fit within the septal compass schema seen within Eusciurida (sciurids, glirids, *Aplodontia rufa*). Alongside extant taxa, we evaluated the ear region of extinct taxa. The insular fossil giant *Leithia melitensis* possesses an additional ventral cavity, which is not seen in any of the extant species analyzed. The distribution of septa in the epitympanic recess is variable and does not represent any known phylogenetic distribution. Here, we propose that the bony septa of the middle ear alone is insufficient for discriminant phylogenetic analyses. For further analyses, we will include characters of the auditory ossicles and the bony labyrinth to better understand the variation of the internal ear architecture within the dormouse lineage.

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**INTERNAL CANINE MORPHOLOGY OF *OURANOPITHECUS MACEDONIENSIS*
(PRIMATES, HOMINOIDEA)**Melania Ioannidou^{1*}, George D. Koufos², Katerina Harvati^{1,3}¹Paleoanthropology, Institute for Archaeological Sciences and Senckenberg Centre for Human Evolution and Palaeoenvironment, Eberhard-Karls University of Tübingen, Rümelinstr. 23, 72070, Tübingen, Germany.²School of Geology, Laboratory of Geology and Paleontology, Aristotle University of Thessaloniki, 54636, Thessaloniki, Greece.³DFG Center for Advanced Studies ‘Words, Bones, Genes, Tools’, Eberhard-Karls University of Tübingen, Rümelinstr. 23, 72070, Tübingen, Germany.

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Keywords: *primates, hominoids, Miocene, dentition, canine morphology*

Dental morphology plays a central role in reconstructions of hominoid evolution, yet internal tooth structure remains less frequently investigated than external crown form, particularly in fossil taxa. This study documents the internal morphology of lower canines in the Late Miocene hominoid *Ouranopithecus macedoniensis* using high-resolution micro-CT. Mandibular material from the fossiliferous localities of Ravin de la Pluie (RPI) and Nikiti 1 (NKT) in northern Greece was analyzed and a virtual segmentation of the crown, root and pulp cavity was performed using specialized software (3D Slicer and AVIZO). This study investigates whether internal canine architecture reflects patterns of reduction in *Ouranopithecus macedoniensis*, a taxon often discussed in the context of hominoid evolution. Measurements include crown dimensions, crown height and root length, along with a qualitative assessment of the pulp canal number and configuration. Preliminary results indicate variation in canine root morphology in *O. macedoniensis*, despite the small sample size. Morphological variation is characterized using descriptive statistics and frequency distributions. Observed patterns are considered within a comparative framework that includes extant great apes, modern humans, australopiths, and other Miocene hominoids. This study provides a systematic assessment of internal canine morphology in *O. macedoniensis* and, together with previous studies on the postcanine teeth of this species, establishes a basis for future comparative analyses of root and canal variation in hominoids.

Acknowledgments: This work was supported by the Senckenberg Gesellschaft für Naturforschung, the Deutsche Forschungsgemeinschaft (DFG INST 37/706-1), the European Research Council (ERC-AdG-101019659), and the 2021 DFG Leibniz award, awarded to Katerina Harvati. Melania Ioannidou is also funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC-3101 „HUMAN ORIGINS – Excellence Cluster of Integrative Human Origins Studies“ – Project 533763844.

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STANDING ON STURDY FEET: METAPODIAL SHAPE VARIATION IN THE INSULAR BOVID *MYOTRAGUS*

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Keywords: *insular dwarfism, allometry, locomotion, artiodactyls, geometric morphometrics*

Myotragus is an extinct bovid lineage endemic to Mallorca and Menorca that underwent dwarfing as a response to its isolated environment. The extensive period of isolation resulted in morphological modifications, including the evolution of short, robust metapodials. Alongside the reduction in size, *Myotragus* metapodials exhibit pronounced inter- and intraspecific morphological variation, which hint towards additional responses to its habitat. Here, we analysed 240 *Myotragus balearicus* and 13 *M. kopperi* specimens across 13 cave localities to understand the morphological variation of metapodials within the genus. 3D geometric morphometric analyses, combined with geospatial methods, suggest that size remains the main driver behind the shape of the metapodials. While interspecific variation is limited, *M. balearicus* specimens are, on average, more robust than similarly sized *M. kopperi* specimens. Regional effects, including elevation and ruggedness, have a limited influence on metapodial morphology. However, the effect of terrain ruggedness on shape appears to be more pronounced in metacarpals than metatarsals. Our results suggest alternative drivers for metapodial shape and size variation in *Myotragus*, such as environmental shifts during glacial-interglacial periods or relaxed selection, but do not rule out the potential effect of sexual dimorphism. Additional dating efforts of fossil sites and specimens will enable further correlations between morphological variation and climate, disentangling the main drivers of shape and size variation within this insular bovid.

Acknowledgements: We thank Dr. Carme Rosselló and Dr. Jordi Roldan for their help in enabling scanning at the Hospital Universitari Son Espases, Carolina Constantino (MBCN) and Guillem X. Pons (SHNB) for providing access to the skeletal material, The Palaeontological Association, SWOL, the Govern de les Illes Balears for funding data collection.

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UNDER THE SEA: THE MIOCENE MARINE MAMMAL FAUNA FROM THE SARMATIAN DEPOSITS OF DOBRUDJA (ROMANIA AND BULGARIA)Bogdan-Alexandru Torcărescu^{1,2,3*}, Ștefan Vasile⁴¹Geological Institute of Romania, Bucharest, Romania.²Doctoral School of Geology, University of Bucharest, Bucharest, Romania.³The Institute of Bioarchaeological and Ethnocultural Research, Chișinău, Republic of Moldova.⁴Department of Geology, Mineralogy, and Palaeontology, University of Bucharest, Bucharest, Romania.

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Keywords: *Paratethys, cetaceans, pinnipeds, paleogeography*

The Miocene evolution of the Paratethys, an epicontinental sea resulting from the collision of the African and Eurasian plates, was defined by complex paleogeographic shifts and the development of highly endemic faunas. This study provides a comprehensive taxonomic re-evaluation of marine mammal remains from Miocene deposits in Romania (Ciobănița, Credința, Plopeni) and Bulgaria (Balchik, Kavarna), focusing on collections housed at the University of Bucharest. While previous research has documented regional pinnipeds and seabirds, cetacean records from these Sarmatian (Eastern Paratethys) deposits have remained significantly understudied, often lacking formal description or stratigraphic context.

Through detailed comparative osteology and morphological analysis of cranial and postcranial material, we identified an assemblage including the cetaceans *Cetotherium* cf. *riabinini* and *Kentriodon fuchsii*, alongside the pinnipeds *Cryptophoca maeotica* and *Monachopsis* cf. *pontica*. This systematic re-examination of historical collections and newly recovered material from sites such as Kavarna demonstrates the critical value of museum archives in reconstructing ancient biodiversity. By refining the taxonomic identifications within an updated stratigraphic framework, this work clarifies the distribution of marine mammals across the Paratethyan sub-basins and contributes to the broader understanding of vertebrate evolution under the fluctuating environmental conditions of the Middle-to-Late Miocene.

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**PRELIMINARY REPORT ON A NEWLY DISCOVERED SHARK TOOTH
ASSEMBLAGE FROM THE MIDDLE EOCENE OF PERU (PARACAS
FORMATION; PISCO BASIN)**

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Keywords: *Los Choros Member, palaeoichthyology, sharks*

The Pisco Basin is one of the major Cenozoic shelf basins that developed at the foot of the Andes. Its predominantly marine sedimentary fill, spanning from the middle Eocene to at least the Upper Miocene, is widely renowned for its exceptional paleontological record. Indeed, this succession has yielded highly informative fossils of bony and cartilaginous fishes, marine reptiles, birds, and mammals, offering an extraordinary window into the deep-time history of the biotic communities associated with the present-day Humboldt Current Ecosystem. Here, we present a preliminary account of the geologically oldest vertebrate assemblage yet known from the Pisco Basin. Discovered in 2025 at a previously unexplored exposure of the middle Eocene Los Choros Member of the Paracas Formation, this assemblage consists of several hundred elasmobranch teeth. Our initial analysis of the numerically dominant shark teeth suggests the presence of representatives of *Abdounia*, *Alopias*, *Brachycarcharias*, *Chlamydoselachus*, *Galeocerdo*, *Hexanchus*, *Hypotodus*, *Macrorhizodus*, *Otodus*, *Physogaleus*, and *Rhizoprionodon* whereas all ray teeth observed to date correspond to myliobatid morphotypes. This ongoing study is expected to help fill a major knowledge gap concerning Paleogene cartilaginous fish faunas along the southeastern Pacific margin, which remain only fragmentarily documented.

Acknowledgements: We acknowledge financial support by the European Union – NextGenerationEU, Mission 4, Component 2, CUP I53D23002070 006, Project Title: BIOVERTICES (BIODiversity of VERTEbrates In the CEEnozoic Sea)

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NEW INSIGHTS INTO THE CRANIAL ANATOMY OF ADELPHAILURUS KANSENSIS, AN ENIGMATIC LATE MIOCENE MACHAIRODONTINE FELIDN. Chatar^{1*}, Z. J. Tseng¹¹Department of Integrative Biology, University of California Berkeley, Valley Life Science Building, 94720, Berkeley, United States of America.

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Keywords: *Felidae, Miocene, Skull, North America*

Adelphailurus kansensis is a puma-sized felid, originally described from fragmentary material in the Big Sandy Formation (Arizona, Mio-Pliocene). Here, we describe a nearly complete cranium from the Wikieup local fauna of the Big Sandy Formation, along with associated dental remains, and refer it to *A. kansensis*. Comparative analysis with *Metailurus major*, *Yoshi minor*, *Y. garevskii*, and *Y. yongdengensis* reveals a unique combination of features. *A. kansensis* shares certain traits with *Metailurus* (narrow snout, M1 orientation) and *Yoshi* (rounded cranial profile) but differs from both in having thinner zygomatic arches of nearly constant width, a more pronounced postglenoid process, and specific dental characteristics, including a P3 lacking an anterior accessory cusp and upper canines with serrations on both margins. Geometric morphometric analyses place *A. kansensis* morphologically between *Metailurus* and *Yoshi*, supporting its intermediate cranial proportions yet confirming its distinctiveness. Several elements, including this cranium and previously misattributed specimens, were originally referred to *Pseudaelurus*, highlighting the persistent taxonomic issues surrounding early diverging felids. This study refines the diagnosis of *A. kansensis*, clarifies its relationships within “metailurins,” and underscores the need to revisit historical collections. Museum-based research continues to hold the potential for uncovering overlooked specimens that can significantly advance our understanding of felid evolution and biogeography during the Neogene.

Acknowledgements: We are infinitely grateful to the curators, collection managers and staffs who allowed us to complete this project: Jin Meng, Judith Galkin and Kiana Clark, Daniel Brinkman and Vanessa R. Rhue and Benjamin Kear, but also Denis Geraads for sharing the 3D model of *Yoshi garevskii*.

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CANID MOLAR EVOLUTION SHEARS THROUGH DEVELOPMENTAL CONSTRAINTS

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Keywords: *teeth, evo-devo, Inhibitory Cascade, Canis lupus, Canis familiaris*

The biases and restrictions development imposes upon evolution are seen as increasingly important in understanding how morphologies arise and change. As this evolutionary-developmental interface exists at the threshold of two vastly complex processes, it is often approached through characterization of developmental systems constraining evolution. The Inhibitory Cascade model (ICM) of mammalian molar development is a prime example of this: the ICM states that patterns of linear size change along the molar row observed in most mammals result from an interlinked developmental sequence, in which first-developing anterior molars inhibit the growth of subsequent posterior ones. Yet, some mammals exhibit molar proportions not explained by the ICM, potentially a result of evolution overriding developmental constraints. Here we explore the underpinnings of one such case, Canidae. Lower molar proportions in many canids are incongruent with the ICM: the molar row is dominated by the elongated first molar, the carnassial, yet often retains a third molar. We examined the evolutionary diversity of molar size and shape in extant and extinct Canidae, and a sample of wolves (*Canis lupus*), domestic dogs (*Canis familiaris*), and hybrids between these two, a gradient of morphologies from natural to human-induced. We identified a link between the trigonid–talonid area ratio in the carnassial and departure from the ICM. Considering the ecomorphological importance of the carnassial, our findings suggest that Canidae may have surmounted the restrictions of the ICM in connection with the evolution of their dietary ecology, highlighting how understanding development can also inform evolutionary research on geological timescales.

Acknowledgements: The project was funded by the FINDOS Doctoral Programme in Oral Sciences at the University of Helsinki and the Research Council of Finland. Specimens provided by Finnish Museum of Natural History and the Natural Resources Institute Finland (Luke). Hybrid identification by Helena Johansson (Luke).

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CRANIAL REMAINS OF A CF. *AELUROGNATHUS* (GORGONOPSIA) FROM THE RUHUHU BASIN, SOUTHERN TANZANIAA. Shchutka^{1*}, M. Mazuch¹¹Institute of Geology and Paleontology, Faculty of Science – Charles University, Prague, Czech Republic

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Keywords: *Ruhuhu, Permian, tetrapoda, Gorgonopsida, Nowack*

Historical vertebrate collections from the Ruhuhu Basin of southern Tanzania represent an important source of data on Permian–Triassic terrestrial faunas, but a substantial part of this material remains insufficiently studied. Here we describe a fragmentary gorgonopsian cranial specimen from the historical collection of the Chlupáč Museum of Earth History, Charles University, Prague, collected by Ernst Nowack in the 1930s and attributed to the Permian–Triassic interval.

The aim of this study is to describe the preserved cranial material and evaluate its taxonomic affinities. The specimen preserves the preorbital portion of the skull with partially exposed dentition embedded in a claystone matrix. The material was mechanically prepared and examined using comparative morphological analysis and basic morphometric measurements.

The specimen shows typical gorgonopsian characteristics, including a large caniniform tooth and a series of smaller postcanine teeth. The morphology and proportions of the preserved dentition indicate affinity with derived gorgonopsians and suggest similarities with the genus *Aelurognathus*. Due to incomplete preservation and the absence of diagnostic cranial elements, the specimen is conservatively referred to as *cf. Aelurognathus*.

The described material represents one of the few identifiable cranial remains from the Prague Ruhuhu collection and improves our knowledge of gorgonopsian diversity in the Ruhuhu Basin. The study demonstrates the scientific value of historical museum collections for research on Permian–Triassic vertebrate faunas.

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**LATE PLEISTOCENE–EARLY HOLOCENE HERPETOFAUNAL REMAINS FROM
STOieni CAVE (MEHEDIŢI COUNTY, SOUTHWESTERN ROMANIA) –
PRELIMINARY RESULTS**

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Keywords: *deglaciation, amphibians, squamates*

Recent palaeontological excavations conducted in the Stoieni Cave (Isverna village, Mehedinţi County, southwestern Romania), provided a unique opportunity to study the changes in vertebrate faunal abundance and taxonomic diversity in relation to the climate changes associated to the end of the latest glaciation. Palaeontological excavations are still ongoing, but the deposits of Stoieni Cave already yielded numerous large and small vertebrate remains radiocarbon dated Late Pleistocene–Early Holocene. Alongside the more abundant mammalian remains, fish, amphibian, and reptilian specimens were also found, the first of this kind described from Romania south of the Carpathian Mountains. Fish remains are very rare and consist of a few vertebrae assigned to an indeterminate salmonid. Amphibians are represented mostly by vertebrae and limb bones belonging to one urodele (the salamandrid *Triturus cristatus*) and two anurans (the bufonids *Bufo viridis* and *Bufo bufo*, and the ranid *Pelophylax esculentus*). Six squamate reptilian taxa were identified, including three lizards (the anguid *Anguis colchica*, the lacertids *Lacerta viridis* and *Lacerta agilis*) and three snakes (the colubrid *Elaphe quatuorlineata*, the natricid *Natrix natrix*, and the viperid *Vipera ammodytes*). With the exception of *E. quatuorlineata*, currently present only further south, closer to the Mediterranean Sea, never reported before from Romania, all the other taxa are currently part of the local herpetofaunal assemblage. The preliminary results show present taxa were already established in the area before the Last Glacial Maximum but also changes in the abundance and taxonomic composition of herpetofauna, as a response to glacial and post-glacial environmental changes.

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**FOSSIL COLLAGEN AS A QUALITATIVE MOLECULAR ARCHIVE:
PRESERVATION, DIAGENETIC MASKING, AND EARLY ANTHROPOGENIC
SIGNATURES IN PLEISTOCENE ANIMAL REMAINS**

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Keywords: *taphonomy, collagen, decomposition, mass spectrometry, ¹⁴C*

Collagen is the primary organic component of bone and a key molecular archive for reconstructing past environments, ecosystems, and chronologies. In Pleistocene contexts, it underpins radiocarbon dating and isotopic studies, yet it is still commonly treated as “present” or “absent,” overlooking its qualitative molecular state. This simplification obscures important information about diagenesis, environmental conditions, and the reliability of analytical results. Here, we investigate collagen preservation in faunal bones from four Central European Pleistocene sites representing diverse depositional contexts: open-air loess, cave and karst settings. These assemblages vary in sediment chemistry, taphonomy, and degrees of human involvement. However, to test the impact of anthropogenic activity, an ideal framework would involve a single site containing stratigraphically distinct layers: one clearly associated with human activity, and another formed exclusively through natural processes, that would allow comparison under similar environmental conditions. For instance, sites like Spadzista yield extensive anthropogenic mammoth accumulations but lack equivalent remains from naturally deceased individuals for direct comparison.

Using ToF-SIMS and FTIR, we conducted low-destructive analyses focusing on molecular fragmentation, peptide signals, and markers of advanced glycation and lipoxidation (AGEs/ALEs). These features reveal oxidative stress, cross-linking, and chemical modification of collagen. We propose that patterns of collagen alteration may serve as proxies for early anthropogenic pressure. Human activities such as hunting, carcass processing, and fire use likely accelerate molecular degradation, producing detectable signatures. Integrating molecular data with archaeological context demonstrates that fossil collagen is not only a dating substrate but also a sensitive recorder of post-mortem processes and human-environment interactions.

Acknowledgements: Funding was provided by the National Science Centre, Poland (grant no. 2023/51/B/ST10/00997).

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PRELIMINARY BIOSTRATINOMIC RESULTS FROM THE ‘CRUZEIRO DO OESTE PALEONTOLOGICAL SITE’ (CAIUÁ GROUP, BAURU BASIN, BRAZIL)

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Keywords: *Pterosaur*, *Caiuajara dobruskii*, *Taphonomy*, *Bonebed*, *Cretaceous*.

The Cruzeiro do Oeste Paleontological Site (COPS) represents the most prolific fossil-bearing outcrop of the Caiuá Group (Bauru Basin, Brazil). These Early Cretaceous desert deposits preserve a singular paleofauna mostly composed of the tapejarid pterosaur *Caiuajara dobruskii* but also include other pterosaurs (*Torukjara bandeirae* and *Keresdrakon wilsoni*), noasaurid dinosaurs (*Vespersaurus paranaensis* and *Berthasaura leopoldinae*), and an acrodont lizard (*Gueragama sulamericana*). Furthermore, COPS comprises the third known occurrence of pterosaur bonebeds worldwide. The present work investigates macroscopic biostratinomic features (e.g., weathering, abrasion, bioerosion, and degree of articulation) of blocks from these bonebeds, aiming to reconstruct the site's taphonomic history. To date, 25 blocks have been analysed, yielding 482 identifiable bones corresponding to pterosaurs (93.2%) and dinosaurs (6.8%). Taxonomic features correspond to *C. dobruskii* and *V. paranaensis*. Pterosaur accumulations are highly disarticulated (94%) with few elements articulated (2.8%) or associated (3.2%), whereas dinosaur remains are predominantly articulated (78.1%), with fewer disarticulated elements (21.9%). No elements show evidence of weathering or bioerosion. Most specimens are unabraded (stage 0; 91.1%), whereas few exhibit stage 1 (7.6%), and advanced stages are rare. Conversely, fractures are common (53.3%), especially stepped (17.1%) and smooth transverse (16%). Overall, these preliminary signatures do not indicate an advanced stage of bone alteration, consistent with short subaerial exposure. Besides, the contrast in the degree of articulation between taxa may be related to differences in exposure time and/or distinct taphonomic pathways to be elucidated. This study contributes to the understanding of arid zone environments, and further analyses are currently underway.

Acknowledgements: Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) n° 2024/20984-0 and 2020/07997-4.

Poster 46

DECIPHERING THE MOLECULAR PALIMPSEST: FROM INDIVIDUAL SPECTRA TO DATA SCIENCE AND MACHINE LEARNINGD. Surmik^{1*}, A. Staniek¹¹Institute of Earth Science, Faculty of Natural Sciences, University of Silesia in Katowice, Sosnowiec, 41-200, Poland.

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Keywords: *molecular taphonomy, collagen, diagenesis, decomposition, contamination*

Fossil biomolecules are rarely preserved as pristine entities; they occur as complex mixtures shaped by diagenetic and geochemical processes. This complexity can be conceptualized as a molecular palimpsest, in which original biomolecular signals overlap with transformation products, environmental inputs, and modern contamination. Interpreting such datasets remains a central challenge in molecular paleontology.

Single ToF-SIMS or FTIR spectra contain hundreds to thousands of peaks derived from multiple sources, including remnants of primary biomolecules such as collagen, diagenetic products including advanced glycation and lipoxidation end-products (AGEs and ALEs), microbial metabolites, soil-derived compounds, and laboratory contaminants. These components coexist within datasets, often without clear boundaries between endogenous and exogenous signals.

Traditionally, spectral interpretation has relied on expert-driven, peak-by-peak analysis based on reference data and chemical reasoning. Although essential, this approach becomes limited as complex datasets grow. Modern studies may involve hundreds or thousands of spectra, making manual interpretation time-consuming and potentially biased.

To address these challenges, molecular paleontology is adopting data science approaches. Tools implemented in Python or R enable automated peak detection, normalization, database matching, and statistical comparison across large datasets. Multivariate methods, including principal component analysis and clustering, allow patterns to be evaluated at the level of entire spectra.

More recently, machine learning has enabled classification of spectral data and identification of subtle molecular signatures associated with preserved endogenous compounds. These methods complement, rather than replace, traditional chemical interpretation, supporting robust, scalable, and reproducible analysis of complex fossil biomolecular data.

Acknowledgements: Funding provided by National Science Centre, Poland (grant no. 2023/51/B/ST10/00997).

Poster 47

NEW DATA ON THE AXIAL OSTEOLOGY OF THE UPPER CRETACEOUS EUROPEAN ANKYLOSAURS

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Keywords: *Thyreophora, Dinosauria, Vertebrae, Systematics, Mesozoic*

Ankylosaurs were common components of European terrestrial ecosystems throughout most of the Cretaceous. Within the Upper Cretaceous record, the morphology of non-sacral axial elements is comparatively poorly understood, particularly the posterior cervical vertebrae. We provide a revisionary study of a posterior cervical and three anterior caudal ankylosaur vertebrae from the upper Campanian of Fox-Amphoux (Provence, southern France). The cervical vertebra is the third occurrence of the series in ankylosaurs from the Campanian-Maastrichtian of Europe. This element shows relatively short prezygapophyses and shares with struthiosaurid cervicals a proportionately wide neural arch. However, unlike struthiosaurids such as *Struthiosaurus*, the Fox-Amphoux cervical is characterized by a strongly anteroposteriorly compressed centrum. Under the most parsimonious interpretation, this element may represent the first record of posterior cervical vertebrae in Upper Cretaceous struthiosaurids. If so, it would suggest that Upper Cretaceous struthiosaurids did not develop necks as notably elongated as implied by other known cervical elements. Alternatively, the greatly shortened centra opens the possibility that the Fox-Amphoux cervical might belong to a lineage of Upper Cretaceous struthiosaurids unrelated to *Struthiosaurus*, or even laying outside of the clade. The Fox-Amphoux caudals possess centra that are wider than taller and strongly compressed anteroposteriorly, as in some ankylosaurids and panoplosaurids. The transverse processes are thicker than wider, unlike the opposite condition typically found in Struthiosauridae and Ankylosauridae. Moreover, the Fox-Amphoux caudals transverse processes are continuous with the neural arches. Overall, these caudals differ morphologically from those of the struthiosaurids *Hungarosaurus* and *Struthiosaurus*.

Acknowledgements: Research supported by grants PID2024-161658NB-I00 and PID2021-122612OB-I00 (MICIN/FEDER) from the Agencia Estatal de Investigación, Ministerio de Ciencia, Innovación y Universidades, Gobierno de España. Additional funding was provided by the CERCA Programme and the project ARQ001SOL-173-2022 funded by the Departament de Cultura of the Generalitat de Catalunya. Research of XPS is supported by the Basque Country Government (group IT1485-22) and the Spanish Ministry of Science (project PID2024-158833OB-I00 funded by MICIU/AEI/ 10.13039/501100011033/FEDER,UE). Authors thank Mr. Jacques Anatom, who prepared the fossil material from the DinoFox Museum.

Poster 48

**ON THE ANATOMY AND DIVERSITY OF EARLY MAASTRICHTIAN
HADROSAURID DINOSAURS FROM IBERO-ARMORICA**A. Prieto-Márquez^{1,2*}¹Dinosaur Ecosystems Research Group, Institut Català de Paleontologia Miquel Crusafont (ICP-CERCA),
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Keywords: *Dinosauria, Hadrosauridae, Cretaceous, Europe, evolution*

The European hadrosaurid dinosaur record shows an imbalance in our understanding of their diversity and evolution: while the upper Maastrichtian is characterized by a diverse lambeosaurine assemblage, the lower Maastrichtian remains poorly understood. This gap is compounded by the general scarcity of diagnostic material, which hampers well-resolved and more stable phylogenetic hypotheses. L'Espinau bonebed in the south-central Pre-Pyrenees of NE Spain provides a critical window into the taxonomic diversity and evolution of European hadrosaurids. The site is late early Maastrichtian (~69–70 Ma) in age and belongs to the Figuerola Formation (Àger Syncline). Hadrosaurids dominate the assemblage as a multi-individual sample across various ontogenetic stages. The postcranial record includes abundant axial and appendicular elements. Cranial elements are scarcer, represented by the frontal, parietal, preotic, supraoccipital, maxilla, postorbital, squamosal, predentary, dentary and dentition. Bones are typically disarticulated, with a few instances of close spatial association. Current anatomical data recovered from L'Espinau support the co-occurrence of at least two distinct hadrosaurid species during the early Maastrichtian of Ibero-Armorica. Most cranial elements (e.g., parietal, predentary, dentary, maxilla) are referable to Lambeosaurinae. Specific appendicular features tentatively support referral of this lambeosaurine to *Adynomosaurus* or a closely related form, part of a lineage that persisted until the end of the Maastrichtian. Additionally, at least one frontal from L'Espinau, which differs markedly from the only other two hadrosaurid frontals known from Ibero-Armorica, indicates the presence of a second species, preliminarily identified as a saurolophid of uncertain affinities.

Acknowledgements: Grants PID2020-119811GB-I00, PID2024-161658NB-I00 and VIGEOCULT [PLEC2021-00793] by the AEI (Gobierno de España), as well as grant ARQ001SOL-173-2022 and the CERCA Programme (Generalitat de Catalunya)

Poster 49

**CRANIAL TOPOLOGY OF ORNITHISCHIAN DINOSAURS:
A COMPARATIVE ANATOMICAL NETWORK ANALYSIS**Tim Schuurman¹, Emiliano Bruner^{2,3}, Albert Prieto-Márquez^{4*}, Fabien Knoll²¹Facultat de Medicina i Ciències de la Salut, Universitat de Barcelona, Carrer de Casanova, 143, 08036, Barcelona, Spain.²Departamento de Biología, Museo Nacional de Ciencias Naturales-CSIC, Calle José Gutiérrez Abascal, 2, 28006, Madrid, Spain.³Reina Sofia Alzheimer Center, CIEN Foundation, ISCIII, Calle de Valderrebollo 5, 28031 Madrid, Spain.⁴Institut Català de Paleontologia Miquel Crusafont (ICP-CERCA), Universitat Autònoma de Barcelona, Carrer Escola Industria, 23, 08201, Sabadell, Spain.

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Keywords: *network theory, functional craniology, spatial constraints, integration, modularity.*

Cranial morphology is intrinsically influenced by the spatial arrangement of its constituent bones. Network theory provides a powerful framework to perform comparative analyses regarding the spatial arrangement of the cranial bones, based on their physical interactions, specifically the joints, i.e., sutures and synchondroses. This methodology is known as anatomical network analysis. Here we use this approach to identify the bones that play a central role in the spatial balance of the cranium of ornithischians, uncover underlying phenotypic patterns of spatial organization, and understand how these patterns might have channeled the evolution of cranial morphology within this clade. We generated anatomical network models based on the complete cranium of 14 ornithischian dinosaur species, encompassing the cranial diversity of the clade. Anatomical network analysis provides morphological information both locally, by assessing the relevance and roles of specific bones, and globally, by quantifying the overall cranial complexity and organization. Our results indicate that, locally, the parietal, parabasisphenoid, and frontal bones are embedded within a highly complex topological context. These elements are subjected to strong spatial constraints, suggesting that their respective cranial regions play a key role in shaping the morphological evolution of the system. Globally, the cranial networks show a clear topological compartmentalization of their regions. For instance, most species display a longitudinal separation between the bones of the snout and those of the postorbital region. This compartmentalization, or modularity, is noteworthy as it highlights sets of bones that undergo morphological evolution in an integrated fashion.

Acknowledgements: This research was funded by European Union's NextGenerationEU programme through the Spanish Recovery, Transformation, and Resilience Plan (CNS2023-144014 to F. Knoll) and the AEI of the Spanish Government (PID2024-161658NB-I00 to A. Prieto-Marquez).

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PERISSODACTYL MAMMALS FROM THE UPPER EOCENE OF MALLORCA (BALEARIC ISLANDS, WESTERN MEDITERRANEAN): A SYSTEMATIC AND TAXONOMIC REASSESSMENTP. Segurado^{1,2,3*}; R. Matamales-Andreu^{3,4}; J. Marigó^{1,4}¹Universitat Autònoma de Barcelona, Departament de Geologia, Cerdanyola del Vallès (Barcelona), Spain²Museu de la Conca Dellà, Isona, Spain³MUCBO | Museu Balear de Ciències Naturals, FJBS-MBCN, Sóller, Mallorca, Spain⁴Institut Català de Paleontologia Miquel Crusafont, Universitat Autònoma de Barcelona, Sabadell, Spain

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Keywords: *Eocene, Mallorca, Perissodactyls, Paleobiogeography, Biodiversity*

During the 19th century, the Paleogene of Mallorca (Balearic Islands, western Mediterranean) attracted the interest of paleontologists, particularly due to the diverse fossil assemblages recovered from the lignite mines in Selva, Lloseta, and Binissalem. The rocks extracted from those (now inactive) mines belong to the Peguera Formation (middle–upper Eocene), which represents a lacustrine depositional environment preserving different floral and faunal assemblages. Among vertebrates, mammal bones are the most abundant remains, with the predominance of fossils attributed to perissodactyls and artiodactyls. Although early studies reported the presence of macromammals, no detailed research has been conducted since the early 20th century. Here we present the results of our study, which reexamines craniodental material housed in the collections of Museu Balear de Ciències Naturals (Sóller). Our findings confirm the presence of two perissodactyl (Paleotheriidae) taxa from the localities of Selva, Lloseta and Binissalem, dated as Bartonian–Priabonian (middle–upper Eocene): *Plagiolophus* aff. *annectens* and *Lophiotherium cervulum*. The former shows some morphological similarities to *P. annectens*, although it varies considerably in size, which may imply the presence of a new species that can provide information on endemism as well as morphological variability of the group in the Eocene of Europe. The latter taxon is hare-sized and represents the smallest mammal studied in the present work. These fossils contribute to a broader understanding of the Paleogene biodiversity, ecosystems and paleobiogeography in Europe.

Acknowledgements: Funding and support from R+D+I project PID2024-157557NB-I00 financed by MICIU/AEI/10.13039/501100011033/FEDER, UE, a “Ramón y Cajal” grant (RYC2021-034366-I to J.M.) funded by MCIN/AEI/10.13039/501100011033) and the European Union NextGenerationEU/PRTR, as well as the CERCA Programme, Departament de Cultura (Generalitat de Catalunya) and Consell Insular de Mallorca (exp. 856257X, 289/2022).

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We understand as a violation of the Code of Conduct any behaviour, conduct, act, practice, interaction, or action that may take place in any activity under the EAVP 2026 umbrella that affects or causes damage to a person or a group on the basis of the aforementioned categories. Wide-ranging inappropriate conduct includes professional dishonesty, mistreatment, diminishing comments, derogatory jokes, hate speech, privacy violations, defamation, stalking, threatening, blackmailing, labour harassment, sexual harassment, unwanted, undesired or unauthorized touching, assault, rape, and retaliation.

REPORTING PROCEDURES

EAVP is committed to being a safe space, therefore, any individual that experiences any of the aforementioned inappropriate conducts (or any other kind of disrespectful or abusive treatment not identified in this code) can inform and report the incident through the Non-Discrimination Committee of the EAVP 2026 (see below for contact information). Reporting or registry of an incident may be executed by two main procedures:

Anonymous informal complaint: Anyone who feels disrespected, mistreated, discriminated against, offended, and/or abused, but does not want to reveal their identity, can submit an anonymous complaint following the form below. Anonymous complaints do not generate direct intervention or response but will help to keep track of the discriminatory dynamics taking place in EAVP 2026 spaces and events allowing to increase awareness.

Formal report. Anyone who feels disrespected, mistreated, discriminated against, offended, and/or abused can report following the formal confidential procedure: this is a form that anyone can download [here](#). The formal report is the only procedure that, following the Non-Discrimination Committee evaluation, would allow the Organizing Committee of the EAVP 2026 to take actions regarding offenders/perpetrators, bystanders, and victims.

The formal reporting will guarantee the principle of confidentiality. All the information will be properly examined while protecting the identity of all parties involved (complainants, offenders/perpetrators, witnesses) until the incident and subsequent investigation are resolved, and those involved are notified. EAVP 2026 is responsible for responding to all formal reporting in a timely manner. All reports will be forwarded to the Non-Discrimination Committee of the EAVP 2026. Formal complaints that extend beyond the meeting itself will be forwarded to the EAVP board and/or the diversity and/or ethics officers of the EAVP.

The Non-Discrimination Committee also offers informal on-site consultation, which comes with an assurance of anonymity (unless or until consent of otherwise is expressly given). Besides the Non-Discrimination Committee, any member of the Organizing Committee may act as consultants/guides/support in informal/formal reporting scenarios and will pass on the information to the Non-Discrimination Committee. The members of both the Organizing Committee and the Non-Discrimination Committees of the EAVP will be easily identifiable by all attendants.

The Non-Discrimination Committee will be in charge of the investigation, fact-finding, fact-checking, resolution (upheld or dismissed report), and action (support, arbitration, and sanction). If an individual from the Committee is involved in the complaint, that individual will be excluded from the procedure.

If the Non-Discrimination Committee upholds an incident-based report, the undertaken action(s) will depend on the scale, scenario, and modality of the Code of Conduct violation. In any case, the Committee will consider the interests and needs of the complainants, guaranteeing their safety and preventing them from suffering any form of retaliation. In addition, the resolution process will always be carried out with transparency, avoiding any form of conflict of interest and bad-faith decisions.

The actions that the Committee can take vary according to the level of the breach/violation itself. EAVP 2026 may bring into force three stages of action:

- Wake-up call to the offender/perpetrator.
- Mediation talks with the parts involved (if possible and authorised by the parts).
- Expulsion of the offender/perpetrator from ongoing activities.

Reporting – formal or informal – should be received by the Non-Discrimination Committee within a month after the end of the conference (5th August 2026). EAVP 2026 cannot guarantee that reports filed after that deadline will be processed.