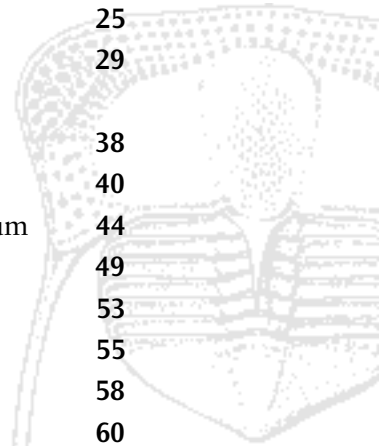


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The Palaeontology Newsletter

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Reminder: The deadline for copy for Issue no. 116 is 3rd June 2024.

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Editorial

As the seasons change in the temperate regions it is time for the first *Palaeontology Newsletter* of 2024. In this issue we detail the medal and award winners announced at the AGM at the end of last year, including the PalAss Exceptional Lecturer for the academic year 2024/2025. If you would like **Alex Dunhill** to give a lecture to your department on *Species loss, community collapse, and ecosystem recovery during times of mass extinction*, please apply to host him via the Association's website. If you want to be our next PalAss Exceptional Lecturer, or to nominate one of your colleagues for our medals and awards, please see the details in this *Newsletter* and on the website. Please submit medal nominations by **31st March**.

My huge thanks to all the contributors who wrote articles for this issue! We have a fascinating article by **Paul Wilson** on the experiences of blind and partially-sighted visitors to museum collections, and what impact 3D printing of specimens can have. In our Behind the Scenes at the Museum, **Rose Prevec** gives us an insight into the history and current collections of the Albany Museum in South Africa. **Mary Sanche** regales us with the life of the palaeoartist Ely Kish, evoking the sensations inherent in Kish's paintings of dinosaurs through her emotive descriptions. Several of Kish's works are displayed in the Royal Tyrrell Museum – check out the images in the article, or the real things if you're lucky enough to visit!

We also have a Mystery Fossil submitted by **Paul Grote** that we hope you will be able to identify, meeting reports from **Laura Mulvey**, **Tom Challands** and a joint contribution from **Amal Zouicha**, **Sara Akboub** and **Saber Salmi**, and lots of grant reports detailing the outcomes of research projects funded by the Association. If you wish to apply for a grant to support your meeting or a research project, please see more details in this *Newsletter* and on the website.

Speaking of meetings, inside we have lots more details about the Association's Annual Meeting in Erlangen this December, as well as information regarding our postgraduate student meeting, *Progressive Palaeontology*, to be held in Bristol in June. Please also see the information about an online meeting being hosted by the Association on Ecological Uniformitarianism.

Finally, we have several Association Council positions that have newly-elected members, starting their terms from the beginning of 2024. Congratulations to the newly-elected Council members – I'm looking forward to working with you all! And to all Association members: this is your *Newsletter* and if you would like to contribute to future issues or have ideas for content that you would like to see then please don't hesitate to get in touch.

Harriet B. Drage

Newsletter Editor

<newsletter@palass.org>



@ThePalAss



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Postcards from the President

Rachel Wood continues her new series to highlights issues of particular topical relevance.



Where do we want to be in 2029?

In 2024, the Association is in its 67th year, and Council will be holding an Away Day in July to create a strategy document to serve as a foundation for decision-making and prioritized areas of action over the next five years.

We will also be exploring the creation of a new overarching Ethics Committee, in order to scrutinize policies already in place, our code of conduct, professional standards, and those issues raised by publications.

This year we continue to support early-career researchers to develop permanent careers in palaeontology by offering further 'Postdoc Funding Chats' webinars on how to improve applications for research fellowships.

Rachel Wood
President

#3: Early Jurassic

Dorset, southern England 195 myr ago

Foreground: *Caenites turneri* (ammonite),

Ichthyosaurus anningae (ichthyosaur)

Background: *Archaeonectrus rostratus* (plesiosaur)

Image by James McKay, © The Palaeontological Association

Association Business

New Council Members for 2024

At the AGM the following individuals were elected to Council:

- Vice-President: **Susannah Maidment**
- Newsletter Editor: **Harriet Drage**
- Reviews Editor: **Richard Dearden**
- Education Officer: **Joseph Keating**
- Diversity Officer: **Nidia Álvarez-Armada**
- Ordinary Members: **Laura Porro** and **Daniela Schmidt**
- Editor Trustee*: **Christian Klug**

*candidate nominated by the Editorial Board as one of two Editor Trustees.

We wholeheartedly thank all those who stood in this election but were unsuccessful: Kirsten Flett, Omar Rafael Regalado Fernández, Romy Rayner, Chris Mays, Amalia Robertson and Alex Dunhill.



The Association is run by members for members. Without these dedicated and selfless individuals putting themselves forward for election we would not be able to continue our work to promote and support the palaeontological community. If you wish to stand for Council in 2024 please see: <<https://www.palass.org/association/how-stand-election-council>>.

Awards and Prizes announced at the AGM

The following awards and prizes were announced and summarised at the 2023 AGM held virtually in December 2023.

Lapworth Medal: Prof. Else Marie Friis

The Lapworth Medal is the most prestigious honour bestowed by the Association to a palaeontologist who has made a highly significant contribution to the science of palaeontology by means of a substantial body of research and service to the scientific community. It is not normally awarded on the basis of a few good papers, but Council will look for breadth as well as depth in the contributions in choosing suitable candidates.

In 2023 the Lapworth Medal was awarded to Professor Else Maria Friis.

Prof. Sir Peter Crane and Dr Paul Kenrick write: *“Fifty years ago there was little prospect of ever having a meaningful understanding of the phylogeny and fossil history of flowering plants, the dominant group of terrestrial autotrophs. Phylogenetic methods were in their infancy, and most of what was known about angiosperm fossils during the Cretaceous was based on leaves and pollen. This situation has been changed dramatically by the development of phylogenies based on molecular data, but also by discoveries of exquisitely well-preserved fossil flowers from the Cretaceous by Professor Friis.”*

They continue: *“Together with Professor Dianne Edwards FRS, one of the few women to have previously received the Lapworth Medal, Professor Friis is one of the foremost palaeobotanists worldwide. She is the undisputed leader in uncovering and developing the rich record of fossil angiosperm flowers from the Cretaceous. Her work on this material, and her continuing new discoveries, have yielded a level of detailed information on the structural and systematic diversity of early angiosperms during the crucial first 70 million years of their evolutionary diversification that was unimaginable before.”*



Photo courtesy of Kaj Raunsgaard Pedersen.



Her key breakthrough was to recognize that numerous small fossil flowers, which are generally not visible to collectors in the field, are abundant, can be extracted from suitable Cretaceous sediments by bulk-sieving, and are often preserved in superb detail. Else Marie pioneered the careful study of these fossils in the 1980s, first with scanning electron microscopy, and then, three decades later, with some of the first applications of synchrotron X-ray microtomography to palaeobotanical material – which is now routine.

Because fossil flowers can be compared directly, and in detail, with comparable structures in living plants, the palaeobotanical data that they yield can be integrated with the other advances in angiosperm phylogenetics and comparative biology that have been made over the past 30 years. Else Marie's work has revitalized research on angiosperm fossils, and has greatly clarified many aspects of early angiosperm evolution. In addition to the discovery of exquisitely preserved ancient flowers – many preserved as charcoal from ancient forest fires – Else Marie has made key breakthroughs and contributions in elucidating the very early fossil record of angiosperms and in integrating the angiosperm fossil record with other fields. Else Marie's book *Early Flowers and Angiosperm Evolution* provides an integrated overview of data and ideas on the major patterns of angiosperm evolution, focusing especially on the early evolution of the group and its fossil record. The book illuminates how palaeobotanical results relate to recent insights into the phylogenetic systematics, structure and biology of extant angiosperms.

In recognition of her research and outstanding service Else Marie received the Royal Order of the Polar Star, First Class, from the Government of Sweden, a highly prestigious, national, civilian honour. She is also a Foreign Member of the Royal Society (2020), a member of the Royal Danish Academy of Sciences and Letters (1990), the Royal Swedish Academy of Science (1996), the Norwegian Academy of Science and Letters (1998), the Chinese Academy of Sciences (2002) and the American Academy of Arts and Sciences (2017).

Else Marie's accomplishments make her a truly worthy recipient of the 2023 Palaeontological Association's Lapworth Medal.

President's Medal: Professor Richard J. Butler

The President's Medal is a mid-career award given by Council to a palaeontologist who has had between 15 and 25 years of full-time experience after their PhD in recognition of outstanding contributions in their earlier career, coupled with an expectation that they will continue to contribute significantly to the subject in their further work.

The President's Medal in 2023 was presented to Professor Richard Butler.

Dr Susannah Maidment and Prof. Paul Barrett write: "*Richard Butler is a world-leading expert on Mesozoic reptiles whose work has fundamentally changed our understanding of the evolution of ornithischian (bird-hipped) dinosaurs, Triassic archosauromorphs and terrestrial biodiversity through time. He has published more than 160 papers in international peer-reviewed journals, has supervised 25 early-career researchers (ECRs), and has collaborated widely with scholars across the world.*"

Richard's PhD research focused on the early evolution of the bird-hipped dinosaurs. He built the first comprehensive phylogeny of early-diverging ornithischians, using a large dataset that was at the limit of what it was possible to analyse computationally at the time. His dataset forms the



basis of virtually every phylogenetic analysis of ornithischians that has been carried out since. During a postdoc at the Natural History Museum, London, Richard analysed quantitatively the co-evolution of dinosaurs and flowering plants, and during an Alexander von Humboldt Fellowship in Munich he studied the archosaurs of the Triassic Period. Amongst others, he demonstrated that archosaurs evolved just a few million years after the end-Permian mass extinction, and that there was no evidence for Cope's Rule during early dinosaur evolution.

In 2013 Richard moved to the University of Birmingham where he began to work on the effects of sampling bias on the terrestrial fossil record, and on patterns of diversity on land through time and space. He has shown that diversity has remained more-or-less constant, except immediately after major new colonization events (e.g. the colonization of land by tetrapods), and he has shown that previously supposed exponential rises in diversity through time are due to sampling biases. This indicates fundamental constraints on terrestrial biodiversity through much of Earth's history.

Richard has held many professional service roles. He is an exceptional mentor of ECRs, has completed two stints on the Council of the Association, has held editorial roles, and is currently Director of Research for the College of Life and Environmental Sciences at the University of Birmingham where he oversaw their successful REF 2021 submission. Richard is barely halfway through his career, but has had a notable influence on vertebrate palaeontology, producing paradigm-shifting publications, mentoring ECRs and notably supporting the wider palaeontological community.

Richard's accomplishments to date make him a deserving recipient of the 2023 Palaeontological Association's President's Medal.

Hodson Award: Professor Rachel C. M. Warnock

The Hodson Award is conferred on a palaeontologist who has had no more than ten years of full-time experience after their PhD and who has made a notable contribution to the science. The 2023 Hodson Award goes to Rachel Warnock, who is Professor of Systems Palaeobiology at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU, Germany).

Professors Erin Saupe and Phillip Donoghue write: "*Rachel is a world-class computational palaeobiologist whose research lies at the interface of palaeontology, molecular biology and computational evolution. In particular, Rachel focuses on the development and application of methods for establishing evolutionary timescales and has made a number of seminal and influential contributions.*"



Photo courtesy of Susannah Maidment.



Rachel completed a BSc in Genetics at University College London and an MRes in Biosystematics at Imperial College London, before undertaking a PhD in Bayesian approaches to estimating divergence times at the University of Bristol. Her PhD focused on the use of palaeontological data in molecular clock analyses, and she served as an influential member of the NESCENT-funded ‘Fossil calibrations database’ team that established best practice in the use of palaeontological data in the formulation of calibrations, which is now the standard in the field.



Photo courtesy of Graham Pugh.

Rachel further demonstrated that standard approaches to vetting fossil calibrations through cross-validation is methodologically flawed. Rachel also took a novel simulation-based approach to testing the molecular clock calibrated by a secularly biased fossil record, finding that while mean clade-ages were always wrong, the credibility interval of the estimate almost always captured the true clade age. For this combined work, Rachel was awarded the Faculty of Science Commendation for ‘Excellence in a PhD thesis’.

Following her PhD, during later research fellowships at the Smithsonian Museum of Natural History in New York and later at ETH Zurich, she worked on establishing evolutionary timescales using fossil stratigraphic information and the inclusion of fossil species within such analyses, building on the development of the fossilized birth–death (FBD) model. Rachel has also developed software for simulating realistic fossil stratigraphic data, *FossilSim*, to explore the relationship between fossil sampling, evolutionary processes and timescales. More recently, Rachel has explored the impact of fossil age uncertainty on such analyses, finding that failure to accommodate it can be pejorative in divergence time analysis, leading to spurious results. These endeavours have involved working with numerous international colleagues to apply these complex techniques to establishing and testing macroevolutionary timescales.

Erin Saupe and Phillip Donoghue state: “*It is clear that Rachel’s research is world class, but she is more than one-dimensional; her teaching and mentoring records are at least as impressive.*”

Rachel has been instrumental in promoting the International Master’s in Paleobiology at FAU, now one of the leading destinations for palaeobiology graduate students in the EU. She inaugurated and coordinates the mentoring and progress monitoring scheme for PhD students in the GeoZentrum Nordbayern. Rachel is also the Women’s Representative for GeoZentrum Nordbayern on FAU’s university-wide Gender and Diversity Committee. This role involves developing and sustaining initiatives to increase diversity across the University and support women and ECRs in their work. In addition Rachel served as the first Diversity Officer for the Association.

Rachel is awarded our 2023 Hodson award, in recognition not only of her research excellence in palaeobiology, but also her unwavering contributions to enhancing teaching and collaborative environments.



PalAss Exceptional Lecturer

We are pleased to announce that **Alex Dunhill** has been appointed as the PalAss Exceptional Lecturer for 2024/25. Alex will present the Innovations in Palaeontology Lecture Series with a talk entitled *Species loss, community collapse, and ecosystem recovery during times of mass extinction*. We now invite interested institutions to apply to host via the Association's website. Please provide a timeframe (between September 2024 and May 2025) during which you would like Alex to give a lecture at your institution. The list of interested institutions will be forwarded to Alex on 1st June, although any applications from institutions submitted after this date will still be considered depending on the remaining time and budget. The Association will pay for any reasonable travel costs incurred by the Exceptional Lecturer in visiting each of the host institutions (up to a maximum of £500 per lecture). The host institutions are expected to cover costs for accommodation (where necessary) and hospitality. Please see page 19 in this *Newsletter* and the website for further details.

Research Grant Awards

Research Grants, the largest grants awarded by the Association, are made to assist palaeontological research. Grants must support a single research project, or a 'proof of concept' proposal with an aim of supporting future applications to national research funding bodies. In 2023 Council agreed awards for the following applicants: Javier Luque for 'Exceptional preservation in tropical settings: a glimpse into the Cretaceous of the equatorial Neotropics' (£9,695.00); and Nicholas J. Minter for 'Re-tracing arthropod ichnology: ichnotaxonomy of arthropod trackways, trails, and imprints' (£9,796.50).

Small Grant Awards

The small grants awarded by the Association for funding in 2023 include the Sylvester-Bradley, Collomon, Whittington and Stan Wood awards. Council agreed that the following applicants should receive Sylvester-Bradley awards: Abi Crane (£1,500); Laura Devine (£1,470); Panagiotis Kampouridis (£1,470); and Cassius Morrison (£1,493). Council also agreed the following awards: Ogechi Ekwunye, Callomon Award (£1,500); Hady George, Whittington Award (£1,049); and Manon Hullot, Stan Wood Award (£1,479). Details of the proposed research projects are given below.

A novel approach to skeletochronology in an underutilized analogue for non-avian dinosaurs

Abi Crane

Lines of arrested growth (LAGs) are cyclical growth marks produced in the bones of many vertebrate taxa. Despite their widespread use in skeletochronology, the relationship between these marks and annual cycles is not well understood and they have been found to show considerable within-skeleton variation. A significant obstacle to our understanding of LAGs are limitations on sampling, which is either destructive (histological sectioning) or of limited access (synchrotron scanning). This project aims to expand the sampling of LAGs by developing methodology by which LAGs can be



quantified using laboratory-based high-resolution computed tomography (μ CT). This project utilizes the kiwi (*Apteryx*), the only modern bird which produces multiple LAGs in the bone cortex, as an underutilized modern analogue for non-avian dinosaurs. Using conventional laboratory-based μ CT and phase-contrast imaging on histologically sectioned kiwi bones, we will make comparisons between LAGs in histology and CT. By quantifying the relationship between the three-dimensional structure of the vasculature and the growth lines, we will investigate the use of vascular structure as a potential proxy for LAGs. Visualizing LAGs in dinosaur bone non-destructively and accessibly will allow for increased sampling of these structures, improving future understanding of the causes of their formation and the life histories of fossil taxa.

The effects of wave action on arthropod taphonomy: comparative analysis between Sirius Passet and taphonomic experiments.

Laura Devine

Taphonomy is the study of the biological, chemical and physical processes that lead to the remains of an organism becoming a fossil. Arthropods are one of the most diverse and evolutionarily significant phyla of animals on Earth, so it is important to determine if there are any processes biasing their fossil record. This project aims to determine if certain arthropod groups are more likely to be preserved as complete specimens or as fragmented small carbonaceous fossils (SCFs) and whether or not wave action is a significant biostratigraphic process that is biasing the arthropod fossil record. To do this, material from the Cambrian-aged Sirius Passet Lagerstätte will be studied at the Museum of Copenhagen. Sirius Passet has been chosen in the context of biases in the arthropod fossil record because it is unique in that both body fossils and SCFs are found. The abundance and taphonomic grades of different arthropod groups will be assessed across the Konservat Lagerstätte body fossils and SCFs within Sirius Passet. The results of the museum study will be compared to the results of taphonomic experiments that have investigated the effects of wave processes on modern analogues of different arthropod groups. This will make it possible to determine whether certain groups of arthropods are more likely to be over- or under-represented in the fossil record.

Palaeoecology and palaeoenvironments of tropical West Africa across the Cretaceous–Palaeogene transition.

Ogechi Ekwenye

Tropical rainforests are extraordinarily diverse ecosystems, and understanding their evolution is crucial to understanding the patterns and processes that have given rise to modern terrestrial biodiversity. At present, detailed knowledge of tropical rainforest evolution is restricted to the Neotropics (Central and South America), and it has been shown recently that the Cretaceous–Palaeogene (K–Pg) mass extinction played a key role in the emergence of modern rainforests in this region. However, owing to a lack of data from other regions, it is currently unclear whether the patterns of rainforest evolution that characterize the Neotropics are also characteristic of the rest of the world, or whether different regions each have their own independent and distinct evolutionary histories. This project aims to address this by reconstructing the palaeoecology



and palaeoenvironments of the K–Pg transition in southeastern Nigeria. The project will focus on sections at Umuasua and Ikpaku, and will use a combination of facies analysis and micropalaeontology to establish depositional environments and refine the position of the K–Pg boundary in this area, and quantify the diversity and composition of ancient vegetation. These data will provide a new window into the biogeographical evolution of tropical rainforests across a critical transition in Earth history.

A redescription of material referred to *Neosteneosaurus edwardsi* (Crocodylomorpha, Thalattosuchia).

Hady George

Thalattosuchia represents a group of predominantly Jurassic stem-crocodylians specialized for life in aquatic habitats. Despite the robust body of knowledge built by dedicated research into Thalattosuchia over the last decade, there are still numerous ecological questions surrounding thalattosuchians. One of these concerns Machimosaurini, a subclade specialized for macrophagy, a feeding behaviour unique among teleosauroid thalattosuchians. It is unclear how this group evolved their specialized feeding behaviour from their more generalist precursors. Furthermore, although there are now several established correlations between ecological niches and cranio-dental traits, it is unclear how postcranial elements are associated with ecology. To investigate these uncertainties, *Neosteneosaurus edwardsi*, a species from the Middle Jurassic of Peterborough, UK, will be comprehensively redescribed and compared to that of other teleosauroid taxa. *N. edwardsi* is an ideal study taxon for this project as it is closely related to Machimosaurini but is currently interpreted as ecologically distinct from the subclade (e.g. certain tooth features, differing mandibular biomechanics, etc.). Additionally, a redescription of the material referable to this taxon has not been carried out since the mid-1800s and is sorely needed. This anatomical evaluation will be of substantial value to future thalattosuchian research and Britain's fossil heritage.

Palaeontological research in the middle Miocene of Gers (southwestern France)

Manon Hulot

The late middle Miocene witnessed the dispersion and radiation of catarrhine primates in Eurasia, attributable to favourable climatic conditions and tectonic changes. Pliopithecoids are documented in eastern Eurasia as early as c. 18 Ma while the earliest evidence of hominoids in Eurasia is from Turkey (c. 14 Ma), followed by western Eurasia (c. 13 Ma). Phylogenetic relationships and ecological preferences of those fossil catarrhines are debated and often based on a few specimens restricted to a handful of sites. A rich fossil record for the middle Miocene is nonetheless documented in the Gers department (southwestern France), including primate remains. However, such remains are scarce and restricted to pliopithecoids. This lack of data is due to under-studied fossil sites reported mainly by amateurs who gathered private collections with little contextual data and with collection bias towards large mammals. This project aims at excavating the c. 15 Ma site of Polastron, which is contemporaneous with the pliopithecoid-bearing site of Sansan, and to renew field prospection around the town of Simorre. We also plan to study original material from private and public collections. We expect this project to lead to the publication of new fossil catarrhine remains in



southwestern France and to provide new data on the palaeoenvironments of the middle Miocene, further contributing to our knowledge of the emergence and radiation of Eurasian fossil primates.

Internal bone morphology and locomotory adaptations of chalicothere finger bones using micro-computed tomography

Panagiotis Kampouridis

Fingers in most mammals are typically in direct contact with the environment during both locomotion and manipulation, and aspects of external phalangeal morphology are traditionally studied to infer differences in autopodial usage. These alone, however, are often not sufficient to determine their exact function. Since bone is a living tissue, which can adapt in response to loading through life, the internal bone microstructure of phalanges can change based on the function performed by the hands and feet. For this project, I will use high-resolution μ CT-scans of phalanges of the enigmatic odd-toed mammal family Chalicotheriidae to investigate its ecology. The fossil sample comprises specimens of the chalicotheriine *Anisodon grande* from Devínska Nová Ves, Slovakia, the schizotheriines *Metaschizotherium fraasi* from Steinheim, Germany and *Ancylotherium peticulum* from Pikermi and Samos, Greece, to evaluate their internal bone microstructure, infer their usage and understand the locomotion and feeding of this bizarre group. For this purpose, I will compare the tomographic data of the fossil specimens to that of extant mammals that have different locomotor habits and diets, and use their hands and feet in different ways. This will allow me to shed new light on the ecology of these cryptic animals.

Dental microwear of South American theropods: testing ecological niche partitioning among Cretaceous carnivores

Cassius Morrison

Medium to large theropod dinosaurs exhibit significant variation in tooth and skull shape that is thought to be associated with dietary differences, enabling ecological niche partitioning. Allosauroid theropods were the top apex predators in most terrestrial Mesozoic ecosystems from the Middle Jurassic to the onset of the Late Cretaceous, although they were sympatric with several other predatory theropods such as megalosauroids, ceratosaurids and megaraptorids, most famously in the Late Jurassic Morrison Formation of the USA. However, their extinction at the end of the Cenomanian dramatically reduced sympatric predator diversity. This dramatic shift in ecosystem composition raises questions of how and why such diverse predatory taxa co-existed. Dental microwear can quantify feeding differences that can infer niche partitioning. I will travel to Argentina to analyse the diets of allosauroids and other sympatric theropods of the Candeleros and Huincul formations of the Late Cretaceous to observe if there are any changes and differences through time. There are no other localities globally with successive well-preserved non-Jurassic allosauroid taxa alongside other predatory theropods. Dental moulds will be made and analysed back in the UK to quantify and determine any dietary disparity among these theropods.



Undergraduate Research Bursaries

The following Undergraduate Research Bursaries were awarded by Council in 2023 and reported at the Annual General Meeting:

Ihlan Ahmad: 'Neuroanatomy of the Early Eocene crocodylian *Kentisuchus spenceri* from the UK and implications for early gavialoid evolution' (supervised by Philip D. Mannion, 8 weeks, £2,917.60);

Ellie Defy: 'Lilliput sharks and marine apex predators of the Permo–Triassic' (supervised by Alexander M. Dunhill, 8 weeks, £2,917.60);

Lucy Jackson: 'Understanding the evolution of pharyngeal structures in fossil echinoderms' (supervised by Frankie S. Dunn, 6 weeks, £2,188.20);

Eren Tasimov: 'Veggiesaurus rex: Diversification of Herbivorous Theropods in the Early Cretaceous' (supervised by Emma M. Dunne, 8 weeks, £2,917.60);

Rhys Edmunds: 'Exploring the evolution of calcite shell layers in muricid gastropods' (supervised by Elizabeth M. Harper, 8 weeks, £2,917.60).

Grant-in-Aid

In 2023 the Association provided funds to support the following meetings and workshops:

S. Maidment for the meeting "200 years of the dinosaurs: a global insight and recent advances" (£2,000);

A. Noubhani for the "Eighth International Meeting on the Valorization and Preservation of Paleontological heritage (RIV3P8)" (£2,000).

Postgraduate Travel Grants

In 2023 the Association awarded travel grants to 12 individuals:

Sreevidya Edayilam, Central University of Kerala: EGU 2023;

Cassius Morrison, University College London: 14th Conference on Mesozoic Terrestrial Ecosystems;

Max Fursman, Goethe University Frankfurt: International Sclerochronology Conference 2023;

Felix Pym, University of Exeter: XXI INQUA Congress 2023;

Madleen Grohgan, University of Bristol: EAVP 2023;

Muhammad Aqqid Saparin, Universiti Teknologi PETRONAS: 2nd Asian Palaeontological Congress;

Miriam Slodownik, University of Adelaide: Palaeo Down Under 3;

Katie Delahooke, University of Cambridge: Palaeo Down Under 3;

Nile Stephenson, University of Cambridge: Palaeo Down Under 3;



Tasnuva Ming Khan, University of Cambridge: CPEG 2023;

Federico Wenger, University of Saskatchewan: V Simposio Latinoamericano de Icnología;

Atreyee Haldar, Indian Institute of Technology Kharagpur: Society of Vertebrate Paleontology Annual Meeting.

Career Development Grants

The Association's Career Development Grant is designed to assist talented early-career researchers who have recently completed their PhD. It aims to strengthen their CVs to help them achieve a career in palaeontology (research or curation). The grantee is also automatically enrolled in the Association's mentoring scheme and assigned a mentor by agreement.

The following grants were made by Council and reported at the 2023 AGM: **Alavya Dhungana** (£2,425); **Cecily Nicholl** (£2,500); and **Romy Rayner** (£2,500).

Upcoming Awards and Prizes in 2024

The Palaeontological Association recognizes excellence in our profession by the award of medals and other prizes. The Association sees its lists of medals and award winners as a record of the very best palaeontologists worldwide, at different career stages, and offering different kinds of contributions to the field. The Association stresses the importance of nominations and encourages all members to make nominations. Members considering making nominations should first read the Palaeontological Association 'Statement of Diversity':

Statement of Diversity

The Palaeontological Association has an *Unconscious Bias* document, the recommendations of which will be adhered to at all times. All decision-making for Palaeontological Association awards and prizes will be carried out objectively and professionally. The Association is committed to making award and prize decisions purely on the basis of the merit of the individual(s). No nominee for awards or prizes will receive less favourable treatment on the grounds of: gender, marital status, sexual orientation, gender re-assignment, race, colour, nationality, ethnicity or national origins, religion or similar philosophical belief, spent criminal conviction, age or disability. Equally, all nominations will be assessed on equal terms, regardless of the gender, age and/or ethnicity of the nominee. Nominations will therefore be assessed and graded on their merits, in accordance with the criteria and the aims and objectives set for each award or medal. Due consideration will be given to any period away from science due to parental leave, illness and any other such career break. Nominators are reminded that neutral language (*e.g.* gender neutral) should be used in all nominations.

The Palaeontological Association acknowledges the existence of various academic career paths and recognizes the challenges associated with balancing an academic career alongside personal commitments. When assessing applicants' eligibility and experience, the Association will take into account periods spent outside the academic environment. These periods may be the result of ill



health, parental and/or adoptive leave, caring responsibilities, career breaks, *etc.* (note that this list is not exhaustive). Applicants who have taken periods outside the academic environment are strongly encouraged to include this information in any grant/award application. Furthermore, individuals with any disabilities are strongly encouraged to highlight these aspects in their applications. In the event that these factors apply to an applicant, even if no work leave was taken, we strongly advise that applicants make these factors known during the application process as we are aware that such factors can significantly slow down past and ongoing academic careers.

In the case of awards granted through the nomination schemes, we ask that nominators bring attention to these aspects if they are aware of them. In the event that the nominators are unsure, they are strongly advised to contact the Diversity Officer (e-mail <diversity@palass.org>), who can approach the nominee directly and enquire whether they would like to disclose any career breaks or other relevant factors that should be taken into consideration during the evaluation of the award. The Diversity Officer can be contacted at any time for advice and assistance.

Palaeontological Association Awards/Medals selection procedures

Council discusses Awards and Medals at the May Council meeting. Voting to select awardees occurs at the meeting or soon after the meeting electronically. The benefit of using Council to select awardees, rather than a dedicated awards committee, is that it draws on the wider experience of the entire Council. Voting is preceded by an introduction from the President and/or Secretary, either verbally or in a written format, that: (i) includes a diversity statement to remind Council of their responsibility in terms of fairness and diversity issues (including impact of non-standard careers *etc.*); (ii) outlines the remit and selection criteria for each award; (iii) considers the impact of awardees in terms of increasing the diversity of recipients. Each award is considered in turn with every application considered except those that clearly fall outside of the remit. Normally only one candidate will be awarded in each category per year. However, at Council's discretion and in exceptional circumstances more than one award in any one category may be bestowed if this is deemed appropriate.

In normal circumstances selection of awardees is conducted by a modified form of supplemental voting, where each Council Member votes by listing their three preferred candidates in rank order (first to third). The candidate(s) with the most votes as preferred candidate will be awarded the award/medal. If there are only two candidates and they are tied the President shall have the casting vote. If there are three or more candidates and a tie, the second ranked candidates will be added to the tally. If the result remains tied, then the third ranked votes are incorporated. If the vote still remains tied the President will cast the deciding vote or (in exceptional circumstances) will ask Council to consider awarding multiple awards/medals.

Lapworth Medal

The Lapworth Medal is the most prestigious honour bestowed by the Association to a palaeontologist who has made a highly significant contribution to the science of palaeontology by means of a substantial body of research and service to the scientific community. It is not normally awarded on the basis of a few good papers, but Council will look for breadth as well as depth in the contributions in choosing suitable candidates.





The candidate must be nominated by two members of the Association (proposer and seconder; names and contact details required). The nomination must consist of: (i) a two-page career summary (font-size 12); (ii) a list of ten papers that demonstrate significance and breadth of research; (iii) Professional Standards and Behaviour declarations by the nominators in relation to the nominee (see website for details). The two-page career summary should outline the significant contribution to the science in terms of research and also other activities such as outreach, teaching, mentoring and administration (including that relevant to palaeontology at their home institutions, scientific societies and at higher levels, such as funding bodies and government advisory panels). We are looking for evidence of both depth and breadth in research with clearly identified achievements and breakthroughs. Relevant honours and awards may be mentioned. If a candidate has taken time out from their professional career for family or other purposes this should be highlighted. Nominations must be compiled into a PDF file of less than 10 MB and uploaded via the appropriate page on the Association's website before the deadline. The completed Professional Standards and Behaviour forms should be either combined with the aforementioned PDF or e-mailed separately to the Secretary and/or Executive Officer.

The award will be considered by Council at its May meeting and awardees will be invited to a ceremony at the Annual Meeting and/or the AGM. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to choose not to make an award in any particular year.

Nominations are invited by **31st March** each year.

President's Medal



The President's Medal is a mid-career award given by Council to a palaeontologist who has had between 15 and 25 years of full-time experience after their PhD (excluding periods of parental or other leave, but not excluding periods spent working in industry) in recognition of outstanding contributions in his/her earlier career, coupled with an expectation that they will continue to contribute significantly to the subject in their further work. Please note that, in recognition of the disruption caused by the COVID-19 pandemic, Council has decided that 2020 should be discounted when

calculating the years of full-time experience.

The candidate must be nominated by two members of the Association (proposer and seconder; names and contact details required). The nomination must consist of: (i) a two-page career summary (font-size 12); (ii) a list of ten papers that demonstrate significance and breadth of research; (iii) Professional Standards and Behaviour declarations by the nominators in relation to the nominee (see website for details). The two-page career summary should outline the significant contribution to the science in terms of research and also other activities such as outreach, teaching, mentoring and administration (including that relevant to palaeontology at their home institutions, scientific societies and at higher levels, such as funding bodies and government advisory panels). We are looking for evidence of both depth and breadth in research with clearly identified achievements and breakthroughs. Relevant honours and awards may be mentioned. If a



candidate has taken time out from their professional career for family or other purposes this should be highlighted. Nominations must be compiled into a PDF file of less than 10 MB and uploaded via the appropriate webpage on the Association's website before the deadline. The completed Professional Standards and Behaviour forms should be either combined with the aforementioned PDF or e-mailed separately to the Secretary and/or Executive Officer.

The award will be considered by Council at its May meeting and awardees will be invited to a ceremony at the Annual Meeting and/or the AGM. Awards will be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to choose not to make an award in any particular year.

Nominations are invited by **31st March** each year.

Hodson Award

The Hodson Award is conferred on a palaeontologist who has had no more than ten years of full-time experience after their PhD (excluding periods of parental or other leave, but not excluding periods spent working in industry) and who has made a notable contribution to the science. Please note that, in recognition of the disruption caused by the COVID-19 pandemic, Council has decided that 2020 should be discounted when calculating the years of full-time experience.

The candidate must be nominated by two members of the Association (proposer and seconder; names and contact details required). The nomination must consist of: (i) a statement of when the PhD was awarded; (ii) a two-page career summary (font-size 12); (iii) a list of ten papers that demonstrate significance and breadth of research; (iv) Professional Standards and Behaviour declarations by the nominators in relation to the nominee (see website for details). The two-page career summary should provide evidence of outstanding contribution in career so far. If a candidate has taken time out from their professional career for family or other purposes this should be highlighted. Nominations must be compiled into a PDF file of less than 10 MB and uploaded via the relevant webpage on the Association's website before the deadline. The completed Professional Standards and Behaviour forms should be either combined with the aforementioned PDF or e-mailed separately to the Secretary and/or Executive Officer.

Nominations will be considered by Council at its May meeting and awardees will be invited to a ceremony at the Annual Meeting and/or the AGM. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to choose not to make an award in any particular year.

Nominations are invited by **31st March** each year.

Mary Anning Award

The Mary Anning award is open to all those who are not professionally employed in palaeontology but who have made an outstanding contribution to the subject. Such contributions may range from the compilation of fossil collections and their care and conservation, to published studies in recognized journals. The candidate must be nominated by two members of the Association (proposer and seconder; names and contact details required). The nomination must consist of: (i) a statement confirming that the nominee is NOT professionally employed in palaeontology;



(ii) a one-page career summary (font-size 12); (iii) Professional Standards and Behaviour declarations by the nominators in relation to the nominee (see website for details). The one-page career summary should outline the nominee's contribution to palaeontology. This should include details of the sorts of activities pertaining to development of fossil collections, curation, care and maintenance of fossil collections, publications relating to these fossil collections, evidence for outreach activities associated with these fossil collections. Nominations must be compiled into a PDF file of less than 10 MB and uploaded via the relevant page on the Association's website before the deadline. The completed Professional Standards and Behaviour forms should be either combined with the aforementioned PDF or e-mailed separately to the Secretary and/or Executive Officer.

Nominations will be considered by Council at its May meeting. Awardees will be invited to a ceremony at the Annual Meeting and/or the AGM, although the award may be presented at another time and place on request of the awardee. Awards will be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to choose not to make an award in any particular year.

Nominations are invited by **31st March** each year.

Gertrude Elles Award

The Gertrude Elles Award is to promote high-quality public engagement in the field of palaeontology. The award is made by Council for high quality, amateur or institutional, public engagement projects that promote the discipline. Nominated projects can include museum displays and exhibitions, outreach programmes to schools and/or communities, art/science collaborations, digital initiatives, or any other programme that falls broadly under the heading of public engagement with palaeontology.

Nominations must consist of a one-page supporting case (font-size 12) and a portfolio of up to four images. The supporting case must outline:

- the aims of the project
- the nature of the target audience
- the available budget and funding sources
- visitor/audience numbers
- the results of project evaluation to demonstrate the quality and effectiveness of the project
- links to any digital components
- mechanisms for obtaining feedback

Self-nominations are permitted, and the nominators (names and contact details required) and proposed recipients do not need to be members of the Association. Nominations will be considered relative to the scale of the institution and the available project budget. The supporting case and the portfolio of images must be compiled into a PDF file of less than 10 MB and uploaded via the webpage on the Association's website before the deadline.

In addition, we ask that nominations are accompanied by Professional Standards and Behaviour declarations (see Association website for forms). The completed forms should either be combined with the aforementioned PDF or e-mailed separately to the Secretary and/or Executive Officer.



The award will be considered by Council at its May meeting and winners will be invited to the award ceremony at the Annual Meeting and/or the AGM. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to choose not to make an award in any particular year.

Nominations are invited by **31st March** each year.

Honorary Life Membership

Honorary Life Membership recognizes individuals whom Council deems to have been significant benefactors and/or supporters of the Association. Recipients will receive free membership for life.

The candidate must be nominated by two members of the Association (proposer and seconder; names and contacts details required). The nomination must consist of a one-page statement (font-size 12) outlining the nature of their support for the Palaeontological Association. In addition [from April 1st 2023 onwards], Professional Standards and Behaviour declarations by the nominators in relation to the nominee (see PalAss website for form) are required to be completed. The outline should be uploaded via the webpage on the Association's website before the deadline. The completed Professional Standards and Behaviour form should either be combined with the aforementioned PDF or e-mailed separately to the Secretary and/or Executive Officer.

The award will be considered by Council at its May meeting and announced at the AGM. The award will also be announced in the *Newsletter*, on the Association website and through social media.

Nominations are invited by **31st March** each year.

Annual Meeting President's Prize and Council Poster Prize

The President's Prize is awarded for the best talks and the Council Poster Prize is awarded for the best posters at the Annual Meeting. All student members of the Palaeontological Association, and all members of the Association who are early-career researchers within one year of the award of a higher degree (PhD or MSc), excluding periods of parental or other leave, are eligible for consideration for these awards. Individuals may nominate themselves for consideration when submitting abstracts for the Meeting. The prizes are announced immediately after the oral sessions at the end of the Annual Meeting. Winners will receive an official certificate and free membership of the Association for one year.

Best Paper Awards

The aim of these awards is to recognize papers published in *Palaeontology* or *Papers in Palaeontology* and reward excellence in our field of science. The selection criteria are as follows: scientific breadth and impact; novelty of approach; and quality of writing and illustration. The awards are open to all authors irrespective of age and nationality; membership of the Association is not required. Frontiers reviews, rapid communications and regular research articles are all eligible. The selection procedure is that a list of all papers published in the year is drawn up (when papers for the final part are allocated) and circulated around the science editors. The science editors are



asked to nominate any papers that stand out, providing two to three sentences explaining why they are deserving. The Editor-in-Chief then draws up a shortlist of no more than five papers with supporting statements to circulate to the Editorial Board. The Editorial Board then selects winners by vote. Corresponding authors of winning papers will be offered 'Gold open access' paid for by the Association for one nominated paper submitted to *Palaeontology* or *Papers in Palaeontology* within the following 18 months (and subsequently accepted). In the case of joint authorship papers, the corresponding author can, by agreement, transfer the prize to one of the co-authors. The Editor-in-Chief will contact the winning authors and write a short synopsis for the *Newsletter*. An announcement of the awards will normally be made at the AGM.

Undergraduate Prize Scheme

The Undergraduate Prize Scheme annually invites all university departments where a palaeontology course or module is taught after the first year as part of a degree programme to recommend one of their undergraduate students to receive this award. The award consists of a certificate and free membership of the Association for the rest of the year in question, plus the following calendar year. It provides electronic access to both of our journals, postal copies of the *Newsletter*, and all the other advantages of membership. Receipt of the award also looks good on a recipient's CV.

Departments may use any criterion for selection, though most prefer to use the scheme as an acknowledgement of best performance in a relevant exam or project. Only one nomination will be accepted from any one institution in each calendar year. The nominee must be an undergraduate student, not a postgraduate, when they are selected. Normally the award is made to a student in their penultimate year of study, but a final-year candidate may be chosen if this is deemed more appropriate for the department in question.

Contact <executive@palass.org> with the nomination (name and e-mail address) and we will arrange to sign up the student as a member and send them a certificate. There is no deadline for this award and it is open to universities anywhere in the world.

Innovations in Palaeontology Lecture Series and the PalAss Exceptional Lecturer

The Innovations in Palaeontology Lecture Series, to be given by the PalAss Exceptional Lecturer, aims to promote palaeontology to the wider academic community and to recognize excellence in research among palaeontologists. The PalAss Exceptional Lecturer is selected in a competitive process. This scheme aims to:

- improve the dissemination of cutting-edge palaeontological research to the broader academic community;
- raise the profile of palaeontology within the Earth sciences and related fields;
- recognize outstanding research and science communication in palaeontology among members of the Association.

Format of the scheme:

- One PalAss Exceptional Lecturer will be selected each year in a competitive process.
- The PalAss Exceptional Lecturer will be expected to give five lectures at five different institutions over a nine-month period, both in person and online/virtual.



- In addition, the Exceptional Lecturer will deliver the Innovations in Palaeontology lecture at the Annual Meeting (or a similar event), which may be live-streamed on the Association's YouTube channel or similar.
- The successful applicant will receive the Innovations in Palaeontology Lecture Series Grant, which will be administered by the home institution of the PalAss Exceptional Lecturer.
- The Grant may only be used to pay the reasonable travel costs incurred by the PalAss Exceptional Lecturer to visit each of the host institutions (up to £2,000 for the total Innovations in Palaeontology Lecture Series with a maximum of £500 for any individual lecture). The host institutions will cover costs for accommodation (where necessary) and hospitality.
- Any academic institution (universities and/or museums) from any country can apply to participate in the Innovations in Palaeontology Lecture Series as a host institution.
- Any unused funds must be returned to PalAss after delivery of the final lecture. Should the PalAss Exceptional Lecturer move institutions within the timeframe of the lecture series, any unspent funds must remain available to the PalAss Exceptional Lecturer.
- Host institutions will be selected by the Exceptional Lecturer and the Association with the goal of maximizing the scheme's impact.

Eligibility and selection process of the PalAss Exceptional Lecturer:

- Eligible candidates will have a PhD in palaeontology or a related field.
- Eligible candidates can demonstrate (for example through their publication record) significant innovative scientific work in palaeontology.
- Applicants can reside in any country, but must be members of the Association.
- Candidates must self-nominate.
- To self-nominate, a two-page CV, full list of publications, and statement of motivation (max. 300 words) must be submitted via the Association's webpage as a single PDF file (max. 8 MB). In addition, a 60 second video summary (in MP4 format; max. size 30 MB) of a proposed seminar topic must be submitted via the Association's webpage.
- To self-nominate, candidates must provide via our online submission form a brief abstract (max. 300 words) and title for their proposed lecture which outline the subject matter of the proposed lecture and how it communicates innovation in palaeontology as a science that is of interest to related academic disciplines; a brief summary of their educational history; and a list of up to five of their publications that are relevant to the proposed lecture.
- After review of the submissions, short-listed applicants will be invited to present a five-minute lightning talk to the Association's Exceptional Lecturer committee to demonstrate their ability to communicate their chosen topic in an engaging manner and to clearly articulate how this topic is innovative and of broad interest to one or more related discipline(s).

Selection of host institutions:

- Institutions interested in participating in the Innovations in Palaeontology Lecture Series should apply via the PalAss webpage and suggest a timeframe within which the lecture should be given.
- The PalAss Exceptional Lecturer will receive the list of potential host institutions after the 1st May deadline, and will choose their preferred hosts and liaise directly with them. Applications after 1st May will be considered depending on the remaining availability.



Expectations for host institutions:

- Each lecture must be widely advertised across the host institution. We particularly encourage advertisement of the Innovations in Palaeontology Lecture Series on social media.
- Host institutions are expected to pay for hospitality and offer a meal in a social environment to the PalAss Exceptional Lecturer.
- If the PalAss Exceptional Lecturer has to travel more than three hours to the host institution or cannot return home at a reasonable time, the host institution must offer at least one night of accommodation.

Deadlines each year:

- 15th November 23:59 GMT: Deadline for nominations for the PalAss Exceptional Lecturer.
- December: The PalAss Exceptional Lecturer will be announced at the Annual General Meeting.
- March: The call for host institutions to participate in the Innovations in Palaeontology Lecture Series will be published in the *Newsletter*.
- 1st May 23:59 GMT: Deadline for applications from host institutions.
- September – May: Delivery of lectures.

Application:

Applications are via online forms. See <<https://www.palass.org/awards-grants/awards/innovations-palaeontology-lecture-series-and-palass-exceptional-lecturer>>.

Upcoming Grants in 2024

Palaeontological Association grants are offered to encourage research, education and outreach through different means. Undergraduates, early-stage researchers, and otherwise unfunded persons are given special encouragement to apply. All of these awards and grants are core to the charitable aims of the Palaeontological Association. A full list of the Association's grants may be found on the Association's website (<<https://www.palass.org/awards-grants>>). Those with deadlines in the next six months or run throughout the year are detailed below.

Grants-in-aid: meetings, workshops and short courses

The Association is happy to receive applications for grants from the organizers of scientific meetings, workshops and short courses that lie conformably with its charitable purpose, which is to promote research in palaeontology and its allied sciences.

The Association will, via the Grants-in-Aid programme, consider applications to financially support workshops to be held as part of the Annual Meeting and Progressive Palaeontology. There are further details on the next page.

General Regulations for all applications

The Association will consider applications up to £2,000 GBP.

- Applications must be received by the deadline of either 1st March or 1st September each year.



- Application must be made in good time. The proposed event must commence no earlier than six months after the application round deadline applied to.
- All applications are to be made by the scientific organizer(s) of the meeting using the online application form at <<https://palass.org/awards-grants/grants/grant-aid-application-form>>.
- Applications will be considered by Council at either the May or the October Council Meeting each year.
- Applicants will normally be informed of the application outcome by the end of May or October (*i.e.* 2-3 weeks after the May or October Council meeting).
- If the application is successful, we require that the support of the Association is acknowledged, preferably including reproduction of the Association's logo, in the meeting/workshop/short course literature and other media.
- Any monies granted must only be used for the specified purposes stated in the original grant application. Should circumstances change and the monies cannot be used then it is expected that all unspent amount is returned to the Association.
- Retrospective changes to grant applications, *i.e.* after the proposed event, are not allowed.
- In the event of unforeseen changes in circumstances prior to the start of the proposed event (*e.g.* due to the current COVID pandemic, illness of keynote speakers, *etc.*) advice should be sought from the Association's Executive Officer and/or the Secretary.

Please see also the Palaeontological Association Grant Ethics and Conditions:

<<https://www.palass.org/awards-grants/grants/grant-ethics-and-conditions>>.

Pre-submission enquiries may be made to the Secretary (e-mail <secretary@palass.org>).

Financial support via the Grants-in-Aid programme for workshops at the Annual Meeting and Progressive Palaeontology

Workshops have been an important part of both the Annual Meeting and Progressive Palaeontology in recent years. These have typically been held the day before each meeting. The workshops are arranged in consultation with the local meeting organizer; the local organizer has the final decision as to how many and which events to select for inclusion in any workshop programme. It may (subject to the local organizer being able to facilitate it) be possible to arrange a hybrid event. Our preference, however, is to run the workshop as either an in-person or a virtual event. We especially welcome suggestions for workshops that help the Association advance its commitments to EDI-related issues.

We invite those organizing workshops at either the Annual Meeting or Progressive Palaeontology to apply for competitive funding via the Grants-in-Aid programme to help offset costs (*e.g.* travel, accommodation) incurred by those delivering the workshop, and/or to provide an honorarium (to a maximum of £250 GBP) for contributors. An honorarium may be appropriate to support ECRs/ precariously-employed workers, others not in full-time, permanent employment, or where the contributions are by subject specialists on topics that do not necessarily form part of their core research activities. These examples are not exhaustive.

Before applying for funding, please liaise with the local meeting organizer and secure their support for the proposed activities. You should confirm in your application that this support is in place. This is to avoid potential issues such as there not being the infrastructure available locally (rooms, *etc.*), or time in the schedule, to accommodate the workshop.



The Association may support a maximum of two workshops at each of the Annual Meeting and Progressive Palaeontology.

Making an application for meeting or workshop/short course support

Applications must be made through online submission, for which you will need the following information:

- Title of meeting / workshop / short course
- Date and Place of proposed event
- Name, position and affiliation of the organizer(s)
- Brief description (not more than ten lines) of the rationale behind the meeting / workshop / short course
- Anticipated number of attendees
- Amount requested
- Other sources of funding applied for
- Specific use to which requested funds will be put

Note 1: If funds are requested to support one or more keynote speakers, then full details of their names, affiliations and titles of presentations must be included.

Note 2: The application will be strengthened if the keynote speaker(s) agrees to submit their paper as a review article for possible publication in *Palaeontology* or *Papers in Palaeontology*.

Deadlines are **1st March** (for events commencing on or after 1st September in the same year) and **1st September** (for events commencing on or after 1st March the following year).

Postgraduate Travel Fund

Financial assistance is offered to postgraduate students who are members of the Association to attend international meetings that are not directly supported by the Association through the Grants-in-Aid scheme. A list of directly-sponsored meetings is given below. The funding is only intended for conferences that are explicitly scientific in nature.

Terms and Conditions

Please read the following notes before applying:

1. The award is specifically for travel.
2. Applicants must be delivering a presentation (poster or oral) that falls within the scope of the Association's charitable aims.
3. The maximum amount awarded will be £200 GBP.
4. Successful awards will be paid retrospectively on the submission of receipts for reasonable travel costs.
5. Applications must be made online no later than two months prior to the beginning of the conference.
6. The total fund and number of awards will be at the discretion of Council.
7. Only one travel grant will be awarded per applicant per year, but subsequent applications can be made.



8. Applications are to be made through the Association website, and should include the personal details of the applicant and their career stage, the title of the accepted abstract, and details of other funding obtained towards the cost of the meeting. Two letters must also be attached, in a PDF document: a letter of confirmation from the meeting convenor which states the acceptance of the applicant's abstract, and a short status-confirming letter from the applicant's supervisor.
9. Funding from the Association must be acknowledged on your poster or in your presentation.

Directly-sponsored meetings (NOT eligible for the Postgraduate Travel Fund):

- The Palaeontological Association's Annual Meetings.
- Progressive Palaeontology.
- Lyell Meetings.
- Any other meetings that have been awarded funds to support student attendance from the Association's Grants-in-Aid scheme.

There is **no deadline** for this fund. Enquiries should be made to the Meetings Coordinator (e-mail <meetings@palass.org>).

Palaeontological Association Carer's Bursary

Bursaries are made to support attendance at Association meetings by researchers with caring responsibilities. Normally the budget for an individual bursary will be a maximum of £250 GBP. Applications must include a supporting statement and a breakdown of anticipated expenses, supported by quotes where possible. Appropriate costs include attendance of a carer or use of local childcare facilities (for care of accompanying young children), or other caring costs at home.

Bursaries will be awarded to applications received prior to the application deadline. Applications will be assessed by the PalAss Diversity Group; if there are several eligible applicants, awards will be made on a first-come first-served basis. No subsequent report on expenditure is required.

Successful applicants will be invited to submit a brief statement (<60 words) describing the impact of the bursary on their career. This statement may be used in publicity for the bursary scheme and thus should not contain any confidential or sensitive information.

The principal applicant must be a member of the Association. Applications must be submitted electronically via the Association website. Any associated publicity must mention the support of the Association.

Successful awards will be paid retrospectively on the submission of receipts for reasonable costs (*e.g.* economy air fares or train tickets, accommodation, subsistence, care costs).

Required supporting information:

- A cover letter detailing the case for support (no more than one A4 page)
- Receipts or quotations for expenses
- Details of any pending or previous applications for funds

These documents must be submitted in a single PDF file.

The provisional deadlines for 2024 are **17th May** (for *Progressive Palaeontology 2024*) and **8th November** (for the Annual Meeting 2024).



ASSOCIATION MEETINGS



68th Annual Meeting of the Palaeontological Association

Erlangen, Germany 9 – 13 December 2024

The 68th Annual Meeting of the Palaeontological Association will be held at Friedrich-Alexander-Universität (FAU) Erlangen-Nürnberg, in the city of Erlangen in northern Bavaria, Germany. This will be the first time that the Annual Meeting will take place in Germany. The organizing committee is chaired by Emma Dunne, Thomas Clements and Rachel Warnock with support from colleagues in the Paleobiology Research Group and student volunteers and colleagues at FAU's GeoZentrum Nordbayern.

Programme outline

The conference will take place from 9th to 13th December 2024, with a one-day pre-conference field-trip and museum visit on 9th December and a one-day post-conference field-trip on 13th December. Tuesday 10th December will begin with an assortment of workshops in the morning, which will take place in several locations across the campus, mainly the GeoZentrum Nordbayern building. The annual Symposium will take place on the afternoon of Tuesday 10th December, on the topic of 'Extinction' and will showcase cutting-edge research from six early-mid career researchers from across the world. All scientific sessions and the symposium will take place in the Heinrich-Lades-Halle on Rathausplatz, close to Erlangen's city centre. The Annual Dinner will be held in the Redoutensaal, a Baroque theatre in the Altstadt (old town).

Field and museum trips

A pre-conference trip to Naturkundemuseum Bamberg (Bamberg's Natural History Museum) will take place on Monday 9th December, where director Dr Oliver Wings will take participants on a private guided tour. Afterwards there will be an opportunity to explore the city and experience the local Christmas market. Conference field-trips will include visits to the spectacular Grube Messel (Messel Pit) fossil site near Frankfurt and the famous Jurassic Solnhofen fossil quarries and museum south of Nürnberg. These will be arranged on different days to allow delegates to attend both if desired. Further details regarding these trips will be made available on the Association website in due course.

Workshops

There are currently four different workshops that will be on offer at the Annual Meeting, which stem from the various foci of the Paleobiology Research Group at FAU. They include workshops on fossils in thin section, fossil sampling biases and phylogenetics, experimental design in taphonomy, and deep-time palaeogeography in R. Please check the relevant sections of the website for further information prior to registering.

The city of Erlangen

Situated at the heart of Franconia, the Baroque city of Erlangen has lots to offer visitors. The city's many open squares host markets, festivals and cultural events throughout the year. The Altstadt, with its winding alleyways, independent craft shops and traditional restaurants, is a must-see, and



if you stroll through the Schlossgarten (Palace Gardens) and botanical gardens, you might spot a red squirrel or two!

At the time of the Annual Meeting in December, the Christmas markets will be in full swing, with lots of traditional Bavarian winter food, Glühwein and live music. We strongly recommend the 'drei im weckla', a Nürnberg classic, for a hearty warm feed by the fireside.

A short train ride south takes you to the historic city of Nürnberg, home to one of the oldest and most famous Christmas markets in the world, the Christkindlesmarkt. To the north of Erlangen is the historic town of Bamberg, where you will find yet another wonderful Christmas market in the town square, only a short walk from the old town, which is a UNESCO World Heritage Site.

Getting to Erlangen

Erlangen's train station is located right in the centre of the city and is approximately a ten-minute walk from the main conference venue, and less than five minutes' walk from the GeoZentrum Nordbayern building. Erlangen has excellent rail connections to most German cities and the rest of Europe, including direct rail routes to Munich and Berlin, while connections to other major cities, such as Frankfurt and Vienna, are possible through the nearby station of Nürnberg.

For travellers flying to the conference, Nürnberg airport lies only a short bus, train or taxi ride from Erlangen. There are direct flights to several major European airports, including Amsterdam, Paris and London. Both Frankfurt and Munich international airports are conveniently located within less than three hours of Erlangen by train.

Accommodation

There are numerous hotels and guesthouses within a 5–20 minute walk of the main conference venue and the centre of the city. Delegates are strongly encouraged to book their accommodation as early as possible, as the city is a popular destination for visitors during Christmas time. We are delighted to be able to offer delegates a special discount on a selection of local hotels for the duration of the Annual Meeting. A bespoke code will be made available to delegates upon registration, but can be requested before registration opens in late spring, via e-mail to the meeting organizers at <annualmeeting2024@palass.org>. Alternatively, accommodation can be booked using the usual online resources, as well through short-term let websites such as AirBnB. There are also numerous accommodation options in nearby Nürnberg, which is connected to Erlangen by regular trains throughout the day.

Student travel grants

The Palaeontological Association runs a programme of travel grants to assist student members (doctoral and earlier) to attend the Annual Meeting in order to present a talk or poster. Grants of up to £100GBP will be available to student presenters who are travelling from outside Erlangen. The actual amount available will depend on the number of applicants and the distance travelled. Payment of these awards is given as a disbursement at the Meeting, not as an advance payment. Students interested in applying for a PalAss travel grant should contact the Executive Officer, Dr Jo Hellawell (e-mail <executive@palass.org>) once the organizers have confirmed that their abstract is accepted. Please title the message "Travel Grant Request". No awards can be made to those who have not followed this procedure. The deadline for applications is **8th November 2024**.



Our logo

Our logo featuring the ginkgo leaves was designed by Thomas Clements and represents the beautiful ginkgo tree (*Ginkgo biloba*) that stands in our main building's garden. With many research interests among the Paleobiology Research Group and several famous local fossils to choose from (including Jurassic ammonites from Buttenheim or the sauropodomorph *Plateosaurus*), we decided that the ginkgo best represents us all as a symbol of our home for research. The colour palette represents the colours the ginkgo turns throughout the seasons.

On behalf of the organizing committee, we look forward to welcoming you to Erlangen in December!





17th-20th June 2024



Talks, Poster sessions and Pre-Conference Event



Workshops

- 'How to Avizo' led by Thermo Fisher Scientific
- Behind-the-scenes Bristol Museum & Art Gallery tour



Social Events

- Rooftop icebreaker with a view over the city
- Annual dinner @ The Mall, Clifton
- Auction



Field Day at Penarth, Wales



@ProgPal2024



Free registration and abstract submission
for students opens 26th Feb 2024





Palaeontology in the news

The curious canopy

If someone asks you to draw a tree, you would probably draw the stereotypical picture of a straight trunk with a round shape on top. In some cases the round shape can be substituted by a triangle-ish one, especially during Christmastime. However, trees in the past may have looked completely different to those we are used to seeing nowadays. A recent study published in *Current Biology* analysed quite a rare finding in palaeobotany: leaves. More specifically, leaves attached to the plant trunk. Leaves are fragile and tend to detach after the death of the plant; this is why some fossil trees are known only by their trunks, giving no hints as to how their canopies would have looked.

Gastaldo *et al.*'s analysis of fossilized trees from New Brunswick, Canada, belonging to the genus *Sanfordiacaulis*, shows that these plants had a unique three-dimensional crown shape. These plants date back to 350 million years ago and look like a fern or palm, though the first palms are 300 million years younger. In comparison to modern palms, the Canadian fossil specimens of *Sanfordiacaulis* had more than 250 leaves all around their trunks, extending at least 1.75 m from the trunk. This means that forests of these trees would resemble a series of 'bottle brushes' with a dense canopy of leaves extending for c. 5.5 metres around a non-woody trunk only 16 cm in diameter.

"We all have a mental concept of what a tree looks like, depending on where we live on the planet, and we have a vision of what is familiar," says Bob Gastaldo of Colby College in Maine, USA, one of the authors of the study. However, plants experimented at least as much as animals with shapes. Rare and unusual fossils like the Canadian trees are examples of unsuccessful experiments in the colonization of our planet.

GASTALDO, R. A., GENSEL, P. G., GLASSPOOL, I. J., HINDS, S. J., KING, O. A., MCLEAN, D. *et al.* 2024.

Enigmatic fossil plants with three-dimensional, arborescent-growth architecture from the earliest Carboniferous of New Brunswick, Canada. *Current Biology*, **34**, 1–12.

The patient palaeontologists

It takes quite a lot of time, and luck, to make a fossil. But also finding, describing and classifying a fossil may be a long and tiring process. This is definitely the case for a 380-million-year-old predatory fish from Central Australia. The specimen was discovered in 1973 by palaeontologist Gavin Young during his exploration of the Middle–Late Devonian Harajica Sandstone in Luritja/Arrernte country. Young collected a series of fossils and fragments, and among them those of an unknown species attracted the palaeontologist's attention. More field-trips were made to the same outcrop, and in 1991 several fragments of the unknown creature were collected to attempt a first classification of the fossil.

It was only in 2016, however, that the first almost complete fossil of this new species was found. Thanks to this fortunate find, the mysterious creature was identified as a new species of fish. It was named *Harajicadectes zhumini* which means "Min Zhu's Harajica-biter", in honour of the Chinese



palaeontologist Min Zhu. According to its name, the fish was likely the top predator of Harajica's ancient rivers; being 40 cm long it is the biggest fossil fish found in the area. Besides being a powerful predator, *Harajicadectes zhumini* has other peculiar features, combining several traits of tetrapodomorphs.

Among its unique mix of features, *Harajicadectes zhumini* has two huge openings in the top of the skull called spiracles. These typically only appear as minute slits in most early bony fishes, while the only living fish with similar structures are bichirs, African ray-finned fish that live in shallow floodplains and estuaries. These African fish use their large spiracles to draw in surface air in oxygen-poor waters. More than 50 years have passed since the first mysterious fragments of *Harajicadectes zhumini* were found and the phylogenetic affinities of this creature are still unclear. However, chances are that this fossil may play a role in understanding the evolution of air breathing in vertebrates.

CHOO, B., HOLLAND, T., CLEMENT, A. M., KING, B., CHALLANDS, T., YOUNG, G. and LONG, J. A. 2024. A new stem-tetrapod fish from the Middle–Late Devonian of central Australia. *Journal of Vertebrate Paleontology*, e2285000.

The fossil emblem

Who wants a fossil as the emblem of their state? Australians do!

The first Australian state to have a fossil emblem was Western Australia, which 20 years ago chose the Devonian fish *Mcnamaraspis kaprios* as its official emblem. This year, New South Wales became the second Australian state to have formally adopted a fossil emblem. Once again, the chosen fossil is a Devonian fish: *Mandageria fairfaxi*, a 365-million-year-old fossil. This creature was a lobe-finned fish that grew to nearly two metres long, and was a voracious predator with large fangs.

The idea of having a fossil emblem came from the USA, where every state has an official state fossil as well as floral, faunal and mineral emblems. Australian states all have a floral, faunal and marine emblem, representing the animals, plants and marine creatures that best epitomize their state's unique natural history, and they can be used to promote tourism. Adding a fossil emblem highlights the importance of the fossil record for the knowledge of past, present and future biodiversity. It also shows the importance of deep time and evolutionary transitions in understanding the natural history of a specific territory. However, while the choice of the first fossil emblem in Western Australia was guided by public submission, for New South Wales' emblem the decision was taken by the relevant Geological Survey and did not involve a public consultation.

What do you think is the best way to select a state's fossil emblem? And if you could choose one for your country, county or state, which one would it be?

LONG, J. 2024. Australia needs more state fossil emblems, but let the public decide.

The Conversation. <<https://theconversation.com/australia-needs-more-state-fossil-emblems-but-let-the-public-decide-46930>>.

Nicola Vuolo

Publicity Officer



LEVERHULME
TRUST



Ecological uniformitarianism – help or hindrance to palaeoecology, palaeoclimatology and conservation biology?

Date:

2–3 July 2024

Location:

Remote via Zoom

Hosted by:

The Palaeontological Association

Registration fee:

£20 (£25 after 7th June 2024)

Free for participants from low and lower-middle income countries

Organised by:

A.L.A. Johnson and J.-F. Cudennec
(University of Derby)

E.M. Harper
(University of Cambridge)

J.A.I. Hennissen
(British Geological Survey)

R.J. Twitchett and T.S. White
(Natural History Museum, London)

Meeting website:

[www.palass.org/meetings-events/
ecological-uniformitarianism](http://www.palass.org/meetings-events/ecological-uniformitarianism)

General Contact:

[Ecologicaluniformitarianism
@palass.org](http://Ecologicaluniformitarianism@palass.org)

Invited speakers:

Paolo Albano (Anton Dohrn Zoological Station, Naples)

Joanne Bennett (Australian National University)

Kate Britton (University of Aberdeen)

Jean-François Cudennec (University of Derby)

Greg Dietl (Cornell University)

Harry Dowsett (US Geological Survey)

David Horne (Queen Mary, University of London)

Bruce Lieberman (University of Kansas)

Sierra Petersen (University of Michigan)

Lynn Wingard (US Geological Survey)

Following the success of a pump-priming event in 2022 (Ecological uniformitarianism – key or lock?), this online meeting will reunite a diverse community of Earth and Life Scientists to discuss the stability of ecological niches. Earth scientists have long taken the (pseudo-) uniformitarian view that niches are stable and hence that the environments of fossil organisms can be interpreted from the ecology of modern counterparts. Niche change is, however, demonstrated by many invasive species. Whether niches are stable or labile has major implications not only for interpreting past environments but also for predicting future communities in the face of ongoing climate and other environmental change.

We invite offers of talks (deadline 29 March 2024) concerning niche stability/labity over various taxa and timescales to complement invited lectures from a set of prestigious speakers. Publication of the proceedings is planned as an online special issue of the Association's journals.



News bites

Probably all of our parents or guardians told us to chew our food properly before swallowing when we were kids. Hadrosauroids took this advice quite seriously. Hadrosauroids were medium- to large-sized herbivorous dinosaurs that reached a pole-to-pole distribution during the latest Cretaceous (70 million years ago) thanks to their ability to chew. Specifically, chewing made hadrosauroids efficient in processing their food. This is an ability shared with many mammals (e.g. cows and horses) but its evolutionary origins remain largely unknown. Söderblom *et al.* explored growth and evolution in the dentary bone of the lower jaw in hadrosauroids. The results support the hypothesis that the shape of the dentary evolved to be more efficient at gathering and processing food. Furthermore, these evolutionary transitions were achieved via changes in the timing of dentary development as hadrosauroids transitioned from earlier to later-evolving forms.

SÖDERBLOM, D. F. K., BLANCO, A., PRIETO-MÁRQUEZ, A. and CAMPIONE, N. 2023. The dentary of hadrosauroid dinosaurs: evolution through heterochrony. *Palaeontology* **66**(5).

▪

Eoandromeda octobrachiata is hard not only to spell but also to fit into the tree of life. Even though there is a place for everybody in the big, intricate tree, sometimes this place isn't easy to locate. This is the case for the fossil *E. octobrachiata*, an organism from the Flinders Ranges of South Australia, dating back around 555 million years. Little is understood about how *E. octobrachiata* looked in life, how it grew, or how it was preserved. Due to this, there are conflicting hypotheses regarding its ecology and where it fits in the tree of life. To solve the puzzle, Botha *et al.* used methods that analysed the shape of this organism, paired with the environmental conditions at the time of burial, to shed light on its ecology, shape and growth during life, and address these conflicting hypotheses.

BOTHA, T. L., SHERRATT, E., DROSER, M. L., GEHLING, J. G. and GARCIA-BELLIDO, D. 2023. Elucidating the morphology and ecology of *Eoandromeda octobrachiata* from the Ediacaran of South Australia. *Papers in Palaeontology*, **9**(6).

▪

We are what we eat, says an old proverb. But we also eat what we can, and what an animal can eat depends on its skull and tooth morphology. This is why skulls are often used in palaeontological analyses, notably for crocodiles and their ancient relatives. Other bones, less directly related to the act of eating, are often discarded by default. In their paper, Scavezzoni and Fischer put these neglected bones under the spotlight, investigating the anatomy of limbs, elbows and the pelvis. These bones have important consequences for how animals move and hunt. The paper investigates the morphology of these bones in three groups of (semi-)aquatic crocodyliforms, *Thalattosuchia*, *Dyrosauroida* and modern crocodiles, using high-precision 3D scans. These three groups are markedly distinct in shape, even though they colonized similar environments. As a result, their postcranial anatomy unveils its potential as a source of abundant taxonomic and phylogenetic characters to assess phylogenetic relationships.

SCAVEZZONI, I. and FISCHER, V. 2023. Limited convergence in the postcranium of aquatic crocodyliformes. 2023. *Palaeontology*, **66**(6).

▪



Fossils and phylogenies are like oil and water... or maybe not. The difficulty in placing fossils in phylogenies stems from the lack of associated genetic data. To overcome this obstacle, Barido-Sottani *et al.* compared two different approaches for placing fossils in phylogenetic trees, one method using taxonomic information and the other using morphological data. Simulated data show that both methods are reliable even in the presence of uncertainty, except for when the fossil taxonomic assignment contains errors. The authors also found that the method using morphological data is more accurate when the dataset is simulated with variations in speciation and fossilization rates across species. Overall, this work confirms that phylogenetic inference using fossils is accurate, but dependent on reliable taxonomic or morphological information.

BARIDO-SOTTANI, J., POHLE, A., DE BAETS, K., MURDOCK, D. J. E. and WARNOCK, R. C. M. 2023. Putting the F into FBD analysis: tree constraints or morphological data? *Palaeontology*, **66**(6).

▪

A trilobite's postcard from the depths of time: Wei *et al.* documented a trilobite fauna from the Upper Ordovician of the North Qilian Mountains. The fauna provides important information for the palaeogeographical reconstruction of the Proto-Tethys Archipelagic Ocean (PTAO). Based on the spatiotemporal distribution of trilobite faunas within the PTAO, the trilobite faunal province of the Middle–Late Ordovician is defined and discussed.

WEI, X., LUAN, X., ZHANG, Y., YAN, G. and ZHAN, R. 2023. Katian (late Ordovician) trilobites of the North Qilian Mountains and their palaeogeographical implications for the Proto-Tethys Archipelagic Ocean (PTAO). *Papers in Palaeontology*, **9**(6).

▪

Burrows are more than holes in the ground; indeed, they are open windows into our planet's past. Burrowing within the sediment is one of the most important behavioural innovations developed by animals because it would have fundamentally changed the physical and chemical conditions on the ancient seafloor, with significant consequences for fossil preservation, and the habitability of marine environments. Psarras *et al.* use a variety of imaging and analytical techniques to study the oldest fossil evidence for complex burrowing and demonstrate that it instead records a dense concentration of dead tubular organisms. This finding moves our oldest known evidence for complex burrows to *c.* 10 million years younger and reveals the presence of abundant communities of early soft-bodied tubular animals on the seafloor roughly 550 million years ago.

PSARRAS, C., DONOGHUE, P. C. J., GARWOOD, R., GRAZHDANKIN, D., PARRY, L. A., ROGOV, V. and LIU, A. G. 2023. Three-dimensional reconstruction, taphonomic and petrological data suggest the oldest record of bioturbation is a body fossil coquina. *Papers in Palaeontology*, **9**(6).

▪

As palaeontologists, one of our favourite statements is that the past is the key to understanding the future. In some cases, like in the study carried out by Golovneva *et al.*, this is very true. Global warming is changing the characteristics of many environments on our planet, but environments are not affected equally. The Arctic is currently warming much faster than any other similarly-sized region on Earth, therefore it is imperative to understand this trend to build an accurate future climate model. Golovneva *et al.* provide an up-to-date overview of available data in the form of plant fossil assemblages, the chronostratigraphy of the Palaeogene succession in Svalbard,



and apply the latest development of the CLAMP (Climate-Leaf Analysis Multivariate Program) proxy. They found that in the early Paleocene Svalbard was characterized by a temperate, humid, seasonal climate with short-term winter snow cover and light frost. This represents the warm Arctic background condition that dominated before the anomalous extreme warm of the early Eocene.

GOLOVNEVA, L. B., ZOLINA, A. A. and SPICER, R. 2023. The early Paleocene (Danian) climate of Svalbard based on palaeobotanical data. *Papers in Palaeontology*, 9(6).

▪

Flowers are part of our everyday life. They adorn our gardens, colour the countryside and are appreciated gifts. But we are not the only flower-lovers, nor the earliest. Angiosperms, flowering plants, emerged and rapidly diversified during the Cretaceous and dominated the end-Cretaceous flora, co-occurring with many herbivorous dinosaurs. How did dinosaurs respond to this diversification? Answering this question is not an easy task, due to the difficulty of diet reconstruction. To address this problem, Kubo *et al.* applied dental microwave texture analysis (DMTA). DMTA quantifies the micro-topography of diet-induced wear marks on tooth surfaces to estimate diets. Kubo *et al.* found a temporal trend towards rougher microwear textures with deeper and larger scars in Late Jurassic and Cretaceous ornithomorphs. Angiosperms contain more phytoliths (amorphous silica bodies) than other major plant groups, and these phytoliths are the major cause of rough dental microwear texture in modern herbivores. Thus the observed trend was likely caused by the increasing consumption of angiosperms by ornithomorph dinosaurs.

KUBO, T, KUBO, M. O., SAKAMOTO, M., WINKLER, D. E., SHIBATA, M., ZHENG, W. *et al.* 2023. Dental microwear texture analysis reveals a likely dietary shift within Late Cretaceous ornithomorph dinosaurs. *Palaeontology*, 66(6).

▪

Nicola Vuolo

Publicity Officer





Palaeontological Association *2023 Best Paper Prizes*

Each year the Association awards Best Paper Prizes for its two journals, *Palaeontology* and *Papers in Palaeontology*. Nominations are made by our dedicated team of Handling Editors and voted on by the Editorial Board. Winning papers combine high levels of scientific rigour and excellent presentation with originality and significance, preferably both within and outside their subdiscipline.

In addition to the kudos that comes with a Best Paper Prize, the corresponding author of each winning paper will be offered Gold Open Access for one paper submitted to the journal (by themselves or a nominated co-author) within the following 18 months. We offer our congratulations to the authors of the two winning papers for 2023.

The winner for *Palaeontology* in 2023 is an insightful analysis of the varied evolutionary pathways taken by different groups of Mesozoic reptiles during adaptation to swimming in the sea:

The locomotor ecomorphology of Mesozoic marine reptiles

by SUSANA GUTARRA, THOMAS L. STUBBS, BENJAMIN C. MOON, BEATRICE H. HEIGHTON and
MICHAEL J. BENTON

<<https://doi.org/10.1111/pala.12645>>

For *Papers in Palaeontology*, the winner is a comprehensive study of *Essexella* from the Mazon Creek biota, describing and interpreting the numerous taphonomic varieties of this common sea anemone:

An abundant sea anemone from the Carboniferous Mazon Creek Lagerstätte, USA

by ROY E. PLOTNICK, GRAHAM A. YOUNG and JAMES W. HAGADORN

<<https://doi.org/10.1002/spp2.1479>>

Paul D. Taylor
Editor-in-Chief

NEWS



The refreshed Scottish Fossil Code: guidance for fossil collectors, and the owners of fossil localities, on the responsible collection and care of Scotland's fossil heritage

First published in 2008, the *Scottish Fossil Code* was relaunched in August 2023 after a period of consultation that highlighted the need for its updating and improvement. Refreshing the Code was necessary in the light of experience gained in palaeontological site management since its original publication, and to accommodate comment from users of the Code's best practice guidance. The principal change to the Code concerns messaging on its legal status and the legalities of land and fossil ownership which have been made clearer. There is the statement that although the Code is backed by national legislation it constitutes best practice guidance and in itself is not a law. Crucially, however, areas of the law are highlighted, relating particularly to property ownership and regulations affecting Sites of Special Scientific Interest (SSSI), which should not be ignored.

The Code now defines different approaches and levels of collecting, namely: casual, minor, significant and large-scale, in order that collectors are better able to appreciate how their collecting compares with others and what may reasonably be expected of them. In recognizing that seeking permission to access and collect fossils can be challenging, there is the stated expectation that those undertaking significant and large-scale collecting are expected to adhere to the Code's highest standards. For those that are minded to set aside the Code and persist in collecting without heed for the consequences of their actions, there is clear messaging that "due regard of compliance or otherwise, with the Code, may be given in the consideration of any offences and associated prosecution".

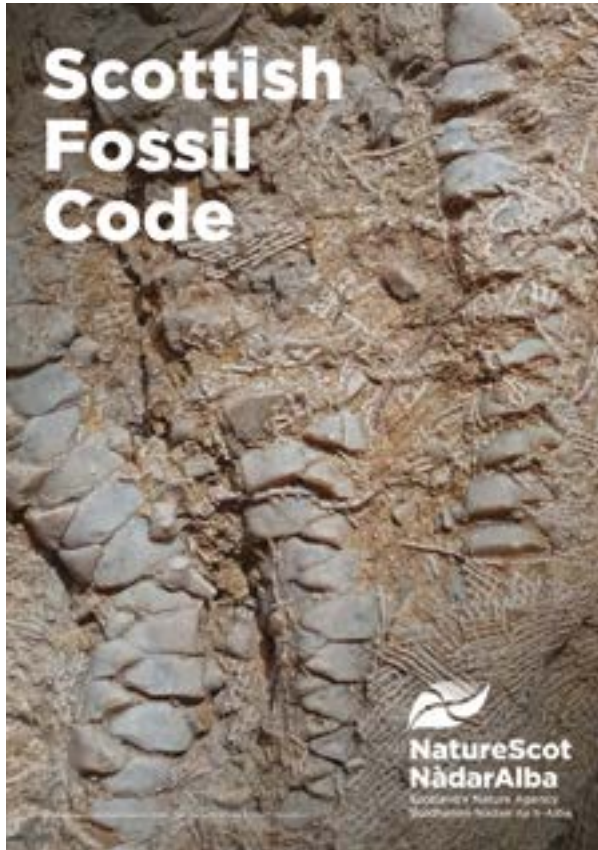
With clearer messaging the Code is now considered more impactful, balanced and pragmatic, and is accompanied by the 'must-read' '*Scottish Fossil Code Guidance*' summary version. It's hoped the Code will prove to be a 'can do' guidance that will find support amongst all who have an interest in the collection and care of Scotland's fossil resources. However, the success of any code depends on its promotion and uptake. Therefore, NatureScot would appreciate advice and assistance in spreading word of the Code's existence, particularly amongst the collector communities on the European Mainland.

The *Scottish Fossil Code Guidance* is available as an accessible HTML page at:

<https://www.nature.scot/doc/scottish-fossil-code-and-guidance>

where the full Code is available as a downloadable PDF document.

Colin MacFadyen
NatureScot



The front cover of the refreshed Scottish Fossil Code. At 54 pages it is a lengthy document but fulfils the duty given in the Nature Conservation (Scotland) Act 2004. Taking into account comments and experiences of users of the Code, as well as evidence of disengagement with the original version, the refreshed Code takes a balanced and pragmatic approach to fossil collecting. The short Scottish Fossil Code Guidance document, available as a fully accessible HTML page on NatureScot's website, represents the summary 'must-read', or companion, version to the Code.

*Is there news that you'd like to see included in the **Newsletter**? Let us know by e-mailing Nick at <publicity@palass.org>, sending a link to the news and explaining its significance.*

NEWS
news



A Palaeontologist Abroad

Highlighting early career researchers who have taken posts outside their home country and the opportunities they used. This issue's palaeontologist is Francesc Pérez-Peris.

Francesc Pérez-Peris is a Spanish palaeontologist living in the USA.

Q1: How did you end up in the USA?

To explain how I ended up in America, I should go back to 2018 when I moved to Switzerland to do my PhD at the University of Lausanne. During my PhD, I studied trilobites and the exceptionally preserved Fezouata Biota under the supervision of Prof. Allison C. Daley. The Swiss National Science Foundation offers the opportunity to develop your own research after finalizing your PhD. I wrote a project together with Prof. Jonathan M. Adrain, which was funded by the SNSF to continue my research on trilobites at the University of Iowa, for a period of two years.

Q2: What is your project about?

Currently we are studying two major trilobite extinctions in the Early Ordovician of Laurentia. We are combining trilobite taxonomy and biostratigraphy together with sedimentological data to infer the palaeoenvironmental conditions in which such extinctions took place. I am working with silicified material, which provides an exceptionally detailed record of the trilobite morphology. During my time here in Iowa, I am learning a lot not only about trilobite taxonomy but also about how to process and manipulate this kind of material, which is extremely fragile.

Q3: What has been the biggest challenge for you living in the USA?

There are several difficulties when you arrive in the USA, especially after moving from another continent. In my opinion, one of the most problematic aspects that I faced is the necessity of having a car. That necessity becomes evident if you want to shop in the big supermarkets, for example. Shops are usually located outside towns in big shopping areas that can only be accessed by car. Without a car, doing the shopping can be a real nightmare. This has been my experience here in Iowa City, which is a relatively small town, although I imagine in bigger cities like Chicago or New York there is less need for a car.



Photo courtesy of Francesc Pérez-Peris.

**Q4: What is the best thing for you about living in the USA?**

I love to go outdoors and experience the wildlife. The USA has amazing parks and landscapes that you cannot find anywhere else. In Europe there are beautiful places, and the outdoor experiences you can have there can be awesome. However, here in America there are some extremely remote areas, and when you experience the nature and wildlife there it somehow feels even more real.

Q5: Apart from friends and family, what do you miss most about Spain?

The first thing that comes to my mind is the food. I love Spanish food and to be honest I am not a big fan of American cuisine. I think this is my main concern about living in the USA. The Midwest extreme winters also make me appreciate the great climate we have in my hometown of Valencia, Spain. This winter, I experienced -28°C for the first time, and I can tell you now that this feels very cold. The extreme cold combined with the snowstorms stopped me from going outdoors and consequently my mood suffered through the winter.

Q6: What forms of support for someone in your position have been the most helpful for you? What form of support do you miss most?

The people from my lab have been really supportive, and they helped me with everything I asked. For example, they gave me furniture for my flat, they drove me to stores during my first few weeks in the USA, and they tried to integrate me within the department. The support I missed the most is from the University itself. As an international researcher there are a lot of things that are not straightforward but that are obvious for local people. It is true that the international student department helped me a bit with some aspects, but in my opinion they did not provide enough support. I had to figure out everything for myself, which sometimes takes double the time and effort compared to if someone from the University could have explained it to me.

Q7: What role does the language of the USA play in your academic and private life?**Has the language been a challenge and how did you go about tackling this?**

Thankfully English is the official language of the USA and Spanish is the second most spoken one. This differs drastically from my previous experiences in Switzerland. In Lausanne, where I did my PhD, French is the official language. I had no knowledge at all of French when I moved to Switzerland, and it was a big barrier in many aspects of my daily life. The language barrier made everything challenging, even doing the shopping was a big effort sometimes. I think this really affected my experience in Switzerland, as it also made it especially difficult to connect with local people. During my time there I tried to improve my level of French, but I feel that this was not enough to have a full experience of the country.

Q8: What was the biggest benefit of your move abroad? What was the biggest sacrifice?

The biggest benefit has been meeting a lot of wonderful people during my time in Switzerland and here in the USA. I maintain great friendships with a lot of them. I met people from all regions of the world, meaning I was able to learn from different cultures. I would say this has been an enriching and mind-opening experience. The biggest sacrifice is to leave behind all the people you love. When you arrive at a new place, you are completely on your own and you miss all the people that you know; it's really difficult to deal with that feeling of loneliness.

Francisc is on X at @PerezPeris1.



Legends of Rock

Legends of Rock: Ely Kish and the Ancient Sublime

Rain drenches the primaeval Permian forest. The air is already wet, so saturated with moisture that it hangs in humid grey-yellow curtains between a background of towering lycophytes and a foreground tangled with ferns. Painted in the centre, frozen in time, are predator and prey: a sail-backed *Dimetrodon* sinking its fangs into the fleshy leg of a similarly sized synapsid, *Diadectes*. Green dominates the scene, olive and emerald, conjuring the swamp from the canvas, save for the rivulets of flame-red blood that glitter in the rain. Down in the soaking mud, *Dimetrodon* eats and survives another day.



Figure 1. *Dimetrodon* by Ely Kish, oil on canvas, 96 cm × 96 cm, 1979. Image © Royal Tyrrell Museum of Palaeontology.

This painting of *Dimetrodon* (Figure 1) is one of three original pieces by Ely Kish that hang in the offices of the Royal Tyrrell Museum of Palaeontology in Drumheller, Alberta, Canada. It inhabits a hallway that witnesses the daily operations of one of Canada's premier palaeontological



research institutions and is lined with paintings – lush portals into the prehistoric world around which the Museum revolves.

Ely Kish, born in 1924 in New Jersey, USA, spent much of her life in Canada. With money earned from a marine mural painted for the Smithsonian Institution, she was able to renovate an old log home in Bourget, Ontario, and turn its appendant barn into a painting studio (Spears 2014). Throughout her career, she painted murals for a number of museums, including the Canadian Museum of Nature and the New Mexico Museum of Natural History (Lucas 2009), as well as illustrating numerous books, collaborating with Dale Russell on several of them (Lescaze 2017). A member of the LGBTQ+ community, Kish was married to wife Huguette Vrancken, who survived her when Kish passed away on 12th October 2014 (Spears 2014).

Kish followed in the tradition of great palaeontological painters of the twentieth century such as Charles R. Knight and Zdeněk Burian (Welzenbach 1990; Lescaze 2017), while also blazing new trails in the depiction of dinosaurs as hot-blooded, intelligent creatures popularized in the 1990s by Robert T. Bakker and Gregory S. Paul (Currie 2000). She measured the fossilized remains of her subjects bone by bone before sculpting them, then finally infused them with colour and life in the finished paintings (Welzenbach 1990). Notably, however, when Kish's name is listed among the likes of Bakker, Paul and William Stout, there is a dearth of other womens' names. She found purchase and success in a field that was, and continues to be, male dominated¹.

Kish's art, like the work of other artists of the time, is colloquially criticized for presenting reconstructed animals in a 'shrink-wrapped' fashion, with the skeletal structure clearly discernible under tight, elastic skin. However, this is not always the case in her pieces. By the 1990s, her animals carried more muscle and weight, corresponding to shifting scientific hypotheses regarding body mass. Whether in the lanky subjects of her 1970s paintings or the lively, warm-blooded beasts of the 1990s, a through-line of hardship and survival provides a thematic backbone for her compositions. In representing the struggle of saurians to survive in spite of disease, famine and natural disasters on prehistoric Earth, her pieces conjure the dreadful gravity of the *sublime*, a concept in art history which refers to the awe-inspiring and fear-inducing power of the natural world: the chase and the hunt, the ferocity of the storm, the vertigo of standing in the shadow of the mountain. Kish's palaeontological subjects, suffused with the cultural climate change anxiety that reared its head during her career, take to wandering sprawling landscapes or wasting away in parched deserts (Lescaze 2017).

The panicked look and exaggerated motion of two *Corythosaurus* fleeing an *Albertosaurus* (Figure 2) recalls the whale-eyed peril of Sir Edwin Henry Landseer's stag in *Deer and Deer Hounds in a Mountain Torrent* (1832), a classic example of the sublime in non-palaeontological art. Kish's herd of *Triceratops* (Figure 3) sends up clouds of dust on an oceanic beach laden with brush strokes, perhaps searching for fresh water in a landscape where everything tastes of salt. The age-old drama of the struggle for survival plays out again and again, enchanting the viewer with the familiar, the fantastic and the frightening.

¹ For example, *Dinosaur Art: The World's Greatest Paleart* (Titan Books, 2012) does not feature any women artists among its ten 'greatest' artists. *Dinosaur Art II: The Cutting Edge of Paleart* (Titan Books, 2017) does minimally better, including one woman artist out of ten and a foreword by trans woman Riley Black. While *Mesozoic Art: Dinosaurs and Other Ancient Animals in Art* (Bloomsbury Wildlife, 2022) includes the most female artists – six – they are still outnumbered 2:1 by male representation, even when counting the foreword by phenomenal animal artist Terryl Whitlatch. This is by no means a comprehensive metric, and does not account for any differences between credited names and the complexity of gender identity and expression, but it is a convenient microcosm to sample.



Figure 2. *Corythosaurus and Albertosaurus* by Ely Kish, oil on canvas, 88.5 cm × 68 cm, 1992. Image © Royal Tyrrell Museum of Palaeontology.

Professing an ungovernable aspect to her artistic process – like it's flowing through [her], from the outside" (Costello 2024 – Ely Kish summoned life into her palaeontological artworks. Her pieces have a soulful quality that has reached out across the decades since their creation and the millennia since their subjects' fossilization. Perhaps the struggle of the act of painting, of making it her career and life, perched on scaffolds with brush in hand, mirrors the struggle of Kish's lovingly-rendered creatures (some of her pieces took years to complete; Welzenbach 1990). With the spread of large-format substrate printing, *bona fide* brush-to-wall murals are becoming increasingly endangered in museum settings, and rare are the paying opportunities for muralists to reconstruct Earth's distant past. Rarer still are these opportunities given to women. Ely Kish's works are deserving of celebration, preservation and respect as one of the outstanding latter-era palaeoartists.

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Figure 3. Triceratops by Ely Kish, oil on canvas, approx. 88.5 cm × 68 cm, 1992. Image © Royal Tyrrell Museum of Palaeontology.

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Behind the Scenes at the Museum

Albany Museum, South Africa



The Albany Museum Natural Sciences building. Photo courtesy of Rose Prevec.

The Albany Museum is a small, provincial museum in the Eastern Cape of South Africa. It was established in 1855, making it the second oldest museum in South Africa. It is situated in the small, beautiful, leafy town of Makhanda (formerly Grahamstown), where donkeys and cattle roam the streets, potholes in our roads abound, and where you may or may not have tap water depending on the day of the week! Steeped in history, this quaint, historic town was established as a military garrison in 1812, and grew into a bustling frontier town. Makhanda lies 80 km inland from the beautiful Eastern Cape coastline, with our nearest city, Gqeberha (formerly Port Elizabeth), just over an hour's drive away. Despite its size and rural setting, Makhanda is an education hub, home to Rhodes University and many excellent government and private schools. We have a vibrant intellectual community, and the town hosts both the National Science and the National Arts festivals each year, drawing local and international visitors. The Museum comprises seven buildings: the Natural Sciences Museum, the History Museum, Fort Selwyn, the Observatory Museum, the Old Provost military prison, Drostdy Arch and the Old Priest's House. There are four active research departments in the Natural Sciences Museum, with curators dedicated to the study, management and development of diverse, nationally and internationally important collections of insects, spiders and scorpions, freshwater invertebrates, plants (the Selmar Schonland Herbarium), fossils and minerals. The Museum also has a variety of exhibits that showcase the natural and cultural heritage of the Eastern Cape, and runs an active outreach programme for local schools.

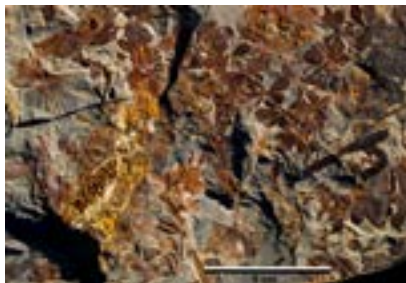


Palaeontological endeavour in the Eastern Cape has a long history dating back to the 1800s, with the exploration and collections of 'Victorian gentlemen of science' and passionate naturalists drawing attention to the rich palaeontological heritage of the Eastern Cape. Mr Andrew Geddes Bain and Dr William Atherstone were particularly prominent figures. Bain (referred to by many as the 'Father of South African geology') found the first pareiasaur (a weird beast he called 'the Blinkwater monster') and the first dicynodonts to be described. It was Atherstone and Bain who, in 1845, found the first dinosaur in Africa, not far from Makhanda. The specimen was later described as the stegasaurid *Paranthodon africanus*. The partial skull resides in the Natural History Museum in London, although a cast (which, I might add, cost a small fortune to procure!) is on display in the Albany Museum, along with what must be the most endearing, if not the most accurate, reconstruction of a stegasaurid dinosaur.

Bain's vision for the creation of a museum in Grahamstown bore fruit in 1856, when the Albany Museum opened its doors to the public. With Atherstone among the founding members, the fledgling Museum housed a growing collection of fossils, rocks and minerals. The collections expanded over time to represent other biological fields, and moved to its current location in 1900. Tragedy struck in 1941 when much of the Museum was destroyed by fire, including most of its catalogues, and information on the provenance of many of the fossils and geological specimens was lost. The Museum was rebuilt, and reopened in 1945. Over the years, the Earth sciences collections were managed by various honorary curators in the Rhodes Geology Department, but without a dedicated custodian, many fossils and rock samples disappeared.

The Albany Museum became an Associate Research Institution of Rhodes University in 1983, and two years later the first full-time curator of the Earth sciences collections, Dr William 'Billy' de Klerk (1952–2022), was appointed. The Albany Museum is the only provincial museum in South Africa that employs a palaeontologist to curate and research palaeontological collections, and it is currently the designated repository for Eastern Cape fossils. Over a career spanning 30 years, Billy became a beloved member of the palaeontological community, and was well-known for his work on Karoo therapsids, and particularly Triassic/Jurassic and early Cretaceous dinosaurs from the Eastern Cape. Billy's retirement in 2016 ushered in a new era for palaeontology at the Museum, with a shift in focus in both the development of collections, and research themes.

I was appointed as the new head and curator of Earth sciences in 2016, and have continued to grow a large collection of Permian plants and insects, and Lower Cretaceous plant fossils, stemming from my work at the Museum since 2004. My focus has been on the iconic plant *Glossopteris*, including its reproduction and regional diversity, and changes in Permian ecosystems through time, including the lead-up to the end-Permian extinction. Dr Robert Gess, a Research Associate of the Albany Museum, and expert on the Devonian collections, has ties to the Museum that go further back to the 1980s, when he began collecting fossils exposed by roadworks on the outskirts of Makhanda. This Waterloo Farm collection is still expanding, and



A mat of impression fossils of the horsetail Trizygia speciosa with cones and tiny Glossopteris leaves from near the Permian–Triassic boundary. Image courtesy of Rose Prevec.



A field team collecting fossils near Sutherland. Photo courtesy of Rose Prevec.

continues to make a huge contribution to global understanding of high latitude, Late Devonian, Gondwanan estuarine and marine ecosystems. The Earth sciences department managed to secure one of the Museum's historic buildings, the Old Priest's House, for the storage of the over 3,000 specimens of the Devonian collection, along with offices for students and researchers, and an exhibition area. Both Gess and I are Research Associates at Rhodes University, in the geology and botany departments respectively, lecturing and supervising students.

A brief outline of key collections at the Albany Museum is as follows:

Plants

- A large collection (over 17,000 slabs) of Permian plant impressions of the *Glossopteris* Flora, including a unique middle Permian flora from Sutherland, smaller collections from the middle Permian of the Eastern Cape, late Permian fossils from the Lebombo Basin, and low-diversity floras from the uppermost Permian (near the Permian–Triassic Boundary).
- A growing collection of Lower Cretaceous plant fossils from the Kirkwood Formation, including impression fossils of gymnosperms (mostly conifers, cycad and bennettitaleans) and ferns, and permineralized wood and charcoal.
- A significant collection of Upper Devonian fossils comprises mostly algae, lycopods and the progymnosperm *Archeopteris*.

Invertebrates

- There is a substantial collection of Lower Cretaceous marine invertebrates from the Sundays River Formation, including ammonites, gastropods, bivalves, brachiopods and rare crustaceans.
- A relatively new addition to the



Khokela Camagu explaining fossil preparation to a school group. Photo courtesy of Rose Prevec.



collections is a host of middle Permian insect fossils that have been emerging from a locality in Sutherland, and which are still being described by Prevec and colleagues. Included in the collection are the world's oldest water mites and leeches, abundant aquatic nymphs of stoneflies and palaeodictyoptera, and many insect wings.

- Collections of Devonian marine invertebrates from the Bokkeveld Group, including a number of trilobite holotypes, as well as brachiopods, echinoderms, gastropods, bivalves and coral.
- A large and growing collection of invertebrates from the Upper Devonian, including fragmentary evidence of the scorpion *Gondwanascorpio* (the earliest terrestrial animal in Gondwana), as well as eurypterids, bivalves and brachiopods.

Vertebrate collections

- The Museum's robust collection of Permian and Triassic vertebrates comprises fish, amphibians, reptiles and therapsids, including 30 holotypes.
- The dinosaur collection is small but contains some important specimens from the Upper Triassic to Lower Jurassic Elliot Formation and Lower Cretaceous Kirkwood Formation. Elliot Formation fossils at the Museum include highlights such as a complete articulated skeleton of *Heterodontosaurus tucki*, and partial but articulated skeletal remains of sauropodomorphs such as *Massospondylus*. Kirkwood dinosaur fossils are rare, mostly isolated bones, including those of large sauropods, but with some spectacular exceptions such as the charismatic little dinosaur 'Kirky' (named after the town Kirkwood), which was the first dinosaur to be given an isiXhosa name: *Qwebasaurus thwazii*.



Priscomyzon, the oldest lamprey, from the Devonian Waterloo Farm site. Image courtesy of Rose Prevec.

- Highlights from the extensive Upper Devonian fossil collections include the world's only known non-tropical Devonian tetrapods (*Tutusius* and *Umzantsia*), the earliest known coelacanth nursery (multiple juvenile *Serenichthys* fossils), and an ontogenetic series of the oldest known lampreys (*Priscomyzon*). These form part of a diverse vertebrate fauna, also including placoderms, acanthodians, chondrichthyans, ray-finned fish and lobe-finned fish.

Despite its small size, and financial and staffing challenges, the Albany Museum punches above its weight, and has made a disproportionately large contribution to South African palaeontology and other fields in terms of its unique collections and the high quality of research that has been produced over the years. All of our researchers have established enduring collaborations with both local and international scientists (e.g. from Sweden, Germany, France, Argentina, Australia and the USA), and we regularly welcome visitors to our collections.

Rose Prevec

Albany Museum, South Africa



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*An adorable reconstruction in the palaeontology gallery of the first dinosaur to be found in Africa, the stegasaurid *Paranthodon africanus*. Photo courtesy of Rose Prevec.*



Milton's Fiend, and friends

The BBC, in close cahoots with the Royal Society, did the great man proud, in the year of his most famous bicentenary. Filching some of the styles of Postman Pat and Monty Python – somehow, both seem very appropriate – they recounted William Buckland's long and eventful life in a little gem of animation¹. In three minutes and fifty-three seconds, space was found for his enthusiastic zoophagy, his memorable lecturing style, the skilful navigation between religion and science, that celebrated actuopalaeontological acumen (tortoise footprints on pastry dough, in this case, as well as the more celebrated insights into hyena poo), his wife Mary's considerable contributions to the science – and, of course, the first dinosaur ever to be named, in *Megalosaurus*, just pipping Gideon Mantell's *Iguanodon* to the post by a year.

It's an excuse, of course, to go back to Buckland's original thinking on the monster he discovered. It's all in seven pages of the *Transactions of the Geological Society of London* of 1824, plus five plates of magnificent half-tone drawings by Mary, then working for the cause as *née* Morland. Among much else, it serves as a reminder of not only what we have gained since as the professional science has grown, but also what we have lost – and here foremost among which is simple readability. Even as Buckland starts to tell his story – *I am induced to lay before the Geological Society the annexed representations of part of a skeleton of an enormous fossil animal* – it's clear that one can sink into the armchair, take hold of a large cup of tea, open the tin of thin biscuits, and simply join him in the adventure. Buckland, like so many of his contemporaries, had, in spades, the fundamental force that Terry Pratchett used to call narratavium. And, the publishing culture of the day, thankfully, was happy to indulge him (and us) in it. It is a major scientific discovery – but still as story read by the fireside, where you can hang on to every word, follow the plot, and keep on thinking through the ramifications, even as you close the book and gaze at the embers that still warm your toes.

The atmosphere is helped along by Buckland's amiability of spirit when mentioning his peers, such as his *friend and fellow-labourer*, the *Rev. W. Conybeare*, acknowledged for help in concocting the name *Megalosaurus*, or Gideon Mantell, with praise for his *rich and highly valuable collection at Lewes*, or in mentioning that celebrated Baron, Cuvier, whose expertise was a large factor in making sense of the evidence provided by the modest job-lot of old bones from Oxfordshire's Stonesfield Slate, that allowed recognition of this monstrous new – and very old – animal. The readability does not even flag in the taxonomic description, where in the jaw, for instance: *The exuberant provision in this animal for a rapid succession of young teeth, to supply those that might be shed or broken, is very remarkable*. It's a technical description in a technical journal, yes – but written in a way that would have been accessible, and easily, comfortably, evocatively accessible to any reasonably educated person of the day, or indeed of any day. No wonder word spread so quickly.

Part of the fun, now, is provided by hindsight, by having cleared a good deal of the mist that Buckland was trying to peer through. *Megalosaurus* was the dinosaur to be named, but named, naturally, before dinosaurs themselves had been invented by Richard Owen – a rather more forbidding character – in 1842. So for Buckland it belonged to *the order of Saurians or Lizards* – the two words then being more or less synonymous. The word 'saurian' has since taken on a life of its own, propelled through imagination and meaning by the dinosaur connection, so that its many Google hits are mostly headed by computer games and sci-fi fandoms, while its technical focus now centres on the Sauria clade, a rather larger assemblage which does indeed include

¹ <<https://www.bbc.co.uk/ideas/videos/the-man-who-tried-to-eat-every-animal-on-earth/p0hbcj1>>



the dinosaurs (including the birds), the crocodiles, the lizards, the snakes – and may or may not include the turtles, depending on choice of cladogram (in my head, I confess, it's generally closer to the sci-fi meaning).

And, Buckland was playing the game of which bone to match with which other bone, too, and this kind of game can play tricks on anyone. His *Megalosaurus* included some of the huge bones that Mantell was simultaneously unearthing in the Weald – bones which Mantell was later to christen as *Iguanodon*, a considerably larger (and geologically younger) beast. Buckland's reconstruction (or Cuvier's, rather, as he acknowledges) was accordingly gigantic. Even the Oxfordshire bones, *when compared with the ordinary standard of the lizard family, yielded a length exceeding 40 feet [12 metres] and the build of an elephant seven feet high*. Adding the Wealden bones into the mix produced a *length ... of sixty to seventy feet [21 metres]*, which was *fallen but a little short of the largest whales*. It was this eye-catchingly monstrous size that led Conybeare and Buckland to conjure up the *Megalosaurus* name. A mistaken size, as we now know – partly because of that bone mixup, and partly because *Megalosaurus* is not simply a hugely magnified version of a modern lizard: on modern reconstructions it reaches a mere (!) ~six metres long. But it was an honest mistake, the best interpretation at that time, as was the lumping of the Stonesfield and Wealden bones: Buckland was well aware of the thickness of strata separating the two localities, but simply and overtly inferred a long stratigraphic range².

And then, there are the travelling companions of *Megalosaurus*, to which the best part of a page is devoted. Buckland notes the presence of *the most remarkable two portions of the jaw of a didelphus or opossum*, this being *on the authority of M. Cuvier, who has examined it*. This authority was sorely needed because *without the highest sanction, I should have hesitated to announce such a fact, as it forms a case hitherto unique in the discoveries of geology; viz. that of the remains of a land quadruped being found in a formation subjacent to chalk*. Well, the authority on that day was working in haste, as another even more august³ authority noted in 1838. To Richard Owen's more measured scrutiny, this fossil was not an opossum, but nevertheless a kind of early mammal – and so still a spectacular find in very much the same ballpark. That was not all. Buckland also noted that *imbedded in the same stratum were the bones of long-legged birds, apparently allied to the order Grallae, which frequent the shores and shallow fords of lakes and seas ... and afford, I believe, the most ancient example yet discovered of the origin of fossil birds*.

A catalogue of riches! And with the last of these, riches they were to remain, even as the fowl turned out to be of another feather. Five years later, Buckland was profiting from the latest plunder that Mary Anning was extracting from the Lias cliffs of Lyme Regis: *the skeleton of an unknown species of that most rare and curious of all reptiles, the Pterodactyle*. And five years on, as both he and the science were a little more mature, one would have thought that the description might grow somewhat more sober and restrained. But not a bit of it – and indeed, the prose reaches new heights of bright invention. With relish he referred not only to the *minute and detailed descriptions* that Cuvier had made of the magnificent specimens that had been pulled out of the quarries of Solnhofen since the late eighteenth century, but also repeated verbatim the Frenchman's astonishment at what he, Cuvier, had been analysing – *Ce sont de tous les êtres dont ce livre nous révèle l'ancienne existence, les plus extraordinaires, et ceux qui, si on les voyait vivans, paroîtroient les plus étrangers à toute la nature actuelle*⁴.

² Not so unreasonable when one thinks of the likes of the coelacanth, and the brachiopod *Lingula* with its half-billion year range.

³ Well, scarier, at least: and working a little later, which always helps.

⁴ 'These are of all beings of those which reveal ancient life to us, the most extraordinary, and those which, if one was to see them living, would appear the most alien to all of today's nature.'



Buckland puts the story into just six pages, and one magnificent lithographic plate, not by Mary Buckland this time, but by one W. Clift. At life size, the headless skeleton appears almost stereoscopically imaged, such is its clarity and vividness, underlining once again how the best hand-drawn images can beat even a good photograph hands-down for impact, not least because the interpretation process (for such it is) leaves out the distracting visual patterns of the matrix and homes in on the heart of the bone. (A head turned up later, and was drawn by Joseph, Mary Anning's brother – perhaps not as elegantly but arguably even more authentically, as he employed the party trick of using ink from the preserved ink-sacs of fossil squid from the Lias – Martill 2010, fig. 5; this head turned out to be quite different to those of the Solnhofen pterodactyls, so Richard Owen later used it to set up the new genus *Dimorphodon*).

Buckland also leant on Cuvier's descriptions of the much more complete German specimens to fill out the description of the pterodactyl, asserting that it possessed not feathers or hair, but *scaly armour like that of an Iguana*. And with this descriptive touch this animal became *in short, a monster resembling nothing that has ever been seen or heard-of on earth, excepting the dragons of romance and heraldry*. And, when the three stout claws that he used to give it the specific name *macronyx* were added, the final, horrific, touch for Buckland's palaeoecological reconstruction was in place: this animal was *like Milton's fiend, all-qualified for all purposes and all elements ... a fit companion for the kindred reptiles that swarmed in the seas or crawled on the shores of a turbulent planet*.

And, to drum home the analogy, the diagnosis of Milton's original was added:

*"The Fiend,
O'er bog, or steep, through straight, rough, dense, or rare,
With head, hands, wings, or feet, pursues his way,
And swims⁵, or sinks, or wades, or creeps, or flies."
(Paradise Lost, Book 11. line 947.)*

Well, the frightful image so conjured up persisted, and the pterodactyls long maintained their sinister reputation, not least in Conan Doyle's *Lost World*, where they are portrayed as utterly, obscenely repulsive⁶. And it was these creatures, and not birds, Buckland now realized, that had left their bones in the Stonesfield Slate, keeping those of *Megalosaurus* company. Moreover, he was generous enough to admit that a fellow savant, a certain Mr I. S. Miller of Bristol, had suggested as much way back in 1823, and so a year before his *Megalosaurus* paper appeared.

Alas for those who like to have their flying reptiles placed firmly amid the forces of darkness, the imputed scaly skin of these flying reptiles did not survive the ever greater array of palaeontological discoveries that were to follow. For the past few decades it has been clear that pterosaurs were covered not in scales but in 'pycnofibres', so they would have been fluffy or downy, and hence nicely warm and perhaps even (with caution) cuddly. And, more recently, Cincotta *et al.* (2022) described a pterosaur from Brazil's Crato Formation (so pretty much *Lost World* territory) with preserved, colour-giving melanosomes on structures that they called not just fibres but thoroughgoing feathers. What's more, these melanosomes occurred as different arrangements on different feathers, indicating that this pterosaur was not only colourful but

⁵ Buckland made sure of a complete analogy by noting an account of a 'Vampyre Bat' off the island of Bonin that was observed swimming.

⁶ *Megalosaurus* got similar treatment in *The Lost World*, so at least the libel was shared out democratically among Buckland's creations: see *Newsletter* 65.



colour-patterned too. So, while appearance is no guide to morality, if the pterosaurs were among the villains of Mesozoic times, at least they were beautifully garbed villains.

And, villainous or no, many of them were awesome beyond the dreams of Buckland and Cuvier. Martill (2010) pointed out that the vagaries of fossil collection led to those early discoveries being of the smaller pterosaurs: Mary Anning's find as described by Buckland was, for example, a little smaller than a raven. That they could get much larger emerged later, when highly fragmentary but very chunky pterosaur bones dug out of the Cambridge Greensand for the phosphate 'coprolite' trade⁷ turned up, and Owen in 1859 – three years after Buckland's death – estimated that some of these animals may have had a wingspan exceeding six metres. Then, a decade later, came the discovery of the giant *Pteranodon* in the American Midwest, itself later eclipsed by such as *Quetzalcoatlus* and *Arambourgiana* with their wingspans reaching ten metres or more.

Buckland is a key figure of nineteenth century science, in substance as well as panache, so it is a little surprising that there seems to be no full-scale biography of him available – with the exception of that published by his daughter, Elizabeth Gordon, in 1894: invaluable and charming, but of its time and written, quite naturally, with more than a touch of filial fondness. The general esteem in which Buckland was held, frequently invoked in those pages, seems, though, to tally with other sources.

Take the way Buckland's name spread through the world as geographic identifier (and beyond, with the Dorsum Buckland, a ridge on the Moon). Two examples, Buckland Island (now Ani-Jima) in the Bonin Islands, and the settlement Buckland (now Nunatchiack) in arctic Alaska, were the gift of Frederick William Beechey, captain of the Royal Navy's *HMS Blossom*, which between 1825 and 1827 sailed the world with its main task to supply the Franklin expedition⁸ to the Arctic, but which on the way did a lot of science on its own account. The Gordon biography devotes several pages to the contacts between Beechey and Buckland, and quotes the former writing to Buckland that the island given his name was distinguished by columnar basalts *far grander than the Giant's Causeway*.

The *Blossom* expedition resulted in impressive scientific accounts – indeed monographs, exquisitely illustrated in colour⁹. In the zoological account, Buckland is at the head of the list of those acknowledged for their involvement and practical support (this was no mere politeness: Beechey was not shy to chide, in the next paragraph and in no uncertain terms, one J. E. Gray for delaying the whole publication by being so slow with describing the 'molluscous animals'). Buckland's main contribution is hidden away at the very end; he organized and annotated the geological details gathered during the voyage – which included some splendid geological cross-sections, complete with some most persuasive tectonic patterns and unconformities. As a networker, facilitator and general encourager, he was clearly up there with the best of them.

There are surely more stories to be told, of Buckland's spider web of connections within a growing science. Perhaps they will appear one day, so we can dwell on them, and for rather longer than three minutes and fifty-three seconds.

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⁷ Which Buckland helped mightily to foster: see *Newsletter 78*.

⁸ This was an earlier expedition than the tragic 1845 search for the Northwest Passage with the *HMS Terror* and *Erebus*, that neither Franklin nor any of his crew survived. Even this earlier time, Franklin did not make the rendez-vous, while Beechey (who did) waited vainly for him before resuming his voyage.

⁹ Now openly available via the good offices of the Biodiversity Heritage Library, one of the more marvellous institutions to have spun out of the Internet.

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Interview with Chris Manias, author of *The Age of Mammals* (2023)

Victor Monnin: What made you want to write a history of nineteenth-century palaeontology focusing on mammals?

Chris Manias: I started off as a historian of the nineteenth century, and especially the relations between scientific fields like anthropology and archaeology and ideas of race and nationality. But I increasingly became interested in thinking about the cultural impact of deeper pasts. This eventually led me to the history of palaeontology, which has been a key field involved in changing our understandings of nature, time and the environment from its inception in the late-eighteenth century, as well as being connected with politics and public culture. As I was learning about the history of palaeontology, I quickly saw that many palaeontologists today are very interested in the history and cultural role of their field, and approached it in a really sophisticated way. So I became interested in building links between palaeontologists and historians of science. This has formed a large part of the impetus around the “Popularizing Palaeontology: Current and Historical Perspectives” (PopPalaeo) network, which I’ve been running since 2016, to think about how we can work across disciplinary boundaries to understand the cultural role of palaeontology.

Specifically on mammals: when I started getting interested in the history of palaeontology, I concentrated mainly on vertebrate palaeontology. With this focus, I initially thought that most of what I would be looking at would be interest in dinosaurs. But from my readings of the primary source material across the nineteenth and twentieth centuries, I saw that interest in dinosaurs – while certainly present – was actually often secondary to interest in extinct mammals. The germ of the book was therefore thinking about: why were early palaeontologists and public audiences so interested in fossil mammals? And what have we missed in our understandings of the history of palaeontology, and its social and cultural role, by not taking this mammal focus into account?



VM: Your book covers two hundred years of history across five continents. Why such a scale?

CM: Fossils aren't bound by political boundaries, and neither are scientific networks – so you need a large geographic framework to understand them. And a long durational perspective is also important, as it allows you to see the continuous and long-term interest in fossil mammals, and how the field of palaeontology itself forms into something that looks a lot like the field today by the 1900s, centred around museums and university departments with a broad and diverse public role. I also wanted to provide a big-picture image that future historians, and other people interested in this topic, can fill in. There have been some really great books on individual fossil mammals (Semonin 2000; Cohen 2002; McKay 2017; Pimentel 2017). Bridging this existing work was something I very much wanted to do.

VM: You refer to fossils as playing “a powerful world-building role”. Could you explain what you mean by that?

CM: Fossils are used to create lost worlds of deep time, ancient periods where the landscape, animals and plants are startlingly different, which need to be imagined and constructed from the fossil record. European scholars and the public were creating this image of deep time at exactly the same time that they are attempting to understand nature in parts of the world which are unfamiliar to them. So the life of the present and the life of the past are deeply linked in this period. Mammals were so interesting in the nineteenth century because they were simultaneously thought of as being at the summit of natural progress, but also because they are found throughout the world in a variety of forms. Extinct animals gave value to particular periods and places. One important aspect can be seen in the way that marsupials and monotremes are persistently presented as primitive or undeveloped. This feeds into stereotypes of prehistoric animals but also into valuations of current places where these animals were still found, with Australia persistently presented as a primitive and ancient country. This example is treated in some depth by Jack Ashby (2022).

V.M: The history that you retrace is peopled with all kinds of actors, from miners to farmers to indigenous people to museum workers. Why include such actors into the history of palaeontology?

CM: I wanted to get away from the idea that the history of palaeontology is just about the 'discovery' of the past by elite figures. So this is trying to think about the history of palaeontology as a meeting ground for lots of different forms of expertise, and lots of different people. Also, nineteenth-century palaeontology was tied with economic processes, and is occurring off the back of mining, quarrying, building canals, roads and railways, *etc.* And miners, farmers and quarry-workers are often the people who initially find and excavate fossils. It shows that palaeontology isn't a field detached from wider society.

VM: Which case-studies prompted you the most to rethink your approach to the history of palaeontology?

CM: One case-study which drove things home to me was the case of the 'Ilford Mammoth,' a large mammoth skull which was excavated from brick-pits to the east of London in the 1860s (and donated to the Natural History Museum, London). As I've lived in east London for the past 20 years, this made it clear to me that the history of palaeontology can be very local and found pretty much everywhere.

VM: How do you hope your book can benefit the paleontological community today?

CM: Firstly, when thinking about outreach and narratives of the history of the field – to go beyond the focus on dinosaurs (Pancioli 2021; Brusatte 2023)! In many respects, the vision



of the deep past presented in the nineteenth century is much more textured and varied than the image that is often presented today in popular contexts. Secondly, the book thinks about how palaeontology was deeply enmeshed with politics, empire and economics throughout its history. This isn't just on the level of its material conduct, but still exists on the level of language – hierarchical thinking, ideas of progress, or notions of particular animal groups having 'dominance'. These are concepts which are rooted in nineteenth-century understandings and ideologies, and are deep in the history of the field. By thinking about how these ideas became rooted, we can start thinking about going beyond them. Finally, there is the question of thinking about where palaeontology is done and by whom. There is a lot of really great work on increasing diversity in science today being conducted by palaeontologists, often using historical examples. What I hope to show in my book is that the history of the discipline has always been extremely varied, conducted by different people, and dependent on different forms of expertise.

Victor Monnin

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Chris Manias

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Spotlight on Diversity

Engaging blind and partially sighted museum visitors with palaeontological collections

Historically, museums have not been particularly favourable towards blind and partially sighted (BPS) people. The reasons why are fairly self-evident. Museums have, since their inception from the 'kunstkammer' of wealthy post-renaissance nobles, been repositories of the magnificent and priceless. These collections served as a method of emphasizing one's class, the exploration



of hidden knowledge accessible only to those wealthy and in the know. Much the same can be said in the life sciences and palaeontology, whose wealth of field-shaping European aristocrats, Darwin, Lamarck, Owen and Cuvier among others, led the foray into discovering the mysteries of deep geological time. For these researchers, museum collections were their own fiefdoms, a world entirely removed from the everyday life of the average citizen. Given the historic maligning of BPS individuals, it is little wonder that access was not even something to be considered.

Museums and their collections as we know them did not really come about until the twentieth century, when museums like the Ashmolean, Louvre, Natural History Museum of London and the British Museum began to realize the power of their collections for societal education. What followed was an explosion in modern exhibition design, beyond mere glass cases and dry labelling to often emotional and thought-provoking galleries that teach visitors about the world and its history. However, there are issues with these. Many experienced museumgoers will be familiar with the foreboding signage omnipresent in most museums: "DO NOT TOUCH". This is a necessity given the nature of the objects on display, but one that provides a major hurdle for BPS visitors. When one has difficulty seeing and cannot touch, how can one meaningfully interact with an exhibit? These days, most museums have some form of provision for BPS visitors. Touch tours and handling sessions are common, where visitors are given the opportunity to handle select items from teaching collections, alongside braille guides, audio tours, tactile reliefs and more.

While a step in the right direction, many BPS museum visitors remain unsatisfied with current provision. Research has shown that while museums in Europe are getting better at providing for their BPS audiences, the opportunity for engagement beyond brief, curated audio-visual experiences with relatively uninteresting objects is lacking (Mesquita and Carneiro 2016). Is this truly access in the same way as for a sighted visitor? Can a BPS visitor properly visualize the exciting dinosaur skeleton dominating the atrium of a natural history museum, cordoned off away from prying hands? How big it is? What a dinosaur really is?

This is further complicated by the fact that blindness is a spectrum. Each BPS visitor has different degrees of sight loss. Those who are congenitally blind will have little experience in visualizing what are quite complex animals, compared to someone who had a wealth of visual experience prior to sight loss. How can you explain a flat crinoid fossil to someone who has never seen anything remotely like it? Similarly, many people have different forms of sight loss, including blurring, central vision loss and low light sensitivity. Braille, the usual first step in making an exhibit BPS-friendly, is poorly understood in terms of literacy rates, with the oft-quoted 10 % literacy figure being recently debunked by Sheffield *et al.* (2022). Most braille readers are congenitally blind, with few who lost their sight later in life having sufficient literacy to properly engage with braille text. Is this truly enabling access to museums for BPS visitors?

Recent efforts have been devoted to the use of 3D printing and physical models to supplement current practices, and the development of many applications dedicated to enabling BPS visitors to engage with museums. While traditional physical models are useful, the pains it takes to craft a decent replica by a skilled conservator limits their use in everyday handling applications. 3D printing thus represents a more time- and cost-effective method of getting museum objects into the hands of BPS visitors.

Once an object has been scanned for 3D printing, it can be replicated an infinite number of times, with material costs and clean-up being the major considerations. This allows BPS visitors,



and even sighted visitors, to meaningfully interact with significant objects in museum collections. Additionally, curators can edit the base geometry of the mesh files to make objects more accessible. For particularly small specimens like the small trilobite *Trinodus* sp., scaling up allows BPS handlers to better engage with a complex, unfamiliar animal. For low-relief specimens, such as those from the Burgess Shale, it is possible to exaggerate the geometry, making certain features more pronounced to aid interaction. Colour and contrast, on a 3D printer capable of printing in either colour or multi-materials, can be adapted to assist those with partial sight loss or colour insensitivity. Further museum interaction can be promoted using touch sensors, such that the printed model reacts to touch and provides supplementary audio information. The most important aspect of this, however, is that providing such prints in the exhibition gallery would enable BPS visitors to interact with museum specimens without strict supervision by curators.

There are a few caveats to this approach though. Investing in a good quality 3D printer is expensive, with continually dwindling budgets limiting the use of such technology to only the largest public institutions (Adams 2023). Price is also intrinsically tied to the quality of the print produced, both in terms of its long-term durability and how authentic the final product looks; issues I have previously explored (Wilson *et al.* 2018). A more practical concern is how museums incorporate such technologies into their current procedures. Most polymers used in 3D printing, particularly resins, can be fragile, becoming more brittle with age; they are therefore unlikely to survive repeated daily handling for long. This also ignores more mundane issues like theft, vandalism, or just a visitor roughly handling a printed model. While much better than the original being lost, the resulting costs could be problematic. Furthermore, how effective such prints are at providing meaningful engagement is yet unclear. Few research papers explore the ins-and-outs of BPS engagement with 3D-printed replicas, and whether such prints provide positive learning experiences for BPS users remains to be explored.

While the prognosis for using 3D-printed replicas in the exhibition gallery is still uncertain, there is certainly potential in giving those living with sight loss access to museum spaces beyond the limited opportunities already provided.

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Mystery Fossil 31

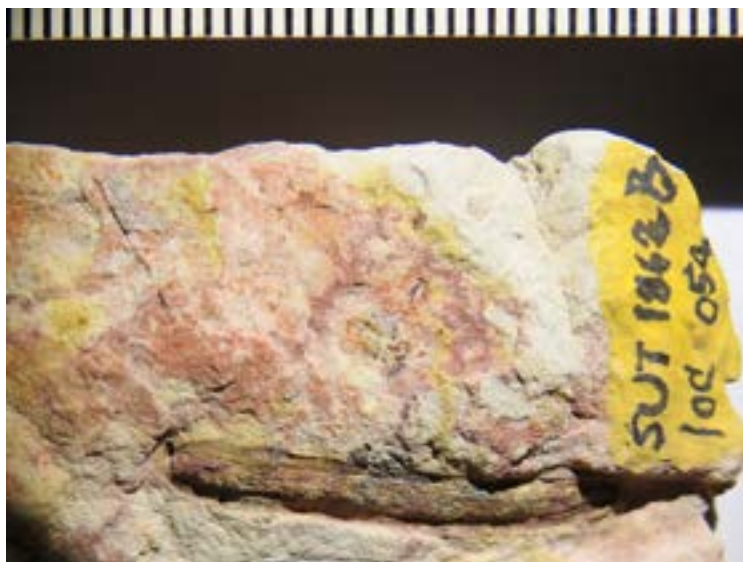
Fossil imprints from Thailand

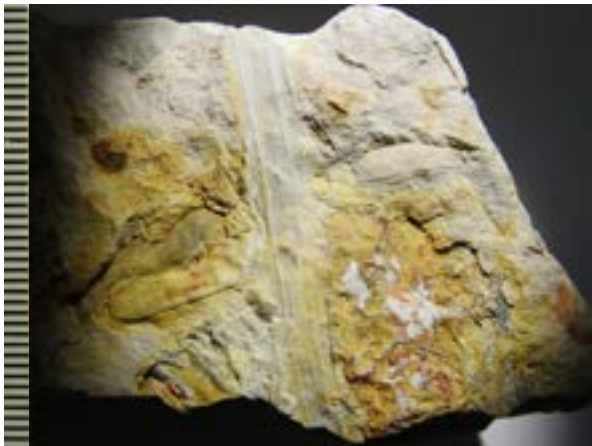
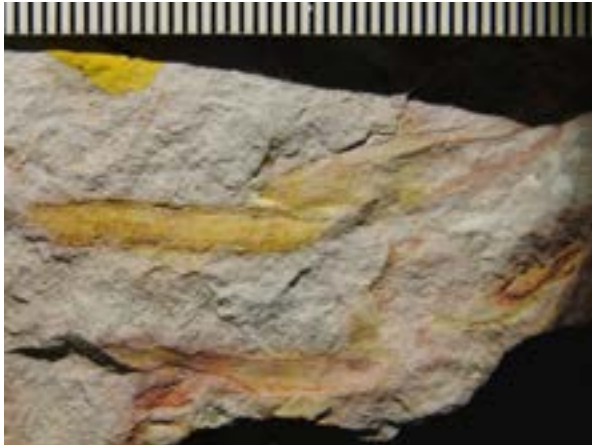
These Mystery Fossils have been submitted by Paul J. Grote of Nakhon Ratchasima Rajabhat University in Thailand. The fossils are imprints in fine sandstone from the Lam Thap Formation, thought to be Early Cretaceous in age, of Krabi, Southern Thailand. The florule consists of plant imprints, including *Zamites*, *Ptilophyllum*, *Podozamites*, *Nageiopsis?* and *Cupressinocladus*.

The specimens appear to have an outer layer surrounding an inner layer. The outer layer appears to have longitudinal ridges or grooves. Could they be seeds? They seem to be too thick to be leaves.

If you have any ideas, please contact Paul via e-mail at <pauljosephgrote@yahoo.com> or the Newsletter Editor at <newsletter@palass.org>.

All photos are by Paul J. Grote and ruler lines are in millimetres.







>>**Future** Meetings of Other Bodies



XXII EJIP (Encuentro de Jóvenes Investigadores en Paleontología)
Igea, Spain and online 1 – 5 April 2024

Early-career researchers are invited to join this next edition of the EJIP (meeting of young researchers in palaeontology) in Spain. This meeting has traditionally been held in various locations on the Iberian Peninsula; last year it was held in Lourinhã, Portugal but now it returns to Spain, to Igea in La Rioja. Igea is known for its valuable palaeontological heritage, which includes outstanding dinosaur track sites, considered among the best in Europe. In addition, the Centro de Interpretación Paleontológico de La Rioja, the main venue of the meeting, houses some of the most important fossils from the region such as Mesozoic reptiles, remains of fish and many other organisms from the past. Talks may be delivered in English, Spanish or Portuguese, but slides must be in English; posters can be presented in English or Spanish. Online participants will be able to follow the presentations electronically via broadcast using the Discord platform and virtual presentations are welcomed. A special volume of the *Spanish Journal of Palaeontology* is planned for after the meeting.

See the circulars online at: <<https://xxiiejip2024.com/>>.



XV International Palynological Congress and XI International Organization of Palaeobotany Congress (XV IPC-XI IOP)
Prague, Czech Republic 25 – 31 May 2024

This congress celebrating 200 years of modern palaeobotany, originally scheduled for September 2020, was postponed until May 2021; however, due to the ongoing pandemic the organizers made the decision to move the event to 2024. This date has also been chosen to reflect the decisions of the parent organizations (IFPS and IOP), and the fact that the online European Palaeobotany and Palynology Conference in Stockholm took place in 2022. These conferences are held biannually and usually alternate between European and world events. More information is available via the website; abstract submission and early bird registration have now ended but registration is still open and on-site registration will be available.

Meeting website: <<https://www.prague2020.cz/>>.



3rd World Biodiversity Forum special session: Insights from the past for a better future
Davos Congress Centre, Switzerland 16 – 21 June 2024

More than 60 thematic sessions will bring together international researchers, practitioners and policy makers of a variety of disciplines. During this edition of the forum there will be a special



session on palaeontology: BEF_1.5 'Insights from the past for a better future'. Species are going extinct at an accelerated rate and despite some success stories, current conservation efforts have not been sufficient to halt extinctions, with more species threatened every year. However, these extinctions do not occur randomly in the tree of life, with some species being more vulnerable than others. What determines this extinction selectivity can provide key clues to target conservation actions. Given that 99 % of species that have ever lived are already extinct, the fossil record can offer unique insights to better understand extinction mechanisms. This session focuses on the use of the fossil record to better understand extinction mechanisms and its potential applicability to inform conservation today. Abstract submission and early bird registration have now ended but registration is still open and on-site registration will be available.

Meeting website: <<https://worldbiodiversityforum2024.org/>>.



Symposium on Toarcian Palaeobiology

Bath Royal Literary & Scientific Institute, UK 17 – 20 June 2024

The Symposium on Toarcian Palaeobiology is an opportunity to platform the diversity of global Toarcian palaeontological research by spotlighting under-represented fields such as the marine benthos, the terrestrial realm and the ecological impacts of the Toarcian Oceanic Anoxic Event, alongside popular fields including ammonites and marine reptiles, as well as the curation and preparation of Toarcian material. The event will consist of two days of single-session talks and posters, with a lunchtime workshop on the second day, and a full day-long workshop on the final day offering the opportunity to explore the Charles Moore collection of specimens from Strawberry Bank. The deadline for abstract submission and registration for presenters is **17th May 2024**.

For more information see:

<<https://www.geocurator.org/events/168-symposium-on-toarcian-palaeobiology>>.



12th North American Paleontological Convention (NAPC)

University of Michigan, USA 17 – 21 June 2024

The 12th NAPC will bring together professionals, graduate and undergraduate students, amateur palaeontologists and interested members of the public from all over the world. The meeting covers all branches of palaeontology, including vertebrate, invertebrate, palaeobotany, micropalaeontology, palaeo-related organic and inorganic geochemistry, palaeoecology, palaeoclimatology and astrobiology. The meeting provides a forum for exchanging research findings, defining future directions and fostering relaxed interactions in the palaeontological community at large. A wide variety of symposia and topical sessions are planned, along with associated workshops and other forums, varied field-trips, and technical workshops. Abstract submission and early bird registration have now ended but registration is still open until early/mid-April.

Meeting website: <<https://sites.lsa.umich.edu/napc2024/>>.

**The Systematics Association International Biennial Conference**

University of Reading, UK 19 – 21 June 2024

The Systematics Biennial Conference represents a coming together of minds and ideas from all across the world of systematics. The conference will be a chance to network with researchers in all career stages in a friendly environment over three full days of systematics and taxonomy in an easily accessible venue at the University of Reading. The organizers have planned plenary lectures, symposia, posters, workshops and networking/social activities. Planned symposia include: Tree of Life; State and theory of New Taxonomy; New gatekeepers of taxonomy: acceleration of taxonomy and influence of Big Data and Artificial Intelligence; and Biodiversity and Economics. There will be a dedicated session for final year PhD students and postdocs as well as student bursaries and a prize for the best PhD student presentation. Early bird registration and abstract submission close on **31st March 2024**.

See more information on the website: <<https://systass.org/events/biennial/>>.

**9th International Brachiopod Congress/Congr s International sur les Brachiopodes (IBC/CIB)**

Niagara Falls Convention Centre, Canada 24 – 27 June 2024

The 9th IBC/CIB invites contributions covering all aspects of Cambrian to modern brachiopods. Topics may include everything from systematics to taphonomy, evolution, biostratigraphy, (palaeo) ecology, (palaeo)biogeography, biomineralization to biogeochemistry, and all types of events from radiations to mass extinctions. The last scientific session of the congress will be dedicated to early-career researchers and scientists. Pre- and post-conference field-trips are planned to Anticosti Island, Quebec and San Juan Island, Washington State, respectively. The congress gala dinner will take place at a leading Niagara Falls restaurant. Early bird registration is available until 29th March and abstract submission is open until 30th April.

Congress website: <<http://paleopolis.rediris.es/BrachNet/ANNONCES/BC/index.html>>.

**56th Annual Meeting AASP – The Palynological Society**

University of Montpellier, France 24 – 28 June 2024

This meeting will be held in Montpellier, in the Mediterranean region of France, over three-days and will cover all aspects of palynology. Pre- and post-meeting field-trips will be available to the Rhone Delta, Camargue and Graissessac, Lac du Salagou and Mour ze, respectively, as well as an icebreaker social event, an early-career researcher event and a conference dinner. The three-day programme will include a wide range of general technical sessions, with abstracts welcomed on any aspects of palynology, covering deep time to present. The programme will feature five focus sessions in addition to a general session: Dedicated session focusing on dinoflagellate cyst research; From palynological data to climate reconstructions and model simulations; Human–environmental



interactions and vegetation change; Vegetation dynamics beyond the Quaternary as a source of information about mountain uplift, sea-level fluctuations, and plate tectonics; A Herb Sullivan-dedicated session: The top 20 palynomorphs for stratigraphy or environmental reconstruction; and General palynology and new frontiers in palynology. The abstract submission deadline is **31st March 2024** and early bird registration ends on **1st May 2024**.

The meeting website is:

<<https://palynology.org/56th-annual-meeting-aasp-the-palynological-society/>>.



10th SECAD meeting (Secondary adaptation of tetrapods to life in water)

Liège, Belgium 25 – 28 June 2024

The aim of this meeting is to help build a vibrant, innovative and progressive SECAD community with a strong spirit of collegiality and with no taxonomic or temporal barriers. The meeting will span four days with talks and posters on the first two days, followed by one day of networking and workshops, then a further day of talks and posters. Dr Anthony Herrel (Muséum national d'histoire naturelle, Paris) will give a transversal plenary talk focusing on the functional morphology of extant vertebrates. Three workshops are planned on: 3D digitization and morphometrics; Dissection of marine mammals and terrestrial relatives; and Designing outreach activities. A museum visit is also planned. The meeting will be hybrid and will offer real-time streaming of presentations (with each presenter's consent). The meeting will be as affordable and inclusive as possible, and instead of a conference dinner the organizers are arranging an event with food trucks featuring local specialities. Although abstract submission has now closed, registration is open from **15th April** until **15th June 2024**.

The second circular is available online: <<https://t.co/RtSa7sqpGG>>.



Turtle Evolution Symposium (TES 2024)

Fribourg, Switzerland 26 – 29 June 2024

The goal of the Turtle Evolution Symposium is to present, promote, communicate and discuss the latest advances and original results on the evolutionary history of turtles, from their origin and early evolution until the present. This is an international meeting that brings together turtle researchers and students from around the world working on specific topics such as anatomy, evolution, nomenclature, taxonomy, phylogenetic relationships, the fossil record of extinct turtles, conservation and more. The symposium will feature a one-day field-trip to the Jura Mountains led by Jérémy Anquetin, and keynotes will be given by Juliana Sterli, Adán Pérez García and Tyler Lyson. Contact Serjoscha Evers at the University of Fribourg for more information.

First circular is available here: <shorturl.at/uALT8>.

**Ecological uniformitarianism – help or hindrance to palaeoecology, palaeoclimatology and conservation biology?**

Virtual (hosted by the Palaeontological Association) 2 – 3 July 2024

Following the success of a pump-priming event in 2022 (<<https://youtu.be/kYEP1-aF4sQ>>), this online meeting will reunite a diverse community of Earth and life scientists to discuss the stability of ecological niches. Earth scientists have long taken the (pseudo)-uniformitarian view that niches are stable and hence that the environments of fossil organisms can be interpreted from the ecology of modern counterparts. Niche change is, however, demonstrated by many invasive species. Whether niches are stable or labile has major implications not only for interpreting past environments but also for predicting future communities in the face of ongoing climate and other environmental change. There will be invited lectures from a set of prestigious speakers, plus contributed papers. Online publication of the proceedings is planned under one of the Association's titles.

Registration is open online at the meeting website: <<https://www.palass.org/meetings-events/ecological-uniformitarianism>>.

See page 31 for further information.

**13th International Symposium on Fossil Algae**

Le Castella, Italy 2 – 6 September 2024

The 13th International Symposium on Fossil algae of the IFAA (International Fossil Algae Association) will be held in Le Castella (Calabria, southern Italy). The scientific topics will cover any aspects of calcareous algae and microbialites, including evolution, present-day and past biogeography, stratigraphic significance, palaeoecology and sedimentogenic roles. Because of the central role of calcareous algae in the global carbon budget, contributions concerning the identification and delimitation of marine habitats dominated by calcareous algae across latitudinal gradients and in different (palaeo)environmental settings are especially welcome. The Symposium is organized by the University of Milano-Bicocca, Department of Earth and Environmental Sciences, in collaboration with the Crotona Province, managing the Marine Protected Area of “Capo Rizzuto”, the Museum Pélagos, and the Aragonese Fortress of Le Castella, where all scientific sessions will be held. Le Castella is located on the Ionian coast, within reach not only of Pleistocene marine terraces, but also of the Vrica GSSP for the Calabrian stage, which are the destinations of our post-symposium field-trip. More information will be available in the coming months.

**The 175th anniversary of the Maastrichtian Stage – a celebratory conference**

Maastricht, the Netherlands 8 – 11 September 2024

In the summer of 1849, Professor André Hubert Dumont of Liège, Belgium first used the phrase ‘système maestrichtien’, while doing geological mapping in the Belgium/Netherlands border area near Maastricht. In the three decades that followed, a wealth of stratigraphical and palaeontological data were published. In fact, the same may be said about recent progress in these fields. New information on the type Maastrichtian, including a chemostratigraphical analysis,



clearly shows that interest in this latest Cretaceous time slice is still very much alive and kicking. Therefore, this celebratory conference has been organized, commemorating the 175th anniversary of the stage, for participants to discuss recent progress and outline future research in an informal setting. A special issue of the periodical *Netherlands Journal of Geosciences*, covering various aspects of the Maastrichtian, will be produced. Two days of oral and poster presentations, an icebreaker party and dinner, plus a full day of fieldwork at two localities in the area are scheduled. Final registration and abstract deadline is **1st April 2024**.

For more information see: <<https://www.nhmmaastricht.nl/maastrichtian-anniversary/>>.



7th Triennial Mosasaur Meeting – a global perspective on Mesozoic marine amniotes

Maastricht, the Netherlands 12 – 15 September 2024

Early in May 2004, some 25 scholars of mosasaurid reptiles assembled for the first edition of what was then referred to as the ‘Mosasaur Meeting’ at the Natural History Museum of Maastricht. An aptly chosen venue – after all, the first fossils of ‘Meuse lizards’ were unearthed there in the latter half of the eighteenth century. The 2004 meeting was the first in a series of triennial workshops, in Europe and North America, for which it was later decided to include also talks on non-mosasaurid marine amniotes of Mesozoic age. The last meeting prior to the pandemic took place in Drumheller, Canada in May 2019, and although not conforming to the three-year turnaround schedule, the next meeting in September 2024 is a special one in that it coincides with the 175th anniversary of the Maastrichtian Stage. During the 7th Triennial Mosasaur Meeting, all aspects of taxonomy, systematics, phylogeny, palaeobiology and palaeobiogeography of mosasaurs (and other Mesozoic marine amniotes) will be considered. Two full days of oral and poster presentations, an icebreaker reception and conference dinner, plus a full day of fieldwork at two localities in the Maastricht area are scheduled. Final registration and abstract deadline is **6th May 2024**.

For information see the website: <<https://www.nhmmaastricht.nl/mosasaur-meeting/>>.



10th European Malacological Congress (Euromal2024)

Cultural Conference Centre of Heraklion, Greece 15 – 20 September 2024

Euromal is the most important meeting for the European malacological community, taking place once every three years. The motto of the 10th Euromal is “The slow side of life on a rapidly changing planet”. The aim of the conference, among other things, is to highlight the importance of molluscs in our efforts to understand and address anthropogenic impacts on the environment. Therefore, at Euromal 2024 all aspects of research concerning diversity, function, ecology, evolution, behaviour, utility and conservation of extant and fossil molluscs are welcomed. The meeting will continue the successful tradition of the past Euromal congresses, and everyone with an interest in molluscs is welcome to join the Congress in Heraklion and to present and discuss their work. The deadline for early bird registration and abstract submission is **30th April 2024**.

See the website for further information: <<https://www.euromal2024.gr>>.

**Joint Meeting of the Polish Paleobiologists and the 95th annual meeting of the Paläontologische Gesellschaft (PalGes)**

Warsaw, Poland 16 – 21 September 2024

This joint meeting will be held in Warsaw, the capital, and the largest city, of Poland. The University of Warsaw will organize the meeting with assistance from co-organizers the Paläontologische Gesellschaft, the Institute of Paleobiology at the Polish Academy of Sciences (IP PAS), the Palaeontological Section of the Polish Geological Society (PS-PGS), and the Polish Geological Institute – National Research Institute (PGI-NRI). The main theme of the conference is ‘More than extinct species: the importance of fossils for ecology, evolution, and conservation across borders?’, which will emphasise the interdisciplinary direction that palaeobiological sciences are currently taking, and the key role of information from the geological past in addressing a variety of issues including ecology, evolution and biodiversity protection that concern us today. The official language of the meeting is English; however, associated outreach events are planned in German, English and Polish. Online registration opens on **1st May 2024**.

Meeting website: <<https://www.palaeontologische-gesellschaft.de/tagungen/jahrestagung/>>.

**7th International Palaeontological Congress (IPC7)**

Cape Town, South Africa 30 November – 3 December 2026

The 7th International Palaeontological Congress will be held in South Africa in 2026, the second time that this meeting will be held in the global South and the first time in Africa. The meeting will be held during the height of the very pleasant summer season at the Cape Town International Convention Centre (CTICC), which has the capacity to host hundreds of delegates, both in large rooms and smaller breakaway rooms. The CTICC is situated close to the vibrant heart of Cape Town’s city centre and a short walk to the Victoria and Alfred Waterfront which hosts numerous restaurants and hotels to suit all pockets. The fossil heritage of South Africa is renowned globally for its importance in understanding the history of life on Earth and extends from the very beginnings of life to the world-famous hominin relatives that have been recovered there. Submissions for symposia topics will soon be invited, and the organizers expect to offer a wide range of symposia, as well as space for general talks. A series of field-trips will give delegates a feel for the rich fossiliferous rocks in South Africa that span significant periods of time. Furthermore, delegates attending IPC7 will have the opportunity to visit some of the most important museum collections of South Africa, including the Albany Museum featured on page 43. Sign up via the “Contact Us” form on the Congress website to receive circulars as they become available.

Congress website: <<https://ipc7.site/>>.

Please help us to help you! Add your own meeting using the link on the Association’s web page:

<<https://www.palass.org/meetingsevents/future-meetings/add-future-meeting>>.



Meeting REPORTS



Fossils, phylogenies, genomes, embryos and the evolution of the deuterostomes
Natural History Museum, London, UK 12 May 2022

The meeting “Fossils, phylogenies, genomes, embryos and the evolution of the deuterostomes” held at the Natural History Museum, London served as a poignant tribute to R.P.S ‘Dick’ Jefferies, whose career there spanned several fields (and decades), leaving what will no doubt be an enduring legacy. The diverse range of topics discussed at the meeting provided an insight into the influence Jefferies had across a breadth of disciplines in palaeontology. [Editor’s note: for more on the life and work of Dick Jefferies see his obituary in *Palaeontology Newsletter* **105**, p.86–88.] The meeting was supported by The Company of Biologists and the Palaeontological Association (grant number PA-GA202102) and organized by Max Telford, Jeff Thompson, Tim Ewin, Paul Barrett, Greg Edgecombe and Tim Littlewood.

The meeting consisted of four sessions with 14 invited speakers. The opening talk was given by **Imran Rahman**. He highlighted some of Jefferies’ ground-breaking work using tomographic techniques and how Jefferies was instrumental in integrating these techniques into palaeontology. Following a short break, session two included topics such as the reliability of the fossil record and the ancestry of the vertebrates. **Paschalia Kapli** gave a fascinating talk exploring “Are deuterostomes monophyletic?”, showing that based on molecular studies the support for deuterostomes as a monophyletic group is equivocal and barely higher than for paraphyletic alternatives. At the next break the organizers provided snacks and refreshments, offering a good opportunity to talk with the other delegates and, having started my PhD in 2020, it gave me my first opportunity to attend an in-person meeting and network. The organizers did a great job of making the event feel safe and welcoming and it was great to finally meet other palaeontologists!



Bertrand Lefebvre about to give his talk on the enigmatic Ordovician fossil Anatifopsis. Dick Jefferies is second from right on the slide. Image by Max Telford.



Back in the lecture hall, session three was then under way. Talks discussing the evolution of the echinoderm body plan were the focus here, using different approaches and describing how all types of data can help to inform our understanding. Separate talks looked at distinct data types including molecular data, morphological data and genomic data! The final session was brought to a close by **Bertrand Lefebvre** whose talk focused on the enigmatic Ordovician fossil *Anatifopsis*. Following the meeting there was a drinks reception in the Darwin Centre, where **Richard Fortey** gave a few final words reflecting on some of Jefferies' work. From his early contributions to his lasting influence on current research, this meeting provided a fitting manner in which to celebrate and reflect on the life and work of Dick Jefferies.

Laura Mulvey

Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany



1st International Symposium on Palaeo-bioinspiration (PALBINS)

Muséum national d'Histoire naturelle, Paris, France 13 – 15 September 2023

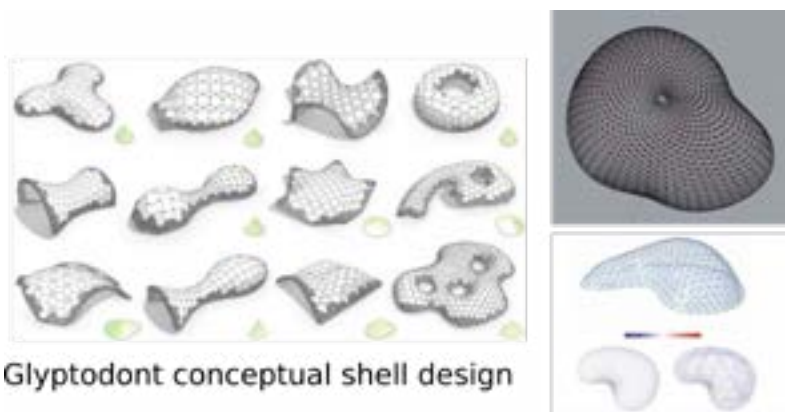
The inaugural International Symposium on Palaeo-bioinspiration (PALBINS) took place in the spectacular settings of the Grande Galerie de l'Évolution and the Institut de Paléontologie Humaine at the Muséum national d'Histoire naturelle (MNHN) in Paris. The meeting was three years in the making and was organized by Annabelle Aish and team, with an emphasis on interdisciplinarity to initialize new networks, approaches, and to promote the concept of palaeo-bioinspiration. Whereas many people are familiar with the idea of bioinspiration – taking ideas from observations of natural systems and converting them into tangible solutions – applying the concept to palaeontology requires well-defined reference points. Besides showcasing many examples of palaeo-bioinspiration, much of the discussion that took place during the symposium centred around the scope of palaeo-bioinspiration combined with a look into the future for this emerging discipline.

Being hosted by the MNHN, the first presentation of the symposium, given by **Michelle Price** (Consortium of European Taxonomic Facilities, Brussels), aptly emphasized the strong link between taxonomic collections in museums and their potential to launch and support innovation. Palaeo-bioinspiration looks to utilize this 'library' of biological diversity for innovation, given that extant life may only account for around 0.01 % of life that has ever existed. **Guillaume Lecointre** (MNHN, Paris) presented a call to arms for semantic discipline in palaeontology to help improve its credibility, particularly with regards to working with neontologists but also when communicating with the public. The key principles of palaeo-bioinspiration were also illustrated by **Thomas Speck** (University of Freiburg), who presented successful examples of palaeo-bioinspiration from his work with plants, both living and fossil, that had made it to the stage of engineering prototypes and beyond. His work was key as a proof of concept for palaeo-bioinspiration as a discipline. **Dino Frey** presented a joint paper with **Mathias Gutmann** (both Karlsruhe Institute of Technology). Focusing on the logics of comparison, they subsequently argued against the concept of optimized function in organisms, noting that each function operates just well enough for survival and any more would be a waste of energy and resources. This is an often-misunderstood concept when considering how (extinct) organisms interact with their environment, as a quick search of palaeontological literature will testify. Together, these four talks formed both a theoretical and practical blueprint on which to base palaeo-bioinspiration, setting the scene for the rest of the symposium.



The remaining afternoon was dedicated to an open discussion on the principles of palaeo-bioinspiration. One of the challenges discussed was using a common language between different disciplines. For instance, 'function' means something very different to engineers (*e.g.* a mathematical function) and biologists/palaeontologists (how an organism does something). The discussion also drew attention to the different motivations of industry and academia, which is often regarded as under pressure to produce ideas and provide intellectual impact, while engineers and industry are obliged to solve specific problems in a short timeframe to minimize costs and maintain productivity.

The second day of PALBINS comprised technical talks from researchers providing examples of palaeo-bioinspiration from across the fossil record. Set in the magnificently sculptured building of the Institut de Paléontologie Humaine, the presentations covered three main themes: construction and protection; hydrodynamics and aeromechanics; and sensing and thermodynamics. The talks included mechanical analyses of glyptodon armour and resultant inspiration for architects, resistance of rhinoceros limb bones to compression, and the convergent evolution in enameloid and enamel-like tissues between chondrichthyans and actinopterygians (showing that the cutting edges of chondrichthyan teeth have a pattern also employed by blacksmiths in the production of laminated steel knives!).



Glyptodont conceptual shell design

Conceptual structure designs based on glyptodont shells. Image courtesy of Valentina Pericone and Natasha Heil.

Various groups of delegates budded off to talk palaeo-bioinspiration over lunch in the excellent restaurants in the area around the MNHN prior to the second theme of the day – hydrodynamics and aerodynamics. The afternoon included talks on how the hydrodynamics of jawless fish may have provided lift just as a delta-wing aeroplane does; an engineer's approach to measuring drag coefficients of 3D-printed ammonite shells; how the aerodynamic properties of pterosaurs are similar to the Gruman X-29 'X-plane'; and the role of insects in palaeo-bioinspiration (*e.g.* the extinct giant pond skater could provide inspiration for a complex oar system). The final two presentations concerned sensing and thermodynamics, including how lateral lines in fossil fish function (operating in a way seen in radar and sonar systems) and how the vascularization of skin in ornamented dermal scutes has thermoregulatory properties (which could inspire artificial smart heat exchange devices).



With the talks completed, the remaining session was dedicated to an open discussion on applications of palaeo-bioinspiration, chaired by **Alexandra Houssaye**. With several representatives from industry present at PALBINS, as well as researchers who have successfully seen their work integrated into industrial projects, the following points were recommended:

- Think about what an industry partner may want in terms of functionality, not what they say they need in terms of product/process.
- Keep language simple – we have our own scientific ‘dialects’ that could be incomprehensible to industrial partners.
- Have a clear process and method in place that can be described and explained comprehensively to potential partners. Specifically, this means being able to ascertain what is needed, what will be done, how a prototype would be created and how a process is sustainable. It was pointed out that palaeobiologists do not invent or innovate. Instead, they make discoveries, and these do not have any intellectual property rights from an industry perspective.



PALBINS delegates on the steps of the Grand Galerie de l'Evolution, Muséum national d'Histoire naturelle, Paris. Photo courtesy of Tom Challands.

One of the main aims of PALBINS was to establish the scope of palaeo-bioinspiration as a new process entwined with palaeobiology, as well as its challenges and future directions, and this was addressed on the final day in a session chaired by **Chris Broeckhoven**. Many of the challenges concerned reciprocal understanding and appreciating the needs of researchers from different disciplines, *e.g.* should palaeontologists read more engineering literature and *vice versa*? The attitudes towards palaeo-bioinspiration among palaeontologists was also cited as a potential challenge. There was a concern that some colleagues may consider a collaboration with industry on innovative products or processes not as academically ‘respectable’ as fundamental research. The application of reverse biomimetics, where palaeontologists learn more about their (palaeo-) biological models through engagement with engineers, is seen as a powerful incentive for collaboration, however. In terms of future directions, participants discussed how new tools and



technical platforms were rapidly increasing palaeontological knowledge, and therefore facilitating its potential transposition to technology in novel ways. Finally, in order for palaeo-bioinspiration to reach its potential, it will be crucial to raise awareness of the approach amongst palaeontologists and understand their interests in and expectations of the field.

A tour of the MNHN was a fitting way to end the Symposium, with a guided visit to the ‘Galerie de Paléontologie et d’Anatomie comparée’. As a new community, those working in palaeo-bioinspiration are relatively few, but PALBINS was able to demonstrate an enthusiasm and motivation for utilizing the fossil record and fossil collections in a new and innovative way. Moving forward, bioinspiration is to be integrated in CETAF’s five-year strategy and in 2025 the second PALBINS conference will be held in Edinburgh, UK. Watch this space for further information.

Tom Challands

University of Edinburgh, UK

[Editor’s note: this is an excerpt from a longer, more detailed report which is available to read on the Association’s website.]



Eighth International Meeting on the Valorization and Preservation of Paleontological heritage (RIV3P8)

Chouaïb Doukkali University, El Jadida, Morocco 23 – 25 November 2023

The eighth International Meeting on the Valorization and Preservation of Paleontological Heritage (RIV3P8) was organized by the Laboratory of Geosciences and Environmental Techniques at Chouaïb Doukkali University (UCD; El Jadida) in collaboration with the National Institute of Archeology and Heritage (INSAP, Rabat) and was held in the Faculty of Sciences. The opening ceremony was chaired by the Vice-President of the University, the Dean of the Faculty of Sciences and the coordinator of the Meeting, in the presence of a large audience. The RIV3P8 benefited from financial and/or logistical support from the UCD, the INSAP, the National Center for Scientific and Technical Research, the Hassan II Academy of Sciences and Techniques, the French Embassy, the Palaeontological Association (grant number PA-GA202302), the Paleontological Society, the Higher School of Technology of Sidi Bennour, the MAMDA-MCMA Group (GASUP) and the Cherifian office for Phosphates Group (OCP).



The opening ceremony of RIV3P8. Photo by Rahni El Mostafa.



The members of the organizing committee, including PhD students, were highly motivated and committed. They performed their allotted tasks very well resulting in a very successful meeting. Prof. **Abdelmajid Noubhani**, as coordinator of the meeting, worked on this project since 2020; the meeting was postponed during the COVID-19 pandemic. The computer processing work of Prof. **Abdelaziz El Arabi** in the design and creation of the web page and the editing of the programme should be highlighted. He, along with other members of the organizing committee, namely professors Fatna Zaakour, Hind El Hachimi, Mariame Kholaiq, Abdellatif Jouhari, Abdelkadir Toufiq, Abdelmejid Rahimi and Aouchouaib Belahmira, spared no effort to make this international event such a success. Our sincere thanks go to all individuals and institutions who helped, directly or indirectly, with the organization of the RIV3P8 and its success.

Meeting programme

More than two hundred authors and coauthors took part in the meeting, including participants from eleven countries: Cameroon, France, Libya, Madagascar, Morocco, Russia, Senegal, Tanzania, the UK and, for the first time in the history of the meeting, Asia and South America were represented, respectively, by delegates from Pakistan and Peru. The meeting centred around three main themes: research in geology and palaeontology (fossil sites and collections); research in archaeology and prehistory (archaeological sites and collections); and protection, valorization and management of geoheritage from the perspective of sustainable development and empowering the economy of local communities (projects to create reserves, geoparks and museums) and, also, legislation associated with this theme. The plenary talks were given on these themes by Prof. **Abderrazzak El Albani** (University of Poitiers, France), Prof. **Abdelouahed Ben-Ncer** (INSAP, Morocco) and Prof. **Jean-Noël Martinez** (National University of Piura, Peru). The oral presentations and poster sessions took place in nine sessions over two days, with rich debate following each presentation.

At a round table held at the end of the second day it was announced that the next meeting will be hosted by the Higher School of Education and Training in Berrechid (ESEFB), Morocco, in 2025. Changing the name of the meeting to a colloquium, thus taking into account the broadening of the work of the meeting by the integration of disciplines other than paleontology, was discussed with the final name change to be decided. A further discussion was held following the recommendations of Prof. **Aâtika Eddif**, from the Regional Center for Education and Training Professions (CRMEF; Fez-Meknes, Morocco) regarding school curriculum development. The absence in secondary school textbooks of the mention of the geological richness of Morocco was underlined. She cited the notable example of the absence from textbooks of Moroccan volcanism, particularly that of the Middle Atlas chain. She highlighted the importance of updating the content of these textbooks by integrating advances made by university researchers in geology and CRMEF research in didactics alongside organizing field-trips for secondary school students.

Unfortunately there was no further time to discuss issues around teaching palaeontology. Indeed, this fundamental and multidisciplinary discipline, located at the interface of Earth and life sciences, risks disappearing from Moroccan universities like the disappeared living beings that are the subject of its investigations. Palaeontology has been neglected and has not had the place it deserves during successive educational reforms following the introduction of the LMD system (licence, master and doctorate) in Morocco. The next round of reforms of the supervisory ministry should put an end



to the broken 'natural' link between geology and biology, while the country needs to train young researchers in palaeontology (see the online petition 'Against the suppression of palaeontology from the Moroccan university curriculum', at <http://www.avaaz.org/ar/petition/nTlb_wzr_ltlm_lly_w_lbHth_lImy_w_tkwyn_lTr_brd_ltr_lmd_lm_lmtHjrt_lBlywntlwjy_wnqdh_mn_lnqrD_mn_1/edit/>). Letters relating to these recommendations will be prepared and sent to the relevant ministries, in particular those of education, higher education, culture, energy transition and sustainable development, tourism, crafts and the social and solidarity economy and the interior ministry.

The final day of the meeting was devoted to an excursion to the archaeological site of Jbel Irhoud and around thirty participants attended. Prof. **Abdelouahed Ben-Ncer** gave a history of the discoveries of human fossils at the site that began in the 1960s. He then presented results from the collaborative research programme between INSAP and the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. These results stood out, above all, for obtaining revolutionary dating, placing the Jbel Irhoud man as one of the oldest representatives of *Homo sapiens* (300,000 years). Following the publication of these results in 2017, and on royal instructions, the construction of an interpretation centre and premises intended for archaeological research and excavations have been under way. Supported by the Department of Culture, the centre is part of an integrated project, along with the development of the roads leading to the site, to promote the heritage of Tlet Irhoud commune and its hinterland, including the site of Jbel Irhoud. The same day, the participants paid a visit to the Youssoufia mining center of the OCP Group. **Youssef Daafi** (manager of the Ganntour mining sites), led a presentation focused on the importance of phosphorus to the country's economy, the types of phosphate deposits around the world, and a history of the exploration and exploitation of phosphate deposits in Morocco. He emphasized the OCP strategy in terms of preserving the rich fossil heritage of the Moroccan phosphate series from the perspective of sustainable development. The visit to the Mzinda mining site allowed participants to appreciate the lithology of the different Maastrichtian and Danian layers of the phosphate series.

Overall it was a very successful meeting, and we look forward to seeing you in 2025!

Amal Zouicha, Sara Akboub and Saber Salmi

Chouaib Doukkali University, Morocco



A group photograph of participants of RIV3P8. Photo by Rahni El Mostafa.



— OBITUARIES —

(Christopher) Barry Cox **1931 – 2023**

Professor Barry Cox was educated at St Paul's School and Balliol College Oxford. At Oxford he was fortunate to be taught by such eminences as E. B. 'Henry' Ford, Charles Elton, Niko Tinbergen and Sir Alister Hardy. His tutor (Harold Pusey) suggested taking a doctorate degree with Rex Parrington in Cambridge. This he duly did and started working on some Permian dicynodonts, which Parrington had collected on a solo expedition to southern Africa during the 1930s. At this time (the early 1950s) a new preparatory technique for fossil specimens had been developed at the Natural History Museum, London; this involved using dilute acetic or formic acids to dissolve the matrix enclosing fossil bones. Barry spent time learning this technique in London and then applied it to Parrington's fossils in Cambridge. The technique worked extremely well and he was able to extract beautiful skulls and skeletons of these animals that he could describe in considerable detail. He published this work quickly and



2003 birthday photo © Tim Cox.

on its strength was appointed to a lectureship at King's College London (KCL), where he remained for his entire career. He was awarded a Harkness Fund Fellowship and spent 1959–60 at Harvard University (at the MCZ – Museum of Comparative Zoology), and was (again) fortunate to be able to work with: George Gaylord Simpson and Alfred Sherwood Romer. 'Al' Romer offered him dicynodont material from Brazil and Argentina, which fuelled Barry's research output. The Harkness Fund encouraged travel within the USA, and he visited places and academic institutions from the east to west coasts, finally spending time at the University of California, Berkeley.

After his return to KCL, 1963 saw Barry involved in raising funds and sponsors in support of an expedition to search for fossils in southern Africa (primarily Zambia and Zimbabwe). This trip was very much a case of 'following in the footsteps' of Parrington and his epic 1933 expedition, it also featured several of Parrington's former students (Barry Cox, Alan Charig, Alfred Crompton and Arthur Cruickshank). The expedition was extremely successful, yielding a considerable quantity of new fossil material that enhanced the research programmes of Barry, Arthur and (Alfred Walter) "Fuzz" Crompton. Almost a decade later Barry organized and raised funds for another expedition, this time to Brazil; and finally, in 1978, he generated all the funds for an expedition to Queensland, Australia that re-united Barry with two of his old southern African muckers: Alan Charig and John Attridge (Birkbeck College).



Barry on the 1963 southern African expedition. Photo ©Steve Tolan.

As one of Barry's two doctorate students (I was with him in the mid 1970s, Peter Galton in the mid 1960s) I found him blessed with unquenchable enthusiasm, even though I was studying animals far removed from his beloved dicynodonts. He had a metaphorical 'bounce' and a 'can-do' attitude that helped me through those seemingly desperate times when research just does not seem to be going anywhere. He was also at this time (mid 1970s) acting as a 'special science correspondent' for *Nature*, a regular contributor to *Science Now* on BBC radio, and an editor of the journal *Palaeontology*; these constant time-pressured preoccupations with communication, word-smithing and ideas were of great value when I started writing up my thesis because these skills enabled him to edit and return my chapters in remarkably short order.

The Department of Zoology in which Barry worked was (when I was there) a happy and vibrant place, presided over by the splendid 'King of the Thames' Don Arthur. One particular memory: I was demonstrating his vertebrate anatomy and evolution classes and once hired a pantomime cow costume (from a shop on the Strand) and proceeded to 'demonstrate' mammalian characteristics in his lab class, much to the surprise of Barry and his class of, slightly bewildered, undergraduate students. That created an abiding memory: Barry standing there smiling in perplexity and then laughing uproariously – apparently enjoying my daft prank.

Barry became interested in the geographical distribution of animals through time when a model of plate tectonics was finally beginning to be understood in the late 1960s–early 1970s. Several symposia wrestled with the implications of geographical changes brought about by plate tectonics across deep time, and the knock-on effect that this would have on organismal distribution and evolution (palaeobiogeography). Barry and some colleagues (notably Peter Moore and Ian Healey) synthesized these discussions and created a book entitled *Biogeography*, which made a lasting contribution, running through many editions up to the present day.



In the late 1970s Barry became Head of the Department of Zoology at KCL, during the turmoil in the University of London caused by government cutbacks and the enforced reorganization/rationalization of the University. Barry was faced with trying to reconcile the interests of the staff of the biology departments at Queen Elizabeth College and Chelsea College with the equivalents at KCL through a forced amalgamation (requiring the equivalent of the Wisdom of Solomon and the Patience of Job, I suspect); this process was not without some pain, and proved to be particularly stressful for Barry. In 1989 he stood down as HoD (and, as a reward for his efforts, he was given sabbatical leave which was spent at Stanford with his family). Restored (somewhat) he returned and took up the position of Assistant Principal at KCL, an equally daunting challenge. Rather ruefully, he would regard this as a classic example of the Peter Principle: his experience and skillset meant that he was not really equipped for this role and quite soon he stood down and returned briefly to some dicynodont research work before retiring in 1996.

Across his career Barry contributed substantially to our understanding of dicynodont diversity, describing or re-describing: *Kingoria* [= *Dicynodontoides*], *Ischigualastia*, *Zambiasaurus*, *Endothiodon*, *Chanaria* [= *Dinodontosaurus*], *Sangusaurus* and *Rechnisaurus*. Perhaps my favourite of Barry's papers is, however, one he wrote for Parrington's festschrift (published in 1972) on *Kawingasaurus* which he analysed, anatomically and biomechanically, to demonstrate that it was most-likely a mole-like (burrowing) creature.

Sadly, in the year of Barry's retirement Sheila, his wife of 35 years died. Sheila had gamely typed up the *three* volumes (with three carbon-copies – remember those?) of my hand-written PhD thesis on her own typewriter – for this I was, and still am, so grateful. Barry never really forgave me for his having to sack-barrow all the bound copies of my thesis up to Senate House London for its formal submission. Barry subsequently married Marie-Hélène Thompson (a family friend and latterly bridge partner) and resumed a little of his research career in later retirement by working on more dicynodont material and revisiting some of the fossil-bearing sites in southern Africa. He was ably assisted and supported by Steve Tolan (Zambia); this resulted in an article on another of his beloved dicynodonts, and an opportunity to create a new species (*Endothiodon tolandi*) that was published in 2015.

Barry valued his family just as much as he enjoyed his involvement with academia and kept that healthy balance throughout his life. He died peacefully, leaving behind Marie-Hélène and her children, as well as Tim, Sally and Justin from his earlier marriage to Sheila.

David Norman

University of Cambridge, UK



John Eustace Whittaker

1945 – 2023

John Whittaker was a distinguished micropalaeontologist who served his entire career at the Natural History Museum, London. With an understated enthusiasm for all that he tackled he made a major contribution to his science both in service and in published works. A much-valued mentor of students and colleagues alike, he had an endearing, mischievous smile and a charming wit, and was respected by all who knew him. John was a down-to-earth character, one that reflected his background. He grew up in a rural backwater of east Lancashire, the son of a farmer. He acknowledged that, in addition to his Roman Catholic school Marist priests, three “amazing mentors” had a huge influence on his education and career path: Ken James, a charismatic geography and geology teacher at Blackburn Grammar School; Robin Whatley, John’s PhD supervisor at Aberystwyth University; and, in John’s words, the “late, great” Geoff Adams, his senior colleague at the Natural History Museum, London.



Photo courtesy of Christine Whittaker.

Having graduated from Aberystwyth University with a degree in Geography and Geology (1967) John then stayed on to undertake doctoral studies on the ostracod crustaceans of the Fleet lagoon, Dorset (1972). As Peter Sylvester-Bradley, his PhD examiner at Leicester would later remark, it was an outstanding piece of research. To the good fortune of the then British Museum (Natural History), London, John was appointed to its staff in 1971. After 35 years of distinguished service, he retired in 2005 as Head of Micropalaeontology, but continued to work there as an Honorary Scientific Associate and was still publishing scientific papers in 2023. The museum collections and its Heron-Allen Library were a constant source of inspiration to him.

John made a sustained scientific contribution throughout his career. He was a renowned authority on the systematics, ecology and environmental significance of living and fossil ostracods and foraminifera. He authored or co-authored more than 200 papers, monographs and books, such as the lauded *Marine and Brackish water ostracods* in the Linnean Society’s *Synopses of the British Fauna* series, now long out of print but still in demand. There were countless reports on fossil biotas world-wide, for national geological surveys and commercial companies. In the latter part of his career he was at the forefront of demonstrating the utility of microfossils in the palaeoenvironmental analysis of archaeological sites, especially key early human localities such as Boxgrove in West Sussex and Happisburgh in Norfolk. Such research opened a new world and friendships for John.



John was never one to push his own self-interests or importance, but his skills and integrity were acknowledged and sought-after. He was Head of Micropalaeontology at the Natural History Museum, London for fourteen years. He served as an editor of various learned journals and held positions on the councils of many societies. He was elected Vice-President of the Palaeontographical Society; Chair of Fleet Study Group; and President of The Micropalaeontological Society (TMS). His claim to be an “Old Stager” of the latter Society was certainly true: he was a founder member (1970) and served TMS admirably in many roles over decades. In recognition of his achievements John received Honorary Membership of The Micropalaeontological Society and The Cushman Award of the Smithsonian Institution, Washington.

John conveyed his enthusiasm for palaeontology to others, always grounded in the specimens themselves. Generations of students in many universities in Wales and England benefited from his teaching, supervision, support and examiner’s eye. His approval was effusive, where approval was due, but he deplored “slackness” which he would counter with advice to “get a grip”. He had a guiding influence on the professional careers of many.

John the man will undoubtedly endure in the memory; with his easy-going, convivial personality, socializing or collaborating with John was always nothing less than fun. Banter was an eclectic mix of science, sport, jokes and stories – so many tales! He promoted the ‘Rent-a-Wreck Award’ for the most decrepit vehicle on TMS field-trips; he used nicknames whenever, as a play on the names of friends and colleagues (e.g. “JA”, “Hat”, “Boyd the Bucket”, “Otto”, “Box-wallah” and “Monsoon Disaster”); and he offered a ‘dial a microfossil identification’ service for instant over-the-phone taxonomic help (indeed, his lengthy and informative calls, invariably concluded with an abrupt “g’bye”, are remembered with affection by recipients).

John’s hobbies and interests were legion – almost as numerous as the size of his family. “Up the Clarets” was his cry, as an ardent supporter of Burnley FC. He spent much energy on organizing football and cricket teams for his sons, and yet he still found time for his treasured collections of Dinky and Corgi toys and postage stamps; his roses and vegetable garden; and his passion for train sets and railway literature. From a small boy he was hooked on steam trains – “real stuff”, as he would often quip. John remarked that he had “never grown up”, but that was a mark of his widespread interests and his charm. He bequeathed an enduring scientific and educational legacy.

John is survived by his devoted wife of 45 years, Christine, whom he met when they worked together in the Palaeontology Department of the Natural History Museum, London; his six sons, Jonathan, Dan, Joel, Dominic, Gregory and Robin; and two grandchildren.

David Siveter

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Engagement Grant REPORTS

EvoArcade

Fionn Keeley

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About EvoArcade

EvoArcade is a free-to-use interactive teaching resource based around a simple point-and-click video game design, guiding the user through 300 million years of life history. The user of the game begins as an ancestral amniote near the end of the Carboniferous period, featuring functionally within the game as a common ancestor for the various reptile, bird and mammal lineages that can be explored. At each stage in the game the player is presented with a scenario (animal and environmental) and asked to pick a behaviour to proceed (for example, picking a food source to subsist on). Clicking on an option will advance the game by a few million years of assumed evolution to adapt to that lifestyle choice. Transitioning to the next stage, any adaptational changes to the animal's anatomy to better suit this lifestyle are highlighted, as well as any changes to the environment and Earth's climate across this time. The player will then be faced with another simple choice between adaptive pathways. If a poor adaptive choice is made (e.g. trying to adapt to eat fish when living in the desert) then the player will 'go extinct' and the game will be over. Alternatively, environmental changes can also cause extinction for previously successful lineages, another learning objective that is increasingly important in modern times.



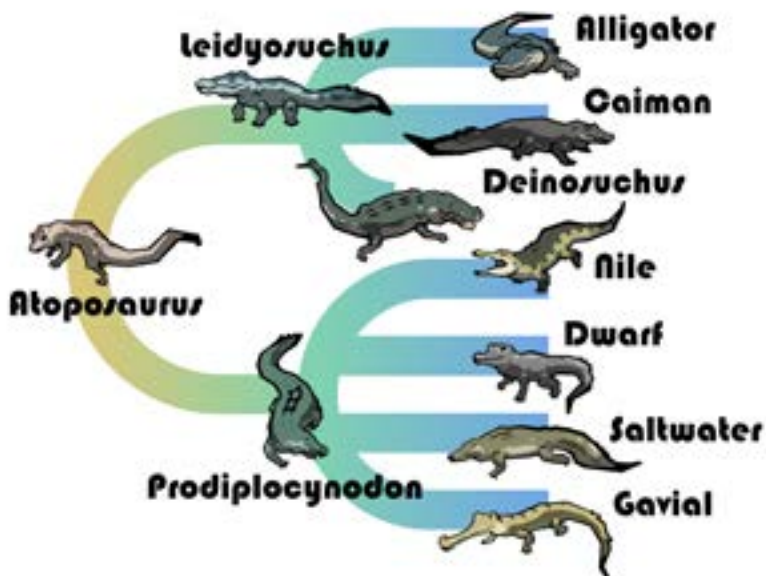
A screenshot showing the game's option menu-based gameplay.



The player's objective is to have their lineage 'survive' to the present day, using their knowledge of evolution, animal diversity and environmental change. EvoArcade is primarily aimed at school students who are learning about evolution and natural selection in their science classes. This gives a main target demographic of pupils aged 10 to 14, a key age group where they will soon be making choices about elective subjects and first thinking about potential future study and career options.

Progress and outcomes

Using funds from a Palaeontological Association Engagement Grant (PA-OE202002), Rhys Charles and I have been able to start development on the EvoArcade and create original palaeoart for the game, as well as having the opportunity to test out the game and get feedback from our target demographics. So far we've developed two 'builds' of the EvoArcade; an alpha build (a proof-of-concept allowing us to playtest the game and test its potential as a science communication tool, while helping us plan out the ideal scope of the project) and a beta build (a more flexible and scalable project, using all-new palaeoart and allowing us to apply everything we've learned from development of the alpha build). Over the last year we've completed and refined the alpha build and have been able to test its efficacy across a number of science engagement events.



A simplified phylogenetic tree of the species featured in the beta build of the game.

During the 2022/23 academic year EvoArcade was showcased at twelve English schools with children from classes in years 6 to 8 (ages 10–13), during which it was play-tested by approximately 700 pupils. The majority of the schools worked with are located in areas which typically have low engagement with higher education and fewer pupils moving into STEM subjects, according to data obtained from the Office for Students (the independent regulator of higher education in England). Beyond school sessions, EvoArcade was exhibited at four public science fairs during this



year; three in Bristol (FUTURES, Bristol Rocks! and the Festival of Nature) and one in Westbury (A Blast from the Past!). The largest of these events was attended by over 12,000 people, and EvoArcade was highlighted specifically in the official evaluation by the organizers as one of the most popular exhibits.

Feedback has been overwhelmingly positive from children, teachers and parents, with school pupils especially finding EvoArcade a novel and intuitive way to explore the evolution of life on Earth. We've integrated feedback into the beta build as we've gone along and have developed a demo using the evolutionary tree of crocodylians, which we hope to be able to expand into a full game covering the entire amniote tree of life (matching the scale and scope of our alpha build). Our beta build uses the open-source game engine Godot in its development, which will help us to ensure compatibility across a variety of platforms going forward. We hope this will enable audiences to experience EvoArcade however they like, as well as broadening the potential audience; ideally, we will be able to provide PC, tablet and even phone versions of the game. Our aim is to be able to release this game internationally and free for all to play, and we hope to secure the necessary funding to allow us to reach this goal in the near future. The game will be released via our website at <<https://www.ffossil.com/>> with a demo release currently planned for early 2024 and additional features to follow shortly afterward.

Museum on Wheels: when you cannot come to the museum, the museum comes to you

Sanjukta Chakravorti

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Fossils hold immense value for palaeobiologists and researchers in STEM fields, but their preservation is hindered by anthropogenic pressures in large countries like India. India's rural economy provides three-quarters of the revenue for Indian families, and 70 % of India's under-privileged population lives in rural areas. India's rich collection of Laurasian and Gondwanan fossils makes it an essential location for research. My project "Museum on Wheels: when you cannot come to the museum, the museum comes to you" aimed to build a mobile museum to reach these rural populations, including women and children and both government and private schools, to help preserve the fossils in this significant landscape. India's cultural diversity and heterogeneity in demography make it a land of many Gods. Folklore surrounding fossils often leads to religious fanaticism, which hinders scientific studies and excavations and hinders the development of rural Indians' lifestyles. The project aimed to educate and eradicate the fear of unknown fossil 'Gods' through the project. It aimed to dispel myths about fossils in rural India, educating children about geological processes, fossil abundance and the importance of protecting fossils. The initiative aimed to reach those unable to attend museums in cities and to inspire more Indian girls to pursue careers in field-based sciences. The initiative, being led by a woman field scientist, now organizes regular online sessions in regional languages to educate children and the next generation about conservation and natural heritage.





Showing various school students around the Geology Museum of the Indian Statistical Institute, Kolkata. Photo © Sanjukta Chakravorti.

Target area I

The outreach activity focused on the villages around the badlands of Gangani, known as the ‘Grand Canyon of Bengal’, and the villages around the Gandheswari River famous for Quaternary mammalian fossils. Posters were printed in local languages for educational purposes and local transport hired to take representative fossils there. Students were taught about how fossils are formed and that there should be no fear of Gods or demons entering fossils. The wood fossils of the Gangani area were feared by the local villagers for representing Bakasura, a supernatural ‘man-eater’



Stopping for refreshments with the children of Puruliya during one of the outreach sessions. Photo © Sanjukta Chakravorti.

who was killed by Bhima, brother of the Pandavas, in the Mahabharata. School children, village kids and locals were encouraged to touch the fossilized tree trunks and Quaternary mammalian fossils available in that area. Small videos and documentaries were made and shown in local schools. Economically poorer areas were more susceptible to orthodox religious fanaticism and provided greater resistance than those with slightly better economic standing. At the end of the first phase of the outreach activity, local statistics showed at least a 20 % increase in acceptance of scientific and natural phenomena by the villagers and, in particular, the children.



Target area II

The Permo–Triassic Gondwana formations of Panchet and Ranigunj in West Bengal, India, are a famous fossil locale of the target area II. Fossils are found along the banks of the Damodar River basin, and are often sold to tourists in this area for money. As a woman, I particularly aimed to educate girls and women about the extinct lives in the area and the reasons for conservation. Locals, including village headmen, men, women and children, were given sustainable alternatives that would serve palaeobiologists and researchers without interfering with the area's tribal and community agriculture or basic economic needs. If they found fossils, they were urged to contact the closest responsible personnel and were provided with contact information and phone numbers.

Target Area III

In Madhya Pradesh, central India, children were trained to dig for fossils with two women, me and my colleague Aindrila Roy. The initiative inspired people from different towns and many children to participate. The educational outreach events were challenging to schedule due to the morning jobs, school and agricultural activities of the inhabitants. The dig site also hosted after-school evening programmes with floodlights.



Me (left foreground) and Aindrila Roy (right foreground) at a famous dig site in Madhya Pradesh with village kids on an evening, giving the children hands-on experience of excavating fossils. Photo © Sanjukta Chakravorti.

Dissemination of results

The COVID-19 pandemic delayed work and publications, but the project remained focused on overcoming challenges. Casts of fossils were created using 3D printing of 100 bones for outreach programmes. Two logos were introduced to enhance the project's appeal. The 'Museum on Wheels'



and the Palaeontological Association's logos contributed to the project's increased popularity. A popular outreach coffee table book entitled "One flew over the Gondwana vertebrates" is being published, introducing kids to India's Gondwanan fossil deposits. Workshops will be held to assess awareness growth. A small team of advocates, led by me, is monitoring the social outcomes of the project. Results were already presented at the 6th International Palaeontological Congress (IPC6) in Thailand and the Bridges Conference in Barcelona, receiving positive feedback and suggestions for further advancements.

Future aims and directions

'Museum on Wheels' is a project aimed at raising awareness of fossils and their transportation. It seeks to find a stable and independent method for transporting casts and moulds. Financial grants will be sought from international platforms to ensure sustainability. The project's statistical results will be published in journals. Due to the pandemic, the plan to release public outreach videos has been only half completed and efforts are being made to release them as soon as possible.

Acknowledgements

I would like to express gratitude to the Palaeontological Association for the Engagement Grant that enabled this project (PA-OE202001). Thanks to the Indian Statistical Institute (ISI), Kolkata for hosting the project. I thank director Prof. Sanghamitra Bandopadhyay and deputy director Prof. Dipti Prasad Mukherjee, the late Prof. Sarbani Patranabis Deb and Prof. Dhurjati Prasad Sengupta for their unwavering support throughout the project. Sincere thanks to Aindrila Roy for her dedication and efforts. Thanks to palaeoartist Luis V. Rey for his contributions to the project. Special thanks to the Geological Studies Unit accounts department and the photography and reprography unit of ISI, Kolkata for cooperation in the project. Thanks to all the children and schools in both urban and rural areas for their enthusiastic participation. My deepest thanks go to all those who contributed to this project.



Small Grant REPORT

Architecture and development of a Carboniferous fern relative

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Introduction

The cladoxyloids are a group of plants known from the Middle Devonian to the early Carboniferous (about 390 to 350 Ma) famously known to have given rise to some of the first trees in Earth's history (Stein *et al.* 2007). However, this group includes numerous taxa (Durieux *et al.* 2021), some being much smaller. One of them, *Cladoxylon* (Unger 1856; Bertrand 1935), has been hypothesized to be non-self-supporting based on a preliminary study (Soria *et al.* 2006), meaning that cladoxyloids may have included plants with a lianescent habit. While this preliminary study defined three developmental stages to reconstruct the biomechanical properties of the plant, an extensive analysis of the developmental pattern and organotaxis (*i.e.* the plant architecture *sensu* Barthelemy and Caraglio 2007) of *Cladoxylon* remained to be done. This was the objective of my three-month stay at UMR AMAP (Montpellier, France) in 2023 funded by a grant from the Palaeontological Association.

Materials and methods

The palaeobotanical collections of Université de Montpellier contain an extensive collection of *Cladoxylon* specimens from the Lydienne Formation (middle Tournaisian, Carboniferous, Hérault, southern France). This collection consists of 53 anatomically preserved specimens and more than 200 slides, peels and polished sections. Observation and imaging of this material were conducted using a digital microscope Keyence VX700. This material allowed me to gain a better understanding of *Cladoxylon* by: identifying the taxonomical diversity of this genus at the locality; defining the primary and secondary growth stages of the plant; and reconstructing its architecture.

Results and discussion

The first result of our study is that all the specimens assigned to *Cladoxylon* (Figure 1) share the following anatomical characters: a dissected stele with 8 to 16 ribs; ribs are vascular bundles with central metaxylem surrounded by secondary xylem (wood) and a mesarch pole of protoxylem toward the external ends. The taxonomic comparison with previously described *Cladoxylon* species (Bertrand 1935) allowed me to identify two species at the locality, *C. taeniatum* (Figure 1) and *C. mirabile*. A potential new species may be represented by specimens MN 400 and MN 904, which possess an extensive development of the wood, a well-developed periderm, and a unique pattern of lateral organ emission. As the single specimen assignable to *C. mirabile* was badly preserved no additional information could be recovered from it. The following part of this report focuses on *C. taeniatum* (30 specimens), MN 400, and MN 904.

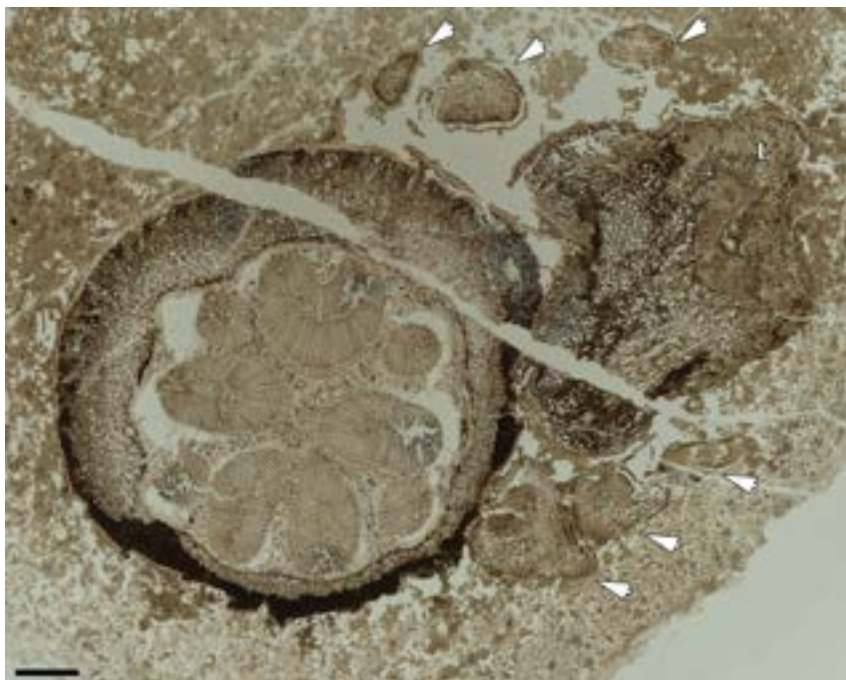


Figure 1. Cross section of *Cladoxylon taeniatum* (specimen MN 958) with an attached lateral abaxial-adaxial organ (L) and ultimate appendages (arrows); scale bar is 1 mm, slide MN958 A S3.

The large number of prepared thin sections allowed me to reconstruct the pattern of lateral organ emission of these plants. Four emission patterns were recognized, three in *C. taeniatum* and one in MN 400. In *C. taeniatum*, the emission starts with vascular strands produced from the tip of three to four ribs (Figure 1). These strands then fused to form new axes showing an abaxial/adaxial polarity. These axes themselves produce alternate circular vascular traces that dichotomize. This sequence allowed me to reconstruct *C. taeniatum* as stem/last order of branch-bearing petiole-like lateral organs with dichotomous ultimate appendages.

In addition to morpho-anatomical observations, I conducted principal component analyses to analyse the diversity of stele characters in *C. taeniatum*. The results of the analysis, coupled with a hierarchical clustering, recovered four different groups (Figure 2). Different hypotheses can be put forward to explain this repartition; however, despite differences the specimens are too similar to represent different species and correspond to the same order of axis based on the reconstructed organotaxis (see below). The remaining hypothesis is that these different groups represent different ontological stages of the plant. I consider this the most likely explanation for the similarity between specimens, the classification in different groups by the analyses, and the correlation between characters (e.g. diameter and number of ribs). In addition, based on my observations, three stages of secondary growth can be proposed: the initiation of the growth, when the ribs are not surrounded by secondary xylem; the secondary xylem is produced evenly around each rib; and an uneven development of secondary xylem, with most of it being in the direction of the centre of



the axis. Comparison with other cladoxylpsid genera as well as the relative amount of primary xylem *versus* secondary xylem allowed me to reconstruct *Cladoxylon* as having an apoxogenetic phase of growth (*i.e.* a decrease of the amount of primary growth towards the apex) in a similar way to the closely related species *Pietzschia levis* (Sorial and Meyer-Berthaud 2004). Nevertheless, all of the species of *Pietzschia* are devoid of secondary growth, and the other growth models proposed for the cladoxylpsids (*e.g.* *Calamophyton*, Giesen and Berry 2013) are very different. As a result, *Cladoxylon*'s growth pattern seems unique among the cladoxylpsids.

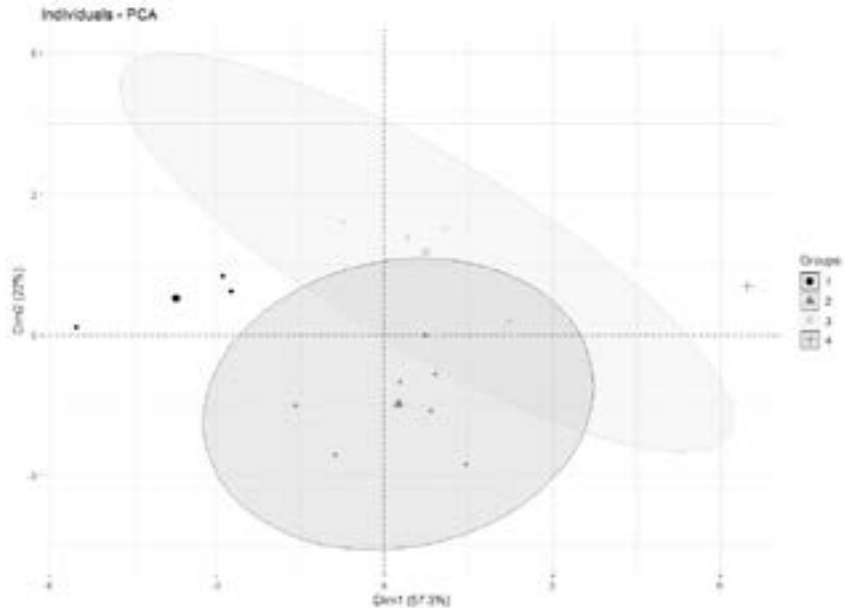


Figure 2. Factorial plan 1 2 of the principal component analysis with groups from the hierarchical clustering analysis.

The preliminary study on *C. taeniatum* by Soria *et al.* (2006) reconstructed this plant as non-self-supporting. Nevertheless, our new data do not fully agree with some of the assumptions of that study, especially for the older (*i.e.* basal) stage that was reconstructed as elliptical and not circular, which has an important impact on the biomechanical results. I thus propose an alternative hypothesis, where this older stage is similar to our potential new morphospecies based on the extensive amount of secondary growth (*i.e.* secondary xylem and periderm) and may indeed represent a basal part of *C. taeniatum* but in the form of a rhizomatous axis. This 'creeping hypothesis' places specimens MN 400 and MN 904 as above or underground creeping axes (a hypothesis first discussed by Solms-Laubach in 1896) with lateral emission forming self-supporting 'stems' with *Cladoxylon* anatomy (Figure 1).

Acknowledgments

I would like to thank UMR AMAP (<<https://amap.cirad.fr/en>>) for hosting me during the project and the Palaeontological Association for supporting the project with a Sylvester-Bradley Award (PA-SB202201) that allowed me to travel to France to study the most extensive collection of *Cladoxylon*.



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Undergraduate Bursary REPORTS

Ontogenetic changes in an extinct species of crocodile

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Fossil remains of crocodylians have been documented from India since the mid-nineteenth century, but specimens attributed to the extinct Late Miocene–Pleistocene species *Crocodylus palaeindicus* have largely been neglected. It has previously been suggested that the closest relative is the extant *Crocodylus palustris* or mugger crocodile, as they share a similar geographical distribution and morphology, possibly indicating similar ecology and behaviour. Furthermore, it is possible that the extant species is a descendant of *Crocodylus palaeindicus*. One of the key attributes of skull evolution pertains to anatomical changes associated with the arrangement of cranial bones, including the role of ontogeny. During ontogeny, crocodylians change their diet, locomotion and the architecture of their skull. Several recent studies have evaluated aspects of the ontogenetic evolution of the crocodylian skull, demonstrating a variety of changes, including the morphology of the snout, skull table and braincase (e.g. Morris *et al.* 2019; Felice and Goswami 2021). Interestingly, the ontogenetic trajectory of some features reveals that adult skulls of some extant taxa are closest morphologically to juveniles of closely related taxa.

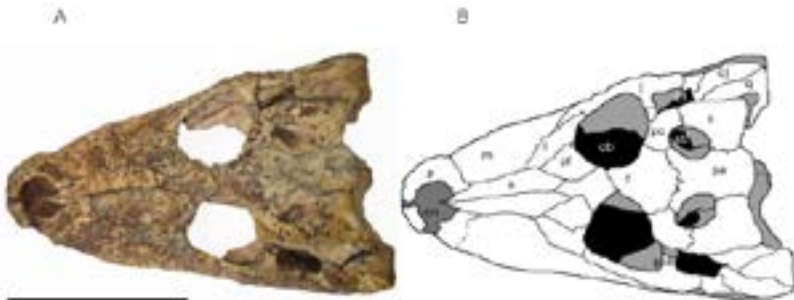


Figure 1. Crocodylus palaeindicus juvenile skull (NHMUK 40823) in dorsal view: A) photograph and B) line drawing. Scale bar is 50 mm.

Here, a juvenile skull of *Crocodylus palaeindicus* (NHMUK 40823) is described, alongside a consideration of the ontogenetic development of this species. I also evaluate whether the ontogenetic trajectory of *Crocodylus palaeindicus* more closely matches that of *Crocodylus palustris* than any other species based on comparisons with juvenile and adult specimens of this species as well as with *Crocodylus niloticus*. The specimen is 100 mm long and 60 mm wide at the occipital (Figure 1). The skull is fractured along the jugal, postorbital and frontal bones, allowing further



analysis of the skull's interior (ectopterygoid, occipital, pterygoid). The lower jaw is fused with the skull. Firstly, the young ontogenetic age of the specimen can be discerned due to its small size and the narrow, elongated snout. Furthermore, the outer bone layer is not heavily sculptured or bulky. The bone sutures are wide and clear, especially on the facial surface (around 0.5 mm in the nasal), suggesting disproportionate growth. The characteristic festooning in Crocodylidae, which allows interlocking teeth, is most visible from lateral view. The observable pointed teeth are around 50 mm long, increasing in breadth from the premaxilla to the end of the row.

The juvenile specimen possesses some, but not all, of the characteristic and diagnostic features of *Crocodylus palaeindicus*, and it clearly differs from adult specimens of *Crocodylus palustris*, as well as from other crocodylians. During comparisons between the juvenile specimen and adult exemplars of *Crocodylus palaeindicus*, the major ontogenetic changes were observed in the snout, which becomes more robust with ontogeny. This might indicate ecological differences with ontogeny (Drumheller *et al.* 2021).

The juvenile specimen was incorporated into a recent phylogenetic data matrix focused on the interrelationships of extinct and extant crocodylians (Rio and Mannion 2021), which already included *Crocodylus palaeindicus* as an operational taxonomic unit. Analyses recovered the juvenile specimen as the sister taxon to this species, although with several character score differences that I attribute to ontogeny. Interestingly, whereas some of these differences appear to be the same for most *Crocodylus* species (e.g. based on comparisons between juvenile and adult specimens of *Crocodylus niloticus*), a number of them were unique to *Crocodylus palaeindicus* and *Crocodylus palustris*, i.e. only these two species showed the same ontogenetic morphological trajectory. This provides further support for their closer relationship to one another relative to other crocodylians.

Acknowledgments

I am very grateful to the Palaeontological Association for the Undergraduate Research Bursary PA-UB202205 that funded this project. I would like to thank Prof. Philip Mannion (University College London) for all the indispensable help given, as well as Cecily Nicholl (University College London) for her assistance in the crocodile world.

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*Veggie*saurus rex: diversification of herbivorous theropods in the Early Cretaceous

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Introduction

Theropod dinosaurs, such as the fierce *Tyrannosaurus rex*, are often associated with a carnivorous diet, as the majority of species show a great variety of features for catching different types of prey. However, several rather bizarre theropods stand out from the rest with adaptations for a herbivorous lifestyle (Zanno and Makovicky 2011), such as Therizinosauria or Ornithomimosauria. Previous studies on the diversity and biogeography of these dinosaurs have focused on intrinsic factors, such as morphology (Lautenschlager 2017), while extrinsic factors, like climate, have largely been overlooked. The goal of this project is to test if climatic factors could have impacted the diversity and distribution of Early Cretaceous herbivorous theropods and whether or not they occupied different climatic niches to other plant-eating dinosaurs, thus avoiding competition with them.

Methods

Occurrence data for Early Cretaceous (145–100.5 Ma) dinosaurs were initially obtained from the Paleobiology Database (PBDB; <www.paleobiodb.org>). Updates were made to these data by checking against the current literature. Species were assigned to their respective taxonomic groups (e.g. Theropoda, Sauropodomorpha, Thyreophora and Cerapoda) and dietary groups (i.e. herbivorous, carnivorous, omnivorous or unknown). The final dataset (completed 31st August 2023) totalled 288 species, of which 27 are either omnivorous or herbivorous theropods. An additional dataset for Early Cretaceous dinosaur-bearing formations was created using the most up-to-date stratigraphic ages from the current literature. Palaeoclimatic data (mean annual temperature, seasonal variation in temperature, mean annual precipitation and seasonal variation in precipitation) were obtained from a general circulation model (HadCM3L) using the procedure outlined in Dunne *et al.* (2023). R (R Core Team 2023) was used for all data manipulation, analysis and visualization, and for different aspects of the datasets. Analyses of taxonomic richness and sampling patterns was conducted in R (R Core Team 2023), as well as explorations of the climatic ranges of each group. A principal component analysis (PCA) was also performed to quantitatively categorize climatic niches of all taxonomic and dietary groups.

Results and discussion

Most Early Cretaceous dinosaurs have been sampled from the northern palaeohemisphere, and herbivorous theropods are most abundant in palaeolatitudes between 30 and 45° north (Figure 1A). A peak richness of herbivorous theropod taxa and occurrences can be seen in the Barremian (125.77–121.4 Ma). This is likely a result of a high diversity of herbivorous theropods in the well-sampled Jehol Biota (northeastern China), which contribute around a third of all herbivorous theropod occurrences.

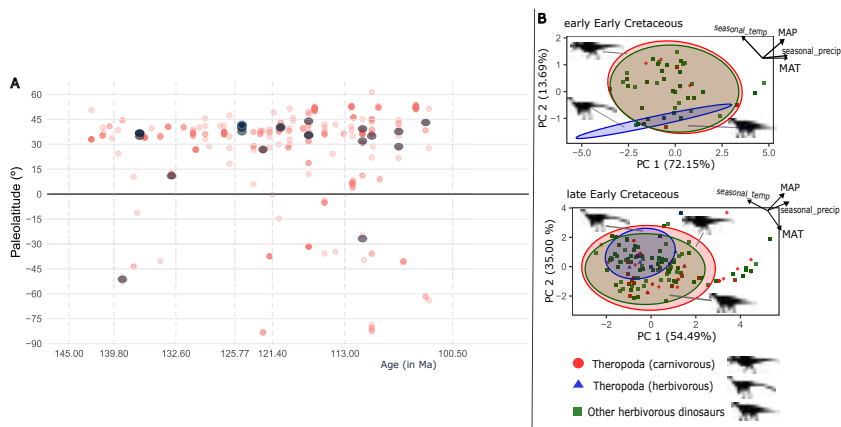


Figure 1. A) Distribution of Early Cretaceous dinosaurs across time and palaeolatitude; the bigger, darker spots highlight occurrences of herbivorous theropods. B) Climatic niches of carnivorous theropods (red), herbivorous theropods (blue) and other herbivorous dinosaurs (green) in the early Early Cretaceous (Berriasian to Hauterivian) and the late Early Cretaceous (Barremian to Albian). Silhouettes are taken from <phylopic.org> (see Acknowledgements for creator credits).

The climatic niches of herbivorous theropods were restricted compared to most of the other dinosaur groups (Figure 1B). Herbivorous theropods occupied regions with lower (around 16–17 °C) mean annual temperatures (MATs) throughout the entire Early Cretaceous, suggesting they remained restrained to relatively colder regions in what was otherwise a very warm world at that time (Hay and Floegel 2012).

A particular point of interest among the results was the comparison between herbivorous theropods and thyreophorans (armoured ornithischian dinosaurs). During the Hauterivian–Barremian, herbivorous theropod diversity was at its highest across the Early Cretaceous, while thyreophoran diversity was comparatively low (Figure 2A). Later in the Early Cretaceous, this pattern reverses when thyreophoran diversity increases and herbivorous theropod diversity decreases (Figure 2A). Furthermore, herbivorous theropods and thyreophorans display a relatively limited overlap of their climatic niches (Figure 2B). These observations could be indicative of climatic niche partitioning; however, further research will be needed to shed light on the real dynamic between these two groups.

Conclusion

Climate, especially temperature, was likely a very influential factor for the diversity of Early Cretaceous herbivorous theropods. Climatic niche partitioning between herbivorous theropods and thyreophorans is implied by various differences in their diversity patterns and climatic niches. These conclusions make the mystery of why and how herbivorous theropods evolved in the first place, back in the Jurassic, even more intriguing and worthy of further attention. Future research will include a study of the available Jurassic data and the constructions of a theropod supertree to further explore hypotheses of the origins of herbivory in theropods.

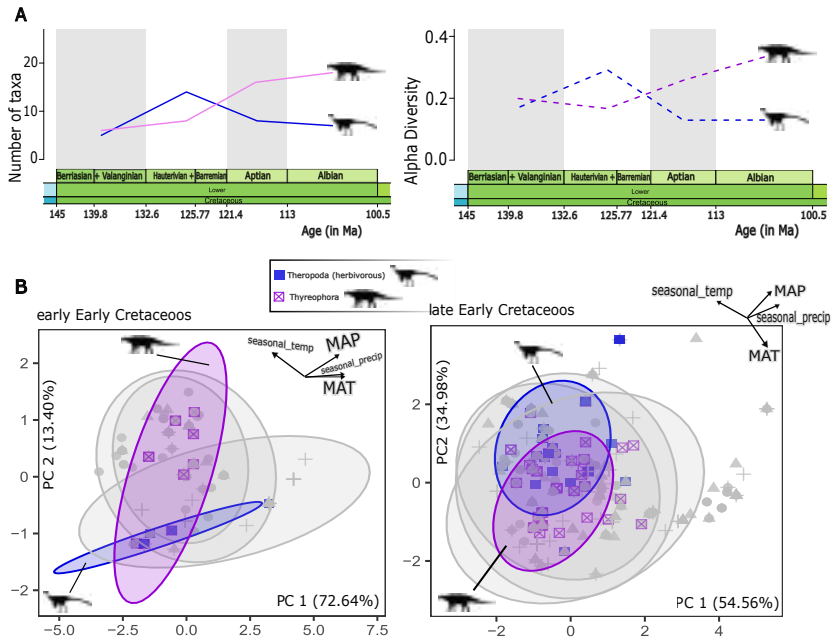


Figure 2. A) Gamma (left) and alpha (right) diversities for herbivorous theropods (blue) and thyreophoran (purple). B) Climatic niche ranges for herbivorous theropods (blue) and thyreophorans (purple) in the early Early Cretaceous (left) and late Early Cretaceous (right). Silhouettes are taken from <phylopic.org> (see Acknowledgements for creator credits).

Acknowledgements

I would like to express my gratitude to the Palaeontological Association for the Undergraduate Research Bursary (grant number PA-UB202303). Thank you to my supervisor, Dr Emma Dunne, for her exceptional support and guidance, and to Dr Stephan Lautenschlager for his vital expertise. Further thanks to Dr Alexander Farnsworth for providing the climate data and Dr Adam Kocsis for his assistance extracting the necessary variables. Additional thanks to Matthew Dempsey, SauropodomorphMonarch and Jagged Fang Designs for creating and uploading silhouettes to <phylopic.org> (CC BY 4.0 license).

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Reviews



Notes from Deep Time: a journey through our past and future worlds

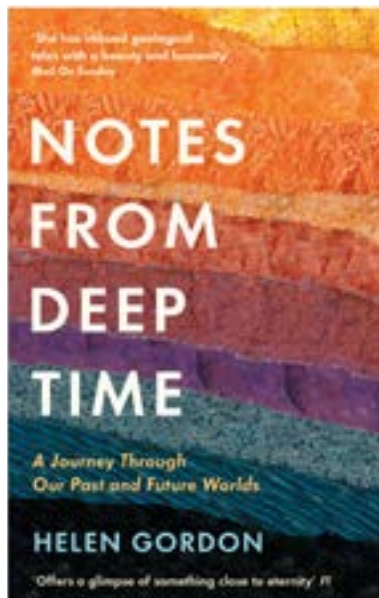
Helen Gordon, 2021, 336pp., Profile Books, ISBN 978-1788161633.

Helen Gordon's aptly titled *Notes from Deep Time* presents a series of vignettes, each focused on a different facet of Earth science. She weaves compelling narratives that masterfully centre the individual researchers, spanning from the development of the geological timescale to plants' colonization of land and the resulting radical Earth system changes to the slow accumulation of Cretaceous chalks. Individual chapters are largely self-contained and provide evocative glosses of how geologists conceptualize the past and how the echoes of deep time are present in our own lives. Indeed, the observation that "rocks are time made manifest" (p. 58) rings true with each successive anecdote.

In Gordon's deeply personal and information-rich reflections, a poetic sense of awe emerges at the scales of time and space and the magnitude of global changes recorded in the rocks. She keenly reckons with the incomprehensibility of these scales and consistently presents the weight of time to the reader.

The book is well-researched and reflects Gordon's extensive travel throughout the UK, Europe and North America in search of places where the past stands close. *Notes* recounts classical stories like James Hutton's process of developing a concept of deep time and the ebbs and flows of interest in dinosaur research. Most compellingly, the book also reflects the uncertainty around the future experienced by humans in this present moment. What, if any, impacts might we humans leave on deep time scales?

For me, the most compelling vignette was one that looked to the future surrounding nuclear waste repositories (chapter 15). The careful process of designing structures to operate on short geological timescales and the challenge of maintaining human memory of these repositories across millennia effectively captures the tension between human perception and deep time. This resonates with earlier content in *Notes* on the challenges for understanding earthquake and volcanic hazards in today's communities. Other highlights include the tale of recent advances in understanding fossil colour and the insights gleaned from the rocks used in construction. The process of drawing stories from our built environments emerged along a similar vein to the classic work *What Rome was built with* (Porter 1907) and reflected both the local geology and broader economic considerations at play when humans carve space from stone.





While Gordon briefly notes the continuing struggle of women in Earth sciences (chapter 9), I noticed some missed opportunities to highlight women's contributions elsewhere in the book. For example, the myriad of researchers simultaneously contributing to the development of plate tectonics in the mid-1900s was evocatively communicated, but Marie Tharp's cartographic work elucidating the geography of mid-ocean ridges (Heezen *et al.* 1959; Barton 2002; Higgs 2021) was omitted from the story. I also felt some uncertainty over the varied presentation of auctions of natural history specimens in the book. While chapter 11 highlights different perspectives on the sale of vertebrate fossils, similar nuance was not applied to the sale of meteorites in chapter 4, with only a representative of Christie's interviewed for that vignette. Laws around the collection and sale of meteorites are heterogeneous (Schmitt 2010), and I would like to have heard the perspectives of meteorite researchers over the fate of specimens that disappear into private collections. The way that other naturalists wrestle with commercialization of a finite number of specimens holds the potential to inform our own thinking about these issues in palaeontology.

Although the majority of the information presented will be familiar to practising geologists, I think this book would be useful additional reading for Earth science undergraduates, particularly when it comes to topical discussions such as the effective communication of risk around natural hazards (chapters 6 and 8), and around the utility of the Anthropocene as a meaningful unit of geological time (chapter 14). Ultimately, *Notes from deep time* both invites people into necessary discussions of our species' global impact and provides a perspective to grapple with the implications.

With this book, Helen Gordon demonstrates that she has indeed developed the eyes of a geologist. Her anecdotes of peering through the fence of an active construction site hoping to see the ground below the pavement and of how previous landscapes click into focus with the right context resonated deeply with my own experiences. Her reflection that "clearly you don't have to know the names of rocks ... in order to enjoy a landscape. But if you do have this information, something changes about the way you exist in that space" (p. 273) encapsulates well the root of our human relationship with the Earth even while existing with a vastly different sense of time.

Paige de Polo

Paige is a vertebrate palaeontologist. She recently defended her PhD at the University of Edinburgh and is now a lecturer at Liverpool John Moores University. When not palaeo-puzzling, she can be found curled up with a cup of tea and a sci-fi novel.

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Ichthyosaurs from the Early Jurassic of Britain

Graham P. Weedon and Sandra D. Chapman, 2022, 448 pp., Siri Scientific Press, ISBN 978-1-8381528-6-4

The early Jurassic ichthyosaurs of Britain, and from the south coast of England in particular, are of international importance, not least because of the fame of Mary Anning. But there is much more to them than that. These were the first Mesozoic marine reptiles to be excavated in any number anywhere in the world and, through Anning's contacts, they were distributed rapidly to noted geologists and palaeontologists who made sure they were published rapidly. Three papers by esteemed surgeon Sir Everard Home in the *Philosophical Transactions of the Royal Society* appeared in 1814 and 1819, to be followed by numerous publications by such notables as Buckland, Conybeare, Cuvier and Owen. The British early Jurassic ichthyosaurs have been the foundation of the academic careers of many notable palaeontologists since, and they continue to show their value today because of the relative completeness of preservation, their abundance, and the fact that they are generally well dated thanks to the ammonite stratigraphy of the British Jurassic. These fossils have been fundamental in establishing the basis of the current phylogenies of Ichthyosauria, in functional studies on hydrodynamics of highly successful large marine predators, as well as in understanding some macroevolutionary phenomena such as recovery from the end-Triassic extinction through an evolutionary bottleneck.

This book is a labour of love by Sandra Chapman who lived with one of the finest collections, at the Natural History Museum in London, through her professional career, and Graham Weedon, who has studied the cyclostratigraphy of the early Jurassic sediments in which the fossils were found. The book presents all of the ichthyosaurs in detail, but also provides details on their occurrence, inferred palaeobiology and evolution.

The first part of the book provides details of the anatomy and evolution of ichthyosaurs, as well as their taphonomy, and some background to the Natural History Museum's collections. Then follows a longer section on ichthyosaur palaeobiology, covering their evolution, reproduction and growth,





senses, feeding, locomotion, diseases and extinction. These sections are succinct, up to date, and well illustrated mainly by colour photographs of specimens. Then follows the meat of the book, 250 pages on the collections of British early Jurassic ichthyosaurs. There is a brief account of the Natural History Museum, London's collections, with mention of Mary Anning, but this section is short, perhaps because the history has been told elsewhere both in journal articles and in books. There is an account of stratigraphic context, especially providing a summary of the ammonite zonation. Then follow the descriptions of the four families (Temnodontosauridae, Leptonectidae, Ichthyosauridae, Stenopterygiidae), nine genera and 21 species, each receiving 10–15 pages, which is enough space to provide a full synonymy, list all the specimens, provide measurements, and illustrate key specimens and anatomical elements.

In the synthesis, the authors list all known localities that have yielded specimens, many of them not on the Jurassic Coast, but located inland across Dorset, Somerset and the banks of the River Severn, often yielding specimens in quarries and railway cuttings that are now lost. The data provide material for a detailed presentation on the stratigraphic occurrences of the 21 species in the UK and elsewhere and an overview of the productivity of different sites and horizons, and some reflections on who lived with whom. The book ends with appendices listing museums that hold specimens, specimen lists and a detailed bibliography.

Many monographs and papers have been written on the British early Jurassic ichthyosaurs, but none of them has such a wealth of detail on occurrences and distributions. The writing and the ideas are fresh because neither author has written on this precise subject before. Further, the authors were enabled to include much raw data that otherwise might be hidden in the supplementary data of regular papers. Finally, the authors are to be commended on the inclusion of hundreds of new, colour photographs of all the materials, as well as original graphs of measurements and distribution maps.

Michael J. Benton

Mike Benton is Professor of Vertebrate Palaeontology at the University of Bristol. His latest books are 'Extinctions: How Life Survives, Adapts and Evolves' (Thames & Hudson) and 'Dinosaur Behavior: An Illustrated Guide' (Princeton University Press).

Ichthyosaurs from the Early Jurassic of Britain

Graham P. Weedon and Sandra D. Chapman, 2022, 448 pp., Siri Scientific Press, ISBN 978-1-8381528-6-4

Perhaps the most comprehensive assessment of ichthyosaurs since McGowan and Motani's (2003) *Handbook of Paleoherpptology Part 8: Ichthyopterygia, Ichthyosaurs from the Early Jurassic of Britain* is an essential read for any enthusiast or undergraduate student taking their first splash into the world of ichthyosaurs. Weedon and Chapman provide a thorough and easily digestible summary of all things ichthyopterygian. Just shy of 450 pages, this hefty book discusses a lot in three parts. The first part, ichthyosaur specimens and palaeontology, includes extensive descriptions of every part of ichthyosaur anatomy, accompanied by well-labelled photographs that illustrate features clearly. Also included is a substantial discussion on the fossilization and taphonomic processes which affect ichthyosaur specimens, and an account of the curatorial management of ichthyosaurs in the Natural History Museum, London. The part ends with an overview of ichthyosaur occurrences



across time and space, delving into their global distribution from the early Triassic to the mid-Cretaceous. The second part has a broader scope covering overall aspects of ichthyosaur palaeobiology: evolution, reproduction and development, sensory systems, diet, locomotion, mortality and extinction. However, these first two parts reference early Jurassic ichthyosaurs in equal amounts to ichthyosaurs from all other time periods.

With only the final third of the book actually dedicated to Early Jurassic ichthyosaurs, the title *Ichthyosaurs from the Early Jurassic of Britain* seems frustratingly misleading. Perhaps the authors felt that solely focusing on Early Jurassic ichthyosaurs produced a much slimmer book and bulked it out with any information considered related. In all honesty, seven pages on Hox genes is not only excessive but out of place, and there's an expectation that the reader

has an academic understanding of complex genomic expression during embryonic development. What even are Sonic Hedgehog Factor, Noggin or Gremlin, which are never defined, and how are these really relevant? The inclusion of these in such detail is even more puzzling when accounting for the fact that key environmental events that specifically impacted ichthyosaur evolution in the early Jurassic are hardly mentioned or are omitted entirely. For example, the Toarcian Oceanic Anoxic Event was a major and widespread marine crisis that caused a catastrophic mass extinction and impacted the entire ecosystem. This event may have altered the evolutionary pathway of ichthyosaurs at the end of the Early Jurassic, but is referred to only once in the entire book. A single short paragraph suggests in passing a possible explanation for an apparent size increase in *Stenopterygius quadriscissus* in Germany. There is no reference to this event regarding its role in the deposition of laminated black shales across vast swathes of Europe, nor in its contribution to the preservation of Britain's large ichthyosaur specimens.

Although the second part feels like the authors have wandered off on a loosely relevant tangent, the third section reins in the focus and finally gives uninterrupted attention to the Early Jurassic ichthyosaurs of Britain. Extensive accounts of all 21 species of Early Jurassic ichthyosaurs, belonging to nine genera and four families, are compiled together in one easily accessible place. For every species the authors list the complete synonym, alongside a discussion on taxonomic history, managing to condense over 200 years of history in some cases. Morphological descriptions are provided alongside photographs of key specimens and the distribution of specimens is illustrated both geographically and biostratigraphically. Where possible, the authors go one step further by discussing the species' palaeobiology, painting these animals as more than just bones.

Unfortunately, this is one of those books cursed to become outdated with any new publication on British ichthyosaurs, and the book fails to keep up with taxonomic changes even before publication.



Undoubtedly, the validation of the species *Temnodontosaurus zetlandicus* by Laboury *et al.* in February 2022 likely came too late, as by this time the book had almost certainly been reviewed and was ready for publication. Perhaps the inclusion of *T. zetlandicus* can be considered in a second edition. What cannot be excused, however, is the incorrect reference to *Steneosaurus bollensis*, a marine crocodylomorph from the early Toarcian of Europe, which was redescribed by Johnson *et al.* as *Macrospodylus bollensis* in October 2020, two years before publication.

I wonder whether there is a bias against the Upper Lias, which becomes apparent through the course of the book, evidenced by the severe north–south divide from which the book suffers. Simply far too much attention is given to the Dorset coast. The geological context chapter provides an extensive bed-by-bed description of the lithostratigraphy and ammonite biostratigraphy of the Blue Lias exposed between Lyme Regis and Seatown, but this only covers the Hettangian and Sinemurian (Lower Lias). An equivalent bed-by-bed account of Pliensbachian (Middle Lias) and Toarcian (Upper Lias) deposits is not included for anywhere in Britain. Why isn't the equally important Whitby Mudstone Formation on the Yorkshire coast discussed in the same detail? Furthermore, Lower Lias ichthyosaur occurrences are discussed relative to ammonite biozones in extensive detail from Lyme Regis and Charmouth, with a few minor accounts of Lower Lias occurrences elsewhere in southwestern England. Only a single sentence here alludes to the ammonite biozone of early Toarcian ichthyosaurs from Strawberry Bank, and nothing else from the Middle and Upper Lias is discussed. A more appropriate title for this chapter would have been *the geological context of Lower Lias ichthyosaurs of Southwest England*. The authors make a vague attempt at balancing the chronic lack of discussion regarding the Middle and Upper Lias in the main body of the book by referring to Benton and Taylor's (1984) catalogue of Toarcian marine reptiles from the Yorkshire coast. Whilst it is true that the most important Yorkshire specimens were collected in the nineteenth century and therefore lack proper spatial and temporal information, it shouldn't be the basis for ignoring the final 18.2 million years of the Early Jurassic. It makes one reflect on current cultural and economic perceptions of northern *versus* southern England, which has no place in a book about ichthyosaurs.

On the one hand the disregard for an equally detailed account of Early Jurassic ichthyosaurs north of the Bristol Channel feels lazy, but on the other it feels like an intentional attempt to overly praise the discoveries of Mary Anning and her peers above all else. There's an entire chapter on the creation of the Natural History Museum in London, which gives a detailed account of how each of Anning's ichthyosaurs on display came to be. The inclusion of this chapter is wholly relevant and vital to understanding the role that Dorset played in the history of ichthyosaur collection and research in Britain. But whilst acknowledging that this collection and its history is entwined in the birth of palaeontology, is the rich history of ichthyosaur collection and research during the days of Alum mining in Yorkshire and its contribution to British palaeontology not worthy of equal spotlight? What of Reverend George Young, who described the first definitive Yorkshire ichthyosaur in 1819 but only gets a brief mention? Or the history of the collection of *Temnodontosaurus* specimens that now reside in regional museums (namely Whitby, York and Manchester), which never receive as much attention, or frankly funding, as the Natural History Museum in London?

It's a shame that a balance is not struck between Dorset and Yorkshire, but thankfully much of what could have been discussed in detail in the main body of the book is at least referred to in the appendices. Appendix 2 provides a list of institutions that hold British specimens, whilst



appendices 3–6 build on this by listing all British early Jurassic specimens (grouped by family) in the published literature, with extensive locality and horizon information, description, nomenclature and references included for each specimen. Hidden at the back, these appendices are arguably the most valuable part of the book, a final hurrah to Early Jurassic ichthyosaurs which is lacking at the beginning of the book.

As a book about ichthyosaurs, *Ichthyosaurs from the Early Jurassic of Britain* is a highly commendable piece of work, providing a sorely needed up-to-date guide that compiles the explosion of ichthyosaur research from the past decade. However, the book fails to fully address its own title by evading discussion of the last 18.2 million years of the Early Jurassic. To build a complete picture of Early Jurassic British ichthyosaurs it is essential that more discussion is given to the occurrences outside of the southwest, particularly the Upper Lias deposits of Yorkshire. As a book about the Early Jurassic ichthyosaurs, there is much to be desired.

Meghan Jenkinson

Meghan is a palaeontologist and postgraduate research student at the University of Leeds researching regional extinction and recovery patterns across the Toarcian Oceanic Anoxic Event. You can find Meghan on X (formerly Twitter) @Palaeo_Meghan, where if she's not talking about research she'll be talking about Jurassic Park.



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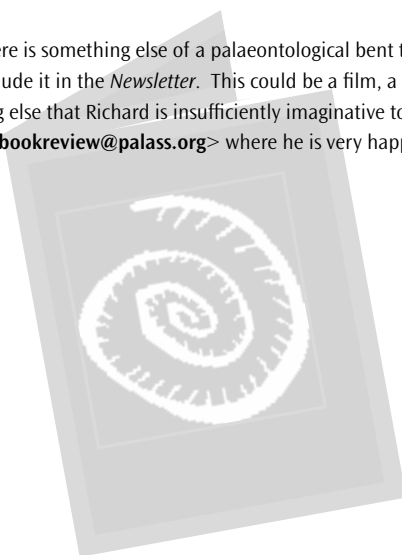
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Careers Q & A

Professional palaeontologists in the wider world

In 2023 Morten Lunde Nielsen completed his PhD on the taphonomy and palaeoecology of the lower Cambrian Sirius Passet Lagerstätte at the University of Bristol in the UK. Since April 2023, he has worked as a government official in the Danish Energy Agency's Centre for Subsoil Resources, which is part of the Danish Ministry of Climate, Energy and Utilities.

When you were a child, what did you want to become when you grew up?

A palaeontologist. It was my dream to study dinosaurs and a big part of my identity growing up.

How did you first get interested in palaeontology?

Not sure, but I was born in 1988 so it was probably related to either the movies *The Land Before Time* or *Jurassic Park*. I was always surrounded by dinosaur toys during my childhood.

What is the biggest highlight of your work as a palaeontologist so far?

Field work in North Greenland during my PhD. There, I collected Burgess Shale-type fossils from the lower Cambrian Sirius Passet Lagerstätte. Sirius Passet is an amazing site to find fossils as they are very abundant and preserve incredible details. You can make a lot of cool discoveries during an expedition. The journey to desolate North Greenland is an adventure too.

How did you make the transition from a PhD to your career outside academia?

Coincidence. I did not actively plan to leave academia. But I have two kids with my partner in Denmark and that limited my options in palaeontology. Just after my PhD defence I



Photo courtesy of Jakob Vinther.

unsuccessfully applied for a small grant to start a pilot project at an institute in Copenhagen. There are very few open research grants in Denmark, so the next deadline was in six months. I therefore decided that I had to look more seriously for other jobs that could be of interest. Shortly after, I was lucky to see a job advertisement seeking a geologist at the Danish Energy Agency to work with licences for geothermal energy and underground gas storage. I had never thought of working in the government, but the advert hooked me by offering the opportunity to work in the green energy transition and energy security; two highly relevant issues. The advertisement's main requirements were all skills I had acquired during my PhD: data analysis, integrity, interdisciplinary collaboration and communication, as well as project management. But everything else was new to me so I had to do a lot of preparation prior to the interview.



Fortunately it went well, and I was able to give several direct examples of how they could benefit from my PhD skills. It's been a very steep learning curve since I started and I still feel very new even after eight months in the job.

What does your job involve on a daily basis?

I have a lot of contact with onshore licensees who send in applications for certain types of underground work in their licences (such as drilling deep wells to extract resources or do geophysical exploration). The Danish underground is, in practice, owned by the government, so they need our approval even if they have a licence. I then evaluate their application and advise on the requirements for an approval. This leads to a lot of back-and-forth as we often need more information. I also evaluate applications for new licences to explore and harvest deep geothermal energy. As part of this, there is a nice geology aspect to the job where we also collaborate with the Geological Surveys of Denmark and Greenland.

Can you tell me more about your current role, and what its significance is?

Basically, we govern the Danish onshore underground and make sure the underground resources are exploited appropriately for the Danish state without violating the Danish Subsoil Act. This means ensuring that all work done by licensees is safe and does not create human or environmental hazards. As an Advisor, I supervise the licensed companies to make sure they have the required technical capabilities to do the work.

What gives you the most satisfaction in your work, and what do you not enjoy so much?

I like that I work for the greater good, on behalf of the Danish people. I also get to have an influence on our evaluation processes for licences, and on changes to the Danish Subsoil Act.

The less fun side is that it is sometimes a bit bureaucratic. When there is law and lawyers involved even small matters can become very tedious and time consuming.

Do you have any opportunity to still work in research areas of interest to you or, if not, do you miss the 'hands on' aspect of being a palaeontologist?

I continue my palaeontological research in my spare time, which is currently very limited with two small kids; maybe a few hours per week. But I enjoy those hours. I do miss being a professional palaeontologist, especially meeting the community at conferences and being an active part of a research group.

Do you have any tips for anyone wishing to transition into a role like yours?

Be aware of the 'soft' transferable skills you acquire as a researcher, we have a lot of them: project management, communication, collaboration, critical thinking *etc.* They are often sought-after in job adverts. Maybe also be aware of broader, non-obvious courses. For example, my doctoral programme offered training for researchers to inform policy-making decisions, and this would have been relevant for my current position.

If you could take a workplace habit from one field to the other, what would it be?

I do not take the job personally nor do I worry about my job when the workday is over. I used to do both as a PhD student.

Is there a skill you wish you had been taught at university that would be useful in industry? What turned out to not be useful at all?

I can think of one that is not useful: figure-making! Such an important craft for science, but rarely, if ever, used in my new branch of industry. And if it is needed, there will be a separate department to do it. Other than that, the skills needed for my job come mainly from completely different disciplines such as law and engineering.

What are your future ambitions?

Keep publishing my palaeontological research! Other than that, I'll prioritise job security and financial security.



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Cover: *Aldanella attleborensis* (Shaler & Foerste), lower Cambrian, Terreneuvian, Emyaksin Fm; Bol'shaya Kuonamka River, eastern Anabar Uplift, Siberian Platform, Republic of Sakha (Yakutia); inner mould with imprints of the platy shell layer on the surface, adapical side, diameter 15 mm. (Photo by kind permission of Artem Kouchinsky; see Kouchinsky *et al.* 2017, fig. 20A, doi: <[10.4202/app.00289.2016](https://doi.org/10.4202/app.00289.2016)>; CC BY 4.0).



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Cover: The echinoderm *Cambroblastus guolensis* from the Cambrian Sandu Formation of Guangxi, South China. Specimen is housed at the Nanjing Institute of Geology and Palaeontology (NIGPAS 156159). Theca approximately 10 mm wide.



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This publication is now registered on ZooBank and is thus deemed to be valid for taxonomic/nomenclatural purposes. However we request contributors (especially those contributing grant reports) not to include names of new taxa in their reports.

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