The Palaeontology Newsletter

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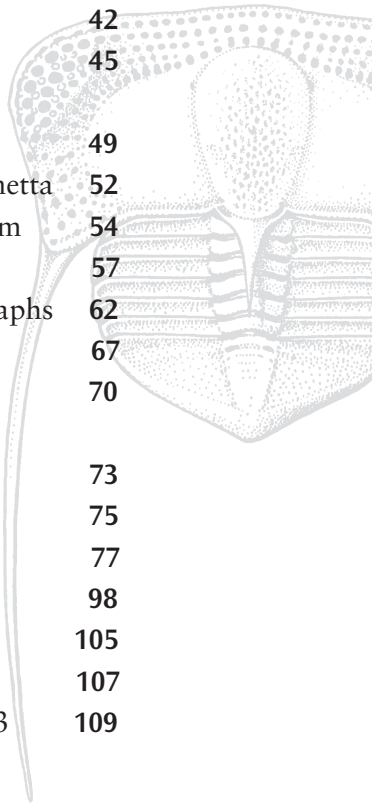

Reminder: The deadline for copy for Issue no. 114 is 1st October 2023.

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Editorial

Working as Acting Newsletter Editor and sitting on the Palaeontological Association Council would have been a dream to childhood Harrie(t). It turns out it's quite a lot of work to juggle with research, but so worth it to have a voice in the field and work on broadening the perspectives we're all exposed to. Moreover, taking on this role satisfyingly combines my careers to date, palaeontologist and publisher, and my grammar and typesetting nerdery. I wanted to take this opportunity to thank those who contribute so much of their time to the Association Newsletter, who brought me on board and are also such a delight to work with, particularly Emilia Jarochowska, Jo Hellawell, Sally Thomas and Nick Stroud.

This issue, we have many excellent contributions from our correspondents that I encourage you to read and consider. We hear from **Sulia Salim Goeting** about the differences between life in Switzerland and Brunei, and **Karen Samonds** about working in Madagascar. **Lorenzo Lustri** tells us about the life of Alberto Mario Simonetta, an early researcher working on the Burgess Shale, and an influence on Lorenzo's career as an Italian palaeontologist. We take a behind-the-scenes tour of the collections available for study at the University Museum of Zoology, Cambridge, thanks to **Emily Mitchell** and **Tom White**. **Jan Zalasiewicz** brings us along on their serendipitous field – literally – work in the Midlands of the UK, and **Gemma Benevento** explains the influence of the hypothesis of punctuated equilibrium on the field of palaeontology. **Ming Khan** gives us a personal insight into the difficulties of living as an academic in a different country to their family, particularly during holiday seasons, an experience that will ring true for many of us. We also have a number of reports from varied Association grants, some engaging book reviews (one of which even inspired a field-trip), and hear from **Graeme Lloyd** on their career outside of academia. A big thank you to all our correspondents for this issue, and I look forward to working with our future correspondents!

Lastly, the 67th Annual Meeting is fast approaching, taking place at the historic University of Cambridge and organized by a fantastic team led by **Alex Liu**; look for details of the Annual Meeting in this issue. The Meeting also marks the deadline for nominations for several open Council positions – if you're interested in working towards positive change for our field please consider applying!

Harriet Drage

Acting Newsletter Editor
<**harriet.drage@palass.org**> / <**newsletter@palass.org**>

@ThePalAss
<**https://www.facebook.com/ThePalAss/**>

Postcards from the President

PalAss President Rachel Wood starts a new series in the *Newsletter* to highlight issues of particular relevance.

Response to concerns raised during IPC6

The International Palaeontological Congress 6 (IPC6) held in November 2022 was attended by numerous members of the Association, including students who were awarded Association travel grants. Following the conference Council was made aware of significant concerns relating to the professional conduct of some delegates and a lack of appropriate response at the time by the organizers. PalAss was not involved in any aspect of the organization of IPC6; however, Council felt it was necessary on behalf of our members and the wider community to raise these concerns formally with the International Palaeontological Association (IPA) who oversee organization of the congress. As part of this communication, Council made clear its view that problematic behaviour and unprofessional conduct have no place in our community. With IPC7 scheduled for 2026, Council will continue to liaise with the IPA leadership and will offer them support in adopting more robust policies, so helping to ensure these issues do not occur in the future.

Rachel Wood, President

Association Business

Annual Meeting and AGM 2023

Notification of the 2023 Annual Meeting

The 2023 Annual Meeting of the Palaeontological Association will be held at the University of Cambridge, UK, on Monday 11th to Friday 15th September, as an in-person meeting. It is organized by Dr Alex Liu and colleagues.

Information on the 2023 AGM

The Annual General Meeting (AGM) will be held in December 2023. Details of how to attend this event will be communicated to members in the coming months; it is likely to be a virtual meeting.

AGENDA

1. Apologies for absence
2. Minutes of the 66th AGM
3. Trustees Annual Report for 2022
4. Accounts and Balance Sheet for 2022 and reappointment of financial examiner
5. Election of Council and vote of thanks to retiring members
6. Report on Council Awards
7. Annual address

Draft AGM Minutes 2022

The 66th AGM took place as a virtual meeting of the membership on 19th December 2022.

1 Apologies for absence: Manabu Sakamoto

1.1 Due to the online nature of the meeting the Secretary asked any member with apologies to e-mail the details so they may be recorded. Names received have been added to the minutes. Total attendance at AGM: 84 members.

2 Minutes of the 65th AGM

2.1 The draft minutes of the 65th AGM were first published in *Palaeontology Newsletter* Issue **110**, as well as in the "yellow pages" section of *Newsletter* **111**. The motion "Does the membership accept the draft AGM minutes from 2021 as a true record?" was put to the vote via a Zoom poll of attendees. The vote had three options: Yes, No, and Abstain. The results were: 19% (13/70) Abstain; 80% (56/70) Yes; 1% (1/70) No. The President asked if the 'No' voter wished to make a statement to the AGM – none was forthcoming. Therefore the motion was passed.

3 Trustees Annual Report for 2021

3.1 The Trustees' Report was first published in *Palaeontology Newsletter* **110**, and also in the "yellow pages" section of *Newsletter* **111**. The motion "Does the membership accept the Trustees' Report from 2021 as published?" was put to the vote via a Zoom poll of attendees. The vote had three options: Yes, No, and Abstain. The results were: 14% (10/73) Abstain; 86% (63/73) Yes; 0% (0/73) No. The motion was passed.

4 Accounts and Balance Sheet for 2021

4.1 The Accounts and Balance sheet ('the Accounts') for 2021 were first published in *Palaeontology Newsletter* **110**, and re-published in the "yellow pages" section of *Newsletter* **111**. The motion "Does the membership accept a) the Accounts from 2021 as published; and b) the re-appointment of the financial examiner (M.R. Corfield of Corfield Accountancy Ltd)?" was put to the vote via a Zoom poll of attendees. The vote had two questions (relating to a) and b) above) each with three options: Yes, No, and Abstain. The results for a) were: 12% (9/74) Abstain; 88% (65/74) Yes; 0% (0/74) No. The results for b) were: 5% (4/74) Abstain; 95% (70/74) Yes; 0% (0/74) No. The motion was passed.

5 Overview of the Association's activities 2022

5.1 Undergraduate Research Bursaries were awarded to: C.R. Scherer (Natural History Museum, London) for 'The dinosaurs of Tendaguru (Late Jurassic, Tanzania): Bringing dark data into the light' supervised by P.M. Barrett; A. Mehmood (University of Bristol) for 'Macroecology of the recovery of temnospondyls from the end-Permian mass extinction' supervised by M.J. Benton; C. Bates (The University of Manchester) for 'Quantifying drift and selection as macroevolutionary processes' supervised by R.J. Garwood; K.M. Walsh (University of Nottingham) for 'Metals, malformations and mass extinction: testing the theory in the living' supervised by B.H. Lomax; I.Z. Rivero Delgado (University College London) for 'Ontogenetic changes in an extinct species of crocodile' supervised by P.D. Mannion; H. Edmondson (The University of Manchester) entitled 'Early Vertebrates of Shropshire' supervised by R.S. Sansom; and S. Newton (University College London) for 'The Palaeobiogeography of Late Cretaceous–Palaeocene mammals' supervised by P. Upchurch.

5.2 In 2022 the Association awarded travel grants to nine individuals via the Postgraduate Travel Fund, plus a further 16 travel grants awarded for individuals to travel to IPC6.

5.3 Grant-in-Aid was awarded by the Association providing funds to support the following meetings and workshops in 2022, totalling £5,018.67: J. Todes for the Karl-Armin Tröger Memorial Inoceramid Workshop (£1,350.00); Z. Hughes for 11th International Symposium of Cephalopods present and past (£1,668.67); and L.A. Jones for the R for Palaeobiologists: Workshop and Hackathon (£2,000.00).

5.4 Engagement Grants were awarded to: J.W. Atkinson for 'Fossils In't Hills and Where to Find Them' (£1,260.00); R.B. Sookias for 'Palaeo For All' (£2,650.00); and M.E.L. Gold for 'Science on the Street' (£1,000.00).

5.5 Career Development Grants were awarded to: N. Carolin (£2,505.63); J. Reeves (£2,400.00); and P. dePolo (£2,424.20).

5.6 Under the Small Grants Scheme Council agreed that the following applicants should receive awards: T. Sklavounou, Whittington Award (£1,490); D. Osipova, Callomon Award (£1,500); J. Ristevski, Stan Wood Award (£1,483.21); and T. Durieux, Sylvester-Bradley Award (£1,500).

5.7 Research Grants were awarded to: R. Sansom for 'Life after death: the evolution of microbial communities responsible for animal decomposition' (£4,280); E. Saitta for 'Characterizing the diagenesis of sex hormones' (£5,000); and S. Maidment for 'The flora, fauna and depositional setting of the Upper Jurassic Sundance Formation, Wyoming, USA' (£9,810.00).

5.8 It was announced that Donald R. Prothero has been appointed as the PalAss Exceptional Lecturer for 2023/24. Donald will present the Innovations in Palaeontology Lecture Series (proposed title: 'How did late Pleistocene birds and mammals from La Brea tar pits respond to climate change?').

6 Council Elections and thanks to retiring Council

6.1 Retiring/Retired Council in 2022 were: Richard Butler (Vice-President); Zoë Hughes (Outreach Officer); Elspeth Sinclair (Education Officer); Nicholas Butterfield (Editor Trustee); Liz Hide (Ordinary Member); Sam Giles (Ordinary Member); and Tom Harvey (Ordinary Member). They were thanked for their service.

6.2 Also thanked by the President were: Maria McNamara and team (Annual Meeting 2022, University College Cork, Ireland); Sean Smart, Emily Green, Shane Wheatley, Lucy Incles, Josh Tucker, and Meghan Jenkinson (ProgPal 2022, University of Lincoln, UK).

6.3 After tallying of votes (both electronic and postal) and scrutineering of the results by Dr Philippa Mason (ex General Secretary of RSPSoc) the following were duly elected as Council members in 2022:

Uwe Balthasar (Vice-President; two years); Russell Garwood (Internet Officer; 2nd term; three years); Shane Wheatley (Deputy Internet Officer; three years); Elizabeth Dowding (Outreach Officer; three years); Orla Bath Enright (Early Research Career Officer; three years); Robert Sansom (Meetings Coordinator; three years); and Harriet Drage (Ordinary Member; three years). The President also thanked everyone who stood for election.

6.4 The outgoing President, Patrick Orr, formally handed over proceedings to Rachel Wood, the incoming President.

7 Announcement of Council Awards

7.1 The Hodson Award 2022 was presented to: Allison C. Daley.

7.2 The President's Medal 2022 was presented to: Zerina Johanson.

7.3 The Lapworth Medal 2022 was presented to: Moya M. Smith.

Trustees Annual Report 2022

The Trustees present their report with the financial statements of the charity for the year ended 31 December 2022. The Trustees have adopted the provisions of *Accounting and Reporting by Charities: Statement of Recommended Practice (SORP)* applicable to charities preparing their accounts in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS 102) (effective 1 January 2019).

1. OBJECTIVES AND ACTIVITIES

1.1 Aims and objectives: The objectives of the Association are to advance education for the public benefit in Palaeontology and its allied sciences by: a) promoting research and publishing the useful results thereof; b) holding public meetings for the reading of original papers and the delivery of lectures; c) extending knowledge of the science through demonstration and publication; d) awarding grants and bursaries; and e) by such other means as the Council of charity trustees may determine.

1.2 General statement about the COVID-19 pandemic: The coronavirus pandemic continued to have a significant impact on Association activities in 2022, particularly with the return to in-person meetings, which have required additional planning and resources (*e.g.* for the Annual Meeting and Progressive Palaeontology).

1.3 Code of Conduct & Professional Standards and Behaviour declarations: In 2022 the Association introduced a new Professional Standards and Behaviour declaration and a new Code of Conduct (CoC) for Members, as well as revised existing policies on professional behaviour and ethical standards. All members will now agree upon renewal of their membership to be bound by the new CoC. The CoC reinforces that: 1) the Association will not discriminate on the basis of race, colour, ethnic origins, immigration status, religion, age, marital status, parental status, sex, sexual orientation, gender identity or expression, socioeconomic background, educational background, or disability; 2) that all members should promote a culture of scientific and research integrity, respect, fairness, and inclusivity and avoid conflicts of interest. Any behaviour that affects or causes damage to a person or a group on the basis of the aforementioned categories will be considered unacceptable and is prohibited by the CoC; and 3) that all members are expected to report any sort of prohibited or unacceptable behaviour while acting in good faith. The new Code of Conduct must be respected by members in any professional workplace.

1.4 Grants-in-aid for meetings and workshops: The Association provided funds to support the following meetings and workshops in 2022, totalling £5,018.67: J. P. Todes, University of Chicago, USA, for the Karl-Armin Tröger Memorial Inoceramid Workshop (£1,350.00); Z. E. Hughes, Natural History Museum, London, UK, for the 11th International Symposium of Cephalopods present and past (£1,668.67); L.A. Jones, Universidade de Vigo, Spain, for the R for Palaeobiologists: Workshop and Hackathon (£2,000.00).

1.5 Public meetings: Two public meetings were held in 2022, and the Association extends its thanks to the organizers of these meetings.

66th Annual Meeting. The Association's Annual Meeting is its flagship meeting and this year was an in-person event held from 18th to 24th July 2022, hosted by University College Cork, Ireland. The meeting was organized by Prof. Maria McNamara and colleagues, and included a pre-conference Public fossil expo, the Royal Irish Academy Discourse Lecture, an early-career researcher event, and workshops/lab tours. There were 188 registrants. The Annual Address was given by Prof. Daniela Schmidt (University of Bristol, UK), entitled 'What – if anything – can palaeontology contribute to understanding our climate crisis?'. President's Prizes for the best 15-minute oral presentations by early-career researchers were awarded to Giovanni Mussini (University of Oxford, UK) and Andre Rowe (University of Bristol, UK). Council Flash Talk Prizes were awarded to Miriam A. Slodownik (University of Adelaide, Australia) and Kiersten K. Formoso (University of Southern California, USA). Council Poster Prizes for best poster presentations by early-career researchers were presented to Iacopo Cavicchini (University of Birmingham, UK), Alison Cribb (University of Southern California, USA), and Anna McGairy (University of Leicester, UK).

Progressive Palaeontology. This is an annual, open meeting for research students in palaeontology and allied sciences to present their work to an audience of their peers. The 2022 hybrid meeting was organized by Sean Smart (co-chair), Emily Green (co-chair), Shane Wheatley (co-chair), Lucy Incles and Josh Tucker at the University of Lincoln, UK, with help from Meghan Jenkinson (The University of Manchester, UK). The meeting was held at the University of Lincoln and online from 14th to 16th June 2022; 107 delegates participated.

1.6 Publications: The journals *Palaeontology* and *Papers in Palaeontology* are produced by Wiley. During 2022, the following volumes were published: *Palaeontology* volume 65, comprising six issues; and *Papers in Palaeontology* volume 8, comprising six issues. The *Palaeontology Newsletter*, consisting of three issues, was also published in 2022. Council thanks Mr N. Stroud for assistance with the typesetting and production of the *Palaeontology Newsletter*.

1.7 Research Grants: A total of 20 valid applications for Palaeontological Association Research Grants were received. Three were recommended for funding in 2022, totalling £19,090, these were: R. S. Sansom (The University of Manchester, UK) for a project entitled 'Life after death: the evolution of microbial communities responsible for animal decomposition' (£4,280.00), E. T. Saitta (Field Museum, Chicago, USA) for a project entitled 'Characterizing the diagenesis of sex hormones' (£5,000.00), and S. C. R. Maidment (Natural History Museum, London, UK) for a project entitled 'The flora, fauna and depositional setting of the Upper Jurassic Sundance Formation, Wyoming, USA' (£9,810.00).

1.8 Small Grants Scheme: The scheme received ten applications, of which four were recommended for funding in 2022, totalling £5,973.21. The small grants awarded by the Association for funding in 2022 include the Sylvester-Bradley, Callomon, Whittington and Stan Wood awards. Council agreed that the following applicants should receive the awards: T. Sklavounou (National and Kapodistrian University of Athens, Greece), for 'Bovid taxonomy and palaeoecology of the Upper Miocene locality of Pikermi (Greece) through osteometric and mesowear analysis' (Whittington Award, £1,490); D. Osipova (Academia Sinica, Taiwan, ROC) for 'Hinge inversion study in Cenozoic Bivalvia of West Pacific' (Callomon Award, £1,500); J. Ristevski (The University of Queensland, Australia) for 'Cranial

anatomy and phylogenetic relationships of the mekosuchine crocodylian Quinkana timara' (Stan Wood Award, £1,483.21); and T. Durieux (Trinity College Dublin, Ireland) for 'Architecture and development of a Carboniferous fern relative' (Sylvester-Bradley Award, £1,500).

1.9 Undergraduate Research Bursary Scheme: The scheme attracted 13 applications, of which seven were recommended for funding in 2022, totalling £16,528.15. The awardees were as follows: C. R. Scherer (Natural History Museum, London, UK) for 'The dinosaurs of Tendaguru (Late Jurassic, Tanzania): Bringing dark data into the light' supervised by P. M. Barrett; A. Mehmood (University of Bristol, UK) for 'Macroecology of the recovery of temnospondyls from the end-Permian mass extinction' supervised by M. J. Benton; C. Bates (The University of Manchester, UK) for 'Quantifying drift and selection as macroevolutionary processes' supervised by R. J. Garwood; K. M. Walsh (University of Nottingham, UK) for 'Metals, malformations and mass extinction: testing the theory in the living' supervised by B. H. Lomax; I. Z. Rivero Delgado (University College London, UK) for 'Ontogenetic changes in an extinct species of crocodile' supervised by P. D. Mannion; H. Edmondson (The University of Manchester, UK) entitled 'Early vertebrates of Shropshire' supervised by R. S. Sansom; S. Newton (University College London, UK) for 'The palaeobiogeography of Late Cretaceous-Palaeocene mammals' supervised by P. Upchurch.

1.10 Publicity, outreach and engagement: The Association continues to promote palaeontology and its allied sciences to print/online media, radio and television. The Association is a major financial supporter of the Lyme Regis Fossil Festival and the Yorkshire Fossil Festival. The Public Engagement Group (PEG), consisting of the Outreach Officer, Education Officer, Publicity Officer, Executive Officer, President and Treasurer decided on expenditure of the group budget (£19,000 for 2022), supporting recurring festival activities and Engagement Grants.

1.11 Engagement Grants: The scheme received a total of five applications in 2022, of which three were recommended for funding, totalling £4,910. These were awarded to: J. W. Atkinson for 'Fossils In't Hills and Where to Find Them' (£1,260) – resources for educational activities and materials required for a stall for use at the Yorkshire Fossil Festival; R. B. Sookias for 'Palaeo For All' (£2,650) – a project to introduce concepts including 'deep time', climate change, and evolutionary thinking to as wide an audience as possible, via creation of a state-of-the-art online Virtual Reality; and M. E. L. Gold for 'Science on the Street' (£1,000) – an online engagement resource to a broad audience by creating and hosting videos on YouTube.

1.12 Career Development Grants: The Career Development Grant is to assist talented early-career researchers who have recently completed their PhD to strengthen their CVs to help them achieve a career in palaeontology. In 2022 the Council awarded a total of £7,329.83 to three early-career researchers: N. Carolin (£2,505.63); J. Reeves (£2,400); P. dePolo (£2,424.20).

1.13 Diversity Group: The Diversity Group (DG) continues to implement the Mentor Scheme and diversity and inclusion continue to be covered in the *Newsletter*, particularly in the section 'Spotlight on Diversity'. In 2022 the DG arranged that membership fees to the Association will also be waived by 60% for people from low-income countries (defined according to the World Bank). Importantly, in 2022 the DG and the Council drafted and approved a Code of Conduct covering all members of the Association.

1.14 Palaeontological Association Exceptional Lecturer scheme: Prof. M. Williams (University of Leicester, UK) was selected in a competitive process to become the Palaeontological Association Exceptional Lecturer for 2022/2023. Under the Innovations in Palaeontology Lecture Series Mark Williams agreed to deliver a talk entitled 'The Anthropocene: planetary scale change to the biosphere, and the future well-being of planet Earth' at multiple institutions: University of Plymouth, UK; Lafayette College, Pennsylvania, USA (virtual presentation); University of Ghent, Belgium; The Geological Society of Glasgow, UK; University of Lausanne, Switzerland; and Athénée Saint Joseph Antsirabe (ASJA) University, Madagascar (virtual – planned for 17th May 2023). He also gave an invited talk after the 2022 AGM.

1.15 Online activities: The Association continues to be the sole host for the online-only journal *Palaeontologia Electronica* and supports *Carnets Geol.* and *The Journal Of Palaeontological Techniques*, as well as continuing to host websites for other societies (The Palaeontographical Society, International Organisation of Palaeobotany), palaeontological online resources (EDNA fossil insect database, the Kent Fossil Database, SPIERS Software), palaeontological networking sites (European Coalfield Conservation Opportunities) and online outreach projects (Palaeontology [Online]). The listserver PaleoNet also continues to be hosted. The Association continues to run its Internet activities on cloud-based services provided by AWS, located on EU-based servers, whilst e-mail, file hosting and internal e-mail lists are operated on Google Workspace through its non-profit provision, and code versioning is achieved through GitHub non-profit provision.

1.16 Awards: The Lapworth Medal, awarded to people who have made a significant contribution to the science by means of a substantial body of research, was presented to Prof. Moya Meredith Smith (King's College London, UK). The President's Medal, awarded to a palaeontologist within 15 to 25 years of 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, was presented to Dr Zerina Johanson (Natural History Museum, London, UK). The Hodson Award, for a palaeontologist within ten years of award of their PhD who has made an outstanding contribution to the science through a portfolio of original published research, was awarded to Prof. Allison Daley (University of Lausanne, Switzerland). Council also awards Undergraduate Prizes to outstanding students in university departments worldwide where Palaeontology is taught beyond Level 1; a total of 18 were awarded throughout the year.

1.17 Forthcoming plans: The Association will continue to make substantial donations from General and Designated funds to promote the charitable aims of the Association. Resources will be made available to continue a similar programme of grants, meetings, outreach and public engagement activities. The 2023 Progressive Palaeontology meeting is to be hosted by the University of Liverpool, UK, in June and the 67th Annual Meeting will be hosted by the University of Cambridge, UK, in September 2023 – both are planned as in-person meetings. The Diversity Group will continue to implement the recommendations of the Diversity Study, removing barriers to participation and increasing access to palaeontology for under-represented groups. Continual surveys of the membership will aid with monitoring progress.

1.18 Public benefit: The Trustees confirm that they have referred to the Charity Commission's guidance on public benefit when reviewing the charity's aims and objectives, in planning future activities and setting the grant-making policy for the year.

2. ACHIEVEMENTS AND PERFORMANCE

2.1 Meetings support: During 2022, the Association agreed to support a total of three palaeontological meetings, symposia or workshops worldwide. In 2022 the Association awarded travel grants to 27 individuals. Of these, 11 Postgraduate Travel Funds (up to £200 per applicant) were awarded to: N. Hohmann – EGU 2022; R. Gougeon – Nereis Park VI; I. Leonhard – European Conodont Symposium 2022; P. Świś – European Conodont Symposium 2022; L. Mulvey – European Conodont Symposium 2022; M. Grohganz – European Conodont Symposium 2022; P.-C. Kuo – 82nd Annual Meeting of the Society of Vertebrate Paleontology (SVP); E. Hunt – 82nd Annual Meeting of the Society of Vertebrate Paleontology (SVP); B. Igielman – 82nd Annual Meeting of the Society of Vertebrate Paleontology (SVP); M. Reid – 82nd Annual Meeting of the Society of Vertebrate Paleontology (SVP); and G. Svorligkou – 16th International Congress of the Geological Society of Greece. A further 16 student travel grants of up to £700 per applicant were awarded for individuals to travel to IPC6. Successful applicants were: M. Ravelson (University of Antananarivo, Madagascar; note: award was not taken up), R. Umamaheswaran (IIT, Bombay, India), A. Haldar (IIT, Kharagpur, India), S. Sen (IIT, Kharagpur, India), T. Priya (IIT, Bombay, India), D. Policarpio (National Institute of Geological Sciences, Quezon City, Philippines), M. Tablizo (National Institute of Geological Sciences, Quezon City, Philippines), M. A. Saparin (Universiti Teknologi Petronas, Malaysia), R. Knecht (Harvard University, USA), S. M Nebreda (Universidad Autónoma de Madrid, Spain), A. McGairy (University of Leicester, UK), S. Lynch (University of Lausanne, Switzerland), Y. Liu (University of Bristol, UK), P. B Vixseboxse (University of Cambridge, UK), G. Potin (University of Lausanne, Switzerland), R. Gougeon (University of Saskatchewan, Canada). The Association's support enabled the worldwide dissemination of research to the benefit of the global palaeontological community.

2.2 Publications: During 2022, Volume 65 of *Palaeontology* (34 papers) and Volume 8 of *Papers in Palaeontology* (43 papers) were published. Both journals are currently hybrid, but 44% of *Palaeontology* articles were published Open Access, and 42% of *Papers in Palaeontology*. The Association established a mentoring scheme for new journal editors. Four Early-Career Associate Editors were appointed, received initial training in the journal workflow, and were each paired with an existing Handling Editor to act as mentor as they managed the review process for submitted articles.

2.3 Support for research: In 2022 the Association agreed to fund the research activities of 14 early-career researchers and undergraduates. Apart from directly benefiting the career development of the individuals concerned, the Association's funds continue to enable more palaeontological research to be undertaken worldwide than would otherwise be the case. Compared to 2021, application numbers for the Research Grants were static (20 applications; three awarded; 15% success rate). The applications to the Small Grants Scheme decreased (from 19 to 10), with four awarded, and the success rate consequently was 40%. In 2022 three Career Development Grants were awarded from a total of eight applications. Applications to the Undergraduate Research Bursary Scheme increased in 2022 compared to 2021 (from seven to 12 applications) and the success rate decreased to 58% from 85%.

2.4 Mentoring scheme for early-career palaeontologists: In 2017 the Association established a mentoring scheme. The scheme initially focused on those transitioning from late-stage PhD to postdoctoral positions and from postdoctoral positions to permanent jobs but is now open to Association members at any stage of PhD study and those conducting post-doctoral research

who do not have a permanent position. A future aim is to roll the scheme out to other transition points such as mid-career to senior leadership. In 2022 a total of 20 palaeontologists in permanent positions offered to act as mentors and, to date, 40 early-career palaeontologists have either been enrolled, or have taken part, in the scheme (25 currently). The Association's Mentor Scheme is via direct mentoring, via e-mail, video calls or other forms of communication with the scheduling and nature of these meetings at the discretion of the paired mentor/mentee.

2.5 Outreach, education and public engagement: During 2022, the Association provided £3,000 to support the online Lyme Regis Fossil Festival and £3,000 to the Yorkshire Fossil Festival. Both were very successful events. In 2022, PEG awarded three Engagement Grants (see 1.10). The Association's Twitter and Facebook accounts continue to enable engagement with wider audiences, and rapid dissemination of news about research, events and palaeontology outside the academic world. The Association's YouTube channel (accessible at <**https://www.youtube.com/thepalaeontologicalassociation**>) hosts videos for a general audience as well as recordings of talks from the 2022 PalAss Exceptional Lecturer. At the end of 2022 members of the Association's Facebook group numbered 2.5K and the Facebook page had 1K followers. The Association's Twitter account had 10.9K followers.

3. FINANCIAL REVIEW

3.1 Reserves: As of 31st December 2022, the Association holds reserves of £808,854 in General Funds, which enable the Association to generate additional revenue through investments, and thus to keep subscriptions to individuals at a low level, whilst still permitting a full programme of meetings to be held, publications to be produced, and the award of research grants and Grants-in-aid. They also act as a buffer to enable the normal programme to be followed in years in which expenditure exceeds income, and allow new initiatives to be pursued. The Association holds £120,087 in Designated Funds, which contribute interest towards the funding of the Sylvester-Bradley, Hodson, Callomon, Whittington and Stan Wood Awards and towards the Jones-Fenleigh Fund. Total funds carried forward to 2023 totalled £928,941.

3.2 Reserves policy: The Association maintains a minimum of General Fund reserves at a level sufficient to fund at least one year's expenditure, based on a three-year average of expenditure, in addition to Designated Fund reserves. This policy is reviewed and approved annually by the Trustees.

3.3 Summary of expenditure: Total charitable expenditure through grants to support research, scientific meetings and workshops in 2022 was £416,278. Governance costs were £20,615. Total resources expended were £487,293. The Association continues its membership of the International Palaeontological Association and remains a Tier 1 sponsor of *Palaeontologia Electronica* and the *Treatise on Invertebrate Paleontology*.

4. STRUCTURE, GOVERNANCE AND MANAGEMENT

4.1 Nature of the governing document: The Palaeontological Association was originally formed on 27th February 1957 as an unincorporated association, which was established as a registered charity (number 276369) on 21st August 1978. At an Extraordinary General Meeting on 16th March 2016, the membership voted in favour of the Association becoming a charitable incorporated organization (CIO) under the Charities Act 2011. All contracts and assets were transferred to the new

organization on 1st January 2017. As a CIO the charity is an independent legal entity and, in the unlikely event of its being wound up, the members (including the Trustees) will have no liability for any outstanding contractual debts that the CIO cannot meet. However, the Trustees will continue to have the normal trustee liability for negligence or fraudulence in managing the charity's affairs. The charitable objectives of the Association remain unchanged. The change in legal status means that there has been a different registration number (1168330) and constitution since 2017. The governing document of the Palaeontological Association is the Constitution adopted at the AGM on 15th December 2016 and updated on 17th December 2020.

4.2 Management: The Association is managed by a Council of up to 20 Trustees, which is led by the President. The Association employs an Executive Officer and a Publications Officer who serve on Council but are not Trustees. The Trustees are elected by vote of the Membership at the Annual General Meeting, following guidelines laid down in the Constitution.

4.3 Membership: Membership on 31st December 2022 totalled 1,050. Of these, there were 531 Ordinary Members, 183 Retired Members, 17 Honorary Members and 319 Student Members.

4.4 Risk: The Trustees consider that the Association is in a sound financial position. Membership numbers and revenues from publications remain strong. The Trustees highlight the changing publications landscape; which will affect the Association's publication revenue in the future, and may require a reduction in future spending to compensate for the loss of income be considered. The Trustees and the Risk Management committee continue to regularly assess the Association's risks.

5. REFERENCE AND ADMINISTRATION

5.1 Name and Charity Number: The Palaeontological Association is a Charity registered in England and Wales, Charity Number 1168330.

5.2 Address: The contact address of the Association is The Palaeontological Association, Alport House, 35 Old Elvet, Durham DH1 3HN, UK.

5.3 Trustees: The following members were elected at the AGM on 19th December 2021 to serve as Trustees in 2022: P. J. Orr (President); P. M. Barrett (Vice President); R. J. Butler (Vice President); A. R. T. Spencer (Secretary); M. Sakamoto (Treasurer); P. D. Taylor (Chair of the Editorial Board); N. J. Butterfield (Editor Trustee); S. C. R. Maidment (Editor Trustee); R. J. Garwood (Internet Officer); E. B. Jarochowska (Newsletter Editor); T. G. Clements (Book Review Editor); Z. E. Hughes (Outreach Officer); N. Vuolo (Publicity Officer); E. C. Sinclair (Education Officer)*; F. Saleh (Diversity Officer); U. Balthasar (Meetings Coordinator); S. Giles (Ordinary Member); T. H. P. Harvey (Ordinary Member); L. A. Hide (Ordinary Member); and R. Theodore (Ordinary Member). *resigned as a Trustee on 6th September 2022. In addition R. A. Wood (President-Elect) was announced at the 2021 AGM.

5.4 Professional services: The Association's Bankers are NatWest, 42 High Street, Sheffield S1 2GE. The Association's Independent Examiner is Ms M.R. Corfield ACA ACMA, Corfield Accountancy Ltd., Myrick House, Hendomen, Montgomery, Powys SY15 6EZ. The Association's investment portfolio is managed by Quilter Cheviot Investment Management, Senator House, 85 Queen Victoria Street, London EC4V 4AB.

Approved by order of the Board of Trustees on 30th June 2023.

Independent Examiner's Report to the Trustees of The Palaeontological Association

Independent examiner's report to the Trustees of The Palaeontological Association ('the Charity')
I report to the Charity Trustees on my examination of the accounts of the above charity for the year ended 31 December 2022 set out on pages 14 to 22.

This report is made solely to the Charity's Trustees, as a body, in accordance with Section 145 of the Charities Act 2011. My work has been undertaken so that I might state to the Charity's Trustees those matters I am required to state to them in an Independent Examiner's report and for no other purpose. To the fullest extent permitted by law, I do not accept or assume responsibility to anyone other than the Charity and the Charity's Trustees as a body, for my work or for this report.

Responsibilities and basis of report
As the Charity's Trustees, you are responsible for the preparation of the accounts in accordance with the requirements of the Charities Act 2011 ("the Act"). You are satisfied that the accounts of the Charity are not required by charity law to be audited and have chosen instead to have an independent examination.

I report in respect of my examination of the charity's accounts as carried out under section 145 of the Charities Act 2011 ('the 2011 Act'). In carrying out my examination I have followed the Directions given by the Charity Commission under section 145(5) (b) of the 2011 Act.

Independent examiner's statement
The charity's gross income exceeded £250,000 and I am qualified to undertake the examination by being a qualified member of the Institute of Chartered Accountants in England and Wales (ICAEW) and the Chartered Institute of Management Accountants (CIMA), which are two of the listed bodies.

I have completed my examination. I confirm that no matters have come to my attention in connection with the examination giving me cause to believe:

1. accounting records were not kept in respect of the Charity as required by section 130 of the 2011 Act; or
2. the accounts do not accord with those records; or
3. the accounts have not been prepared in accordance with the methods and principles of the Statement of Recommended Practice for accounting and reporting by charities (applicable to charities preparing their accounts in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS102)) and the 2011 Act.

I have no concerns and have come across no other matters in connection with the examination to which attention should be drawn in this report in order to enable a proper understanding of the accounts to be reached.

Ms M. R. Corfield ACA ACMA
Corfield Accountancy Limited
Chartered Accountants
Myrick House
Hendomen
Montgomery
Powys
SY15 6EZ

Date: 26th June 2023.

THE PALAEONTOLOGICAL ASSOCIATION

Statement of Financial Activities for the Year Ended 31 December 2022

	Notes	Unrestricted funds £	Designated funds £	31.12.22 Total funds £	31.12.21 Total funds £
INCOME AND ENDOWMENTS FROM					
Donations and legacies		30,299	4,014	34,313	35,256
Charitable activities					
Public Meetings		32,114	—	32,114	31,284
Publications		312,910	—	312,910	317,787
Investment income	**2**	13,603	1,531	15,134	14,736
Total		388,926	5,545	394,471	399,063
EXPENDITURE ON					
Raising funds	**3**	50,400	—	50,400	37,820
Charitable activities					
Public Meetings		65,200	—	65,200	22,100
Grants & Awards		64,078	9,159	73,237	28,317
Administration		73,211	—	73,211	51,652
Publications		204,630	—	204,630	197,051
Governance Costs		20,615	—	20,615	9,462
Total		478,134	9,159	487,293	346,402
Net gains (losses) on investments		(93,808)	—	(93,808)	79,350
NET INCOME/(EXPENDITURE)		(183,016)	(3,614)	(186,630)	132,011
RECONCILIATION OF FUNDS					
Total funds brought forward		991,870	123,701	1,115,571	983,560
TOTAL FUNDS CARRIED FORWARD		808,854	120,087	928,941	1,115,571

The notes form part of these financial statements.

THE PALAEONTOLOGICAL ASSOCIATION

Balance Sheet
31 December 2022

	Notes	Unrestricted funds £	Designated funds £	31.12.22 Total funds £	31.12.21 Total funds £
FIXED ASSETS					
Investments	**6**	575,775	120,087	695,862	794,075
CURRENT ASSETS					
Debtors	**7**	188,416	—	188,416	190,472
Cash at bank		54,811	—	54,811	147,113
		243,227	—	243,227	337,585
CREDITORS					
Amounts falling due within one year	**8**	(10,148)	—	(10,148)	(16,089)
NET CURRENT ASSETS		233,079	—	233,079	321,496
TOTAL ASSETS LESS CURRENT LIABILITIES		808,854	120,087	928,941	1,115,571
NET ASSETS		808,854	120,087	928,941	1,115,571
FUNDS					
Unrestricted funds	**9**			928,941	1,115,571
TOTAL FUNDS				928,941	1,115,571

The notes form part of these financial statements.

The financial statements were approved by the Board of Trustees and authorised for issue on 30th June 2023, and were signed on its behalf by Dr M. Sakamoto – Trustee.

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements for the Year Ended 31 December 2022

1. ACCOUNTING POLICIES

Basis of preparing the financial statements

The financial statements have been prepared in accordance with the Charities SORP (FRS 102) 'Accounting and Reporting by Charities: Statement of Recommended Practice applicable to charities preparing their accounts in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS 102) (effective 1 January 2019)', Financial Reporting Standard 102 'The Financial Reporting Standard applicable in the UK and Republic of Ireland' and the Charities Act 2011.

The Palaeontological Association meets the definition of a public benefit entity under FRS102. Assets and liabilities are initially recognized at historical cost or transaction value unless otherwise stated in the relevant accounting policy.

Income

The charity's income principally comprises subscriptions from individuals and institutions which relate to the period under review, and sales of scientific publications.

All income is recognized in the Statement of Financial Activities once the charity has entitlement to the funds, it is probable that the income will be received and the amount can be measured reliably.

Expenditure

Liabilities are recognized as expenditure as soon as there is a legal or constructive obligation committing the charity to that expenditure, it is probable that a transfer of economic benefits will be required in settlement and the amount of the obligation can be measured reliably. Expenditure is accounted for on an accruals basis and has been classified under headings that aggregate all cost related to the category. Where costs cannot be directly attributed to particular headings they have been allocated to activities on a basis consistent with the use of resources.

Allocation and apportionment of costs

Administrative costs have been allocated to the various cost headings based on estimates of the time and costs spent thereon.

Taxation

The charity is exempt from corporation tax on its charitable activities.

Fund accounting

General Funds are unrestricted funds which are available for use at the discretion of the Council in furtherance of the general objectives of the charity and which have not been designated for other purposes.

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2022

1. ACCOUNTING POLICIES – continued

Designated funds comprise unrestricted funds that have been set aside by Council for particular purposes. The aim of each designated fund is as follows:

- Sylvester-Bradley Fund: Grants made to permit palaeontological research.
- Jones-Fenleigh Fund: Grants to permit one or more delegates annually to attend the Symposium of Vertebrate Palaeontology and Comparative Anatomy (SVPCA) meeting.
- Hodson Fund: Awards made in recognition of the palaeontological achievements of a researcher within ten years of the award of their PhD.
- Callomon Fund: Grants made to permit palaeontological research with a strong fieldwork element.
- Whittington Fund: Grants made to permit palaeontological research with an element of study in museum collections.
- Stan Wood Fund: Grants in the area of vertebrate palaeontology ideally involving fieldwork, due to generous donations in memory of the Scottish fossil collector Mr Stan Wood.

2. INVESTMENT INCOME

	31.12.22 £	31.12.21 £
Deposit account interest	230	16
Investment Income	14,904	14,720
	15,134	14,736

3. RAISING FUNDS

	31.12.22 £	31.12.21 £
Voluntary Income Costs: Administration	45,994	32,870
Investment Management Costs: Stockbroker Fees	4,406	4,950
	50,400	37,820

4. TRUSTEES' REMUNERATION AND BENEFITS

There were no Trustees' remuneration or other benefits for the year ended 31 December 2022 nor for the year ended 31 December 2021.

Trustees' expenses

The total travelling expenses reimbursed to 20 Members of Council (2021:20) was £6,709 (2021: £71).

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2022

5. STAFF COSTS

Analysis of Staff Costs and Remuneration

	£ 2022	£ 2021
Salaries	101,301	93,536
Social Security Costs	7,115	6,467
Pension Costs	10,160	9,354
Total	118,576	109,357

The average monthly number of employees during the year was as follows:

	2022	2021
Publications	1	1
Administration	1	1
	2	2

No employees received emoluments in excess of £60,000.

6. FIXED ASSET INVESTMENTS

Investments are initially recognized at their transaction value and subsequently measured at their fair value as at the balance sheet date. The statement of financial activities includes the net gains and losses arising on revaluation and disposals throughout the year.

7. DEBTORS: AMOUNTS FALLING DUE WITHIN ONE YEAR

	31.12.22 £	31.12.21 £
Sundry Debtors	188,416	190,472

8. CREDITORS: AMOUNTS FALLING DUE WITHIN ONE YEAR

	31.12.22 £	31.12.21 £
Trade creditors	2,419	6,294
Subscriptions in advance	7,729	9,795
	10,148	16,089

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2022

9. MOVEMENT IN FUNDS

	At 1.1.22 £	Net movement in funds £	At 31.12.22 £
Unrestricted funds			
General fund	991,870	(183,016)	808,854
Sylvester-Bradley	12,417	(5,215)	7,202
Jones-Fenleigh	28,880	1,641	30,521
Hodson	112	2	114
Callomon	1,609	(253)	1,356
Whittington	15,017	21	15,038
Stan Wood	65,666	190	65,856
TOTAL FUNDS	1,115,571	(186,630)	928,941

Net movement in funds included in the above are as follows:

	Incoming resources £	Resources expended £	Gains and losses £	Movement in funds £
Unrestricted funds				
General fund	388,926	(478,134)	(93,808)	(183,016)
Sylvester-Bradley	461	(5,676)	—	(5,215)
Jones-Fenleigh	2,498	(857)	—	1,641
Hodson	2	—	—	2
Callomon	292	(545)	—	(253)
Whittington	502	(481)	—	21
Stan Wood	1,790	(1,600)	—	190
TOTAL FUNDS	394,471	(487,293)	(93,808)	(186,630)

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2022

9. MOVEMENT IN FUNDS — *continued…*

Comparatives for movement in funds:

	At 1.1.21 £	Net movement in funds £	At 31.12.21 £
Unrestricted Funds			
General fund	858,207	133,663	991,870
Sylvester-Bradley	14,586	(2,169)	12,417
Jones-Fenleigh	28,403	477	28,880
Hodson	112	—	112
Callomon	1,322	287	1,609
Whittington	15,982	(965)	15,017
Stan Wood	64,948	718	65,666
TOTAL FUNDS	983,560	132,011	1,115,571

Comparative net movement in funds included in the above are as follows:

	Incoming resources £	Resources expended £	Gains and losses £	Movement in funds £
Unrestricted funds				
General fund	395,432	(341,119)	79,350	133,663
Sylvester-Bradley	514	(2,683)	—	(2,169)
Jones-Fenleigh	477	—	—	477
Callomon	287	—	—	287
Whittington	535	(1,500)	—	(965)
Stan Wood	1,818	(1,100)	—	718
TOTAL FUNDS	399,063	(346,402)	79,350	132,011

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2022

9. MOVEMENT IN FUNDS — *continued…*

A current year 12 months and prior year 12 months combined position is as follows:

	At 1.1.21 £	Net movement in funds £	At 31.12.22 £
Unrestricted funds			
General fund	858,207	(49,353)	808,854
Sylvester-Bradley	14,586	(7,384)	7,202
Jones-Fenleigh	28,403	2,118	30,521
Hodson	112	2	114
Callomon	1,322	34	1,356
Whittington	15,982	(944)	15,038
Stan Wood	64,948	908	65,856
TOTAL FUNDS	983,560	(54,619)	928,941

A current year 12 months and prior year 12 months combined net movement in funds included in the above are as follows:

	Incoming resources £	Resources expended £	Gains and losses £	Movement in funds £
Unrestricted funds				
General fund	784,358	(819,253)	(14,458)	(49,353)
Sylvester-Bradley	975	(8,359)	—	(7,384)
Jones-Fenleigh	2,975	(857)	—	2,118
Hodson	2	—	—	2
Callomon	579	(545)	—	34
Whittington	1,037	(1,981)	—	(944)
Stan Wood	3,608	(2,700)	—	908
TOTAL FUNDS	793,534	(833,695)	(14,458)	(54,619)

THE PALAEONTOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2022

10. RELATED PARTY DISCLOSURES

There were no related party transactions for the year ended 31 December 2022.

11. INVESTMENT GAINS AND LOSSES

All gains and losses are taken to the Statement of Financial Activities as they arise. Realized gains and losses on investments are calculated as the difference between sales proceeds and their opening carrying value or their purchase value if acquired subsequent to the first day of the financial year.

Unrealized gains and losses are calculated as the difference between the fair value at the year end and their carrying value. Realized and unrealized investment gains and losses are combined in the Statement of Financial Activities.

Investment Gains/Losses	**31st December 2022**	**31st December 2021**
	£	£
Realized Gain/(Loss)	—	18,839
Unrealized Gain/(Loss)	(93,808)	60,511
Total per Statement of Financial Activities	(93,808)	79,350

Detailed Statement of Financial Activities for the Year Ended 31 December 2022

	31.12.22 Unrestricted funds £	31.12.21 Total funds £
INCOME AND ENDOWMENTS		
Donations and legacies		
Donations	7,205	2,307
Subscriptions	27,108	32,949
	34,313	35,256
Investment income		
Deposit account interest	230	16
Investment Income	14,904	14,720
	15,134	14,736
Charitable activities		
Scientific Journals	306,984	308,307
Special Papers	712	416
Field Guides	4,885	8,391
Distribution	329	673
Scientific Meetings	32,114	31,284
	345,024	349,071
Total incoming resources	**394,471**	**399,063**
EXPENDITURE		
Raising donations and legacies		
Administration	45,994	32,870
Investment management costs		
Stockbroker Fees	4,406	4,950
Charitable activities		
Scientific Journals	53,138	48,520
Newsletters	15,260	20,060
Marketing	1,705	215
Publication Costs	84,412	84,205
Editorial Costs	50,115	44,051
Public Meetings & Costs	65,200	22,100
Grants & Awards	48,527	9,541
Research Grants	24,710	18,776
Administration	73,211	51,652
	416,278	299,120
Support costs		
Governance costs		
Trustees' expenses	6,709	71
Accountancy and legal fees	595	595
Administration	13,311	8,796
	20,615	9,462
Total resources expended	**487,293**	**346,402**
Net income before gains and losses	**(92,822)**	**52,661**
Recognized gains and losses		
Recognized gains/(losses) on fixed asset investments	(93,808)	79,350
Net income	**(186,630)**	**132,011**

This page does not form part of the statutory financial statements.

INVESTMENT PORTFOLIO 2022

In July 2020 the Association investments held with Quilter Cheviot Ltd were transferred to their Global Income and Growth Fund for Charities launched early in 2020. The funds held by Quilter Cheviot represent approximately 60 % of the Association's investment portfolio. The remaining 40 % of invested assets are with CCLA Investment Management and of these approximately 20 % are held in a COIF Charities Fixed Interest Fund and the remaining 80 % were transferred in July 2021 to their COIF Charities Ethical Investment Fund. The combined portfolio movements are shown below.

Opening balance 01.01.2022:	794,075.51
Purchases	—
Sales	—
Gains / (Losses)	(93,807.85)
Stockbroker Fees	(4,406.00)
Balance at 31.12.22	695,861.66

Nominations for Council

At the upcoming AGM in December 2023, the following vacancies will occur on Council:

- Vice-President (two-year term)
- Diversity Officer (three-year term)
- Education Officer (three-year term)
- Newsletter Editor (three-year term)
- Reviews Editor (three-year term)
- Ordinary Member (three-year term)

Nominations are now invited for these posts. Please note that each candidate must be proposed by at least two members of the Association and that any individual may not propose more than two candidates. Each nomination must be accompanied by the candidate's written agreement to stand for election, and a short personal statement (less than 200 words) describing their interests for publication in the *Newsletter*, and a completed Professional Standards and Behaviour Self-Declaration form filled in by the candidate. Full details of the nomination procedure and form to download can be found at <**https://www.palass.org/association/how-stand-election-council**>.

All potential Council Members are asked to consider the following: since the Palaeontological Association is a Registered Charity, in the eyes of the law most Council Members become a Trustee of that Charity. Under the terms of the Charities Act 2011, Trustees have independent control over, and legal responsibility for, a charity's management and administration. Further information on the responsibilities of Trustees can be obtained from the Charity Commission for England and Wales.

The updated closing date for nominations is **15th September 2023**. They should be sent in a PDF document to the Secretary by e-mail to <**secretary@palass.org**>.

Council vacancies: 'job descriptions'

Vice-President (x1 vacancy; two-year term)
The Vice-President is one of the more loosely defined Council offices. Vice-Presidents are normally long-serving Council members who have previously held one of the other offices. They have no formal portfolio or duties other than to deputize for the President if and when required, but are present on Council to provide independent input on all matters, backed up by experience arising from their long service. They are also expected to lead or at least participate in important subcommittees, particularly those tasked with making recommendations for the awards of grants.

Diversity Officer (three-year term)
The Diversity Officer leads the Diversity Group in developing strategies to support and promote diversity within the Palaeontological Association and broader palaeontology community. The Diversity Officer should aim to identify issues and barriers that arise for under-represented groups and work with the Diversity Group on trying to provide solutions. The officer will also liaise with the Public Engagement Group with the aim of promoting palaeontology as a diverse and welcoming scientific community to a wider audience. The officer should also promote the code of conduct and facilitate efforts to ensure it is being upheld at Association-sponsored events. The Diversity Officer may volunteer to sit on one or more of the Council sub-committees to review grants and awards.

Education Officer (three-year term)
Together the Publicity Officer, Outreach Officer and Education Officer comprise the Public Engagement Group (PEG). These posts have responsibility for all the Palaeontological Association outreach activities. Currently they include organizing the Association's presence at Lyme Regis Fossil Festival and the Yorkshire Fossil Festival, coordinating the Engagement Grants, answering relevant enquiries, and initiating other activities that promote and develop palaeontological outreach and education for the Association. The members of PEG work closely together and their roles often overlap, but responsibilities associated with the Education Officer post include leading the Association's educational activities, *e.g.* delivering dedicated activities at schools' days associated with fossil festivals and communication with ESTA. Members of PEG also work closely with the Diversity Group. The Education Officer may volunteer to sit on one or more of the Association sub-committees to review grants and awards.

Newsletter Editor (three-year term)
Editing the *Palaeontology Newsletter* is an intense role three times a year with relatively little in between apart from collating some content and attending Council meetings. The main responsibilities are approaching people and commissioning content, ensuring that permission for all reproduced images and content has been sourced, editing all content in the *Palaeontology* style, and reminding contributors of deadlines as necessary. The Newsletter Editor may volunteer to sit on one or more of the Council sub-committees to review grants and awards.

Reviews Editor (three-year term)
The main duty of the Reviews Editor is to provide a range of new and recently-published scientific book titles for members to review, as well as soliciting reviews of any other relevant media (*e.g.* film, TV programme, online blog, YouTube series, podcast, computer game, educational resource, software package). The books available to review span all areas of palaeontological and evolutionary research and, as such, it is necessary to establish and maintain contact with a broad range of publishers, search for new titles and request review copies from publishers. For each

Palaeontology Newsletter, a list of recently-acquired titles is prepared and, as requests come in from members to review the books, each copy must be sent to the prospective reviewer. Reviews recently received from members must be edited in time for each *Newsletter* deadline. It is often necessary to remind reviewers when their text is required so records must be kept to monitor movement of books and receipt of reviews. The Reviews Editor may volunteer to sit on one or more of the Council sub-committees to review grants and awards.

Ordinary Members (x1 vacancy; three-year term)
Ordinary members do not have a formal portfolio. They attend Council meetings and contribute to discussion, decision making and future planning. They often participate in important sub-committees, such as those tasked with reviewing and making decisions upon grant applications.

Awards and Prizes

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' below.

Statement of Diversity

The Palaeontological Association has an Unconscious Bias document (available on the Association website), 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 sex, 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.

Palaeontological Association awards and medals selection procedures

Council discusses the Association awards and medals at the May Council meeting. Voting to select awardees occurs at the meeting or soon after the meeting by electronic means. 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 being 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 tied, 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.

Nominations that are unsuccessful will be rolled over for a further two years, unless this takes them outside of the award's remit. The nominees will have the opportunity to revise the nomination each year by contacting the Secretary. After the three-year period elapses re-nomination is possible providing that the application continues to fall within the award/medal remit.

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 befpre 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 talk and the Council Poster Prize is awarded for the best poster 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 this award. Individuals may nominate themselves for consideration when submitting abstracts for the Meeting. The prize is 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 either *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 will be drawn up in October (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 or three sentences explaining why they are deserving. The Editor-in-Chief will draw up a short-list of no more than five papers with supporting statements to circulate to the Editorial Board. The Editorial Board will then select 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*/*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 short synopses for the *Newsletter*. An announcement of the awards will also be made at the AGM.

(The winners for 2022 are announced on page 40.)

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.

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.
- 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 Innovations in Palaeontology Lecture Series 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.
- Applications to be a PalAss Exceptional Lecturer will be strengthened if the applicant agrees to submit a paper as a review article for possible publication in *Palaeontology*.

Eligibility and selection process of the PalAss Exceptional Lecturer:

- Eligible candidates will have a PhD in palaeontology or a related field.
- 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.
- The PalAss Exceptional Lecturer will be chosen based on the career track record, including research impact (relative to their career stage) and oratorical skills.

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:

- 1st November 23:59 GMT: Deadline for nominations for the PalAss Exceptional Lecturer.
- December: The PalAss Exceptional Lecturer will be announced at the Annual Meeting.
- March: The call for host institutions to participate in the Innovations in Palaeontology Lecture Series will be published in the *Newsletter*.
- 1st June 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**>.

GRANTS

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.

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).

Engagement Grants

Awards are made to encourage educational outreach, public engagement, and related initiatives with palaeontological themes. Normally, the budget for an individual grant would be less than £5,000 GBP (or equivalent currency in the applicant's country at the time the funds are disbursed). However, under exceptional circumstances, a budget of up to £8,000 GBP for an individual application will be considered. Grants can support either stand-alone complete projects, or 'proof of concept' case studies that have their own outcomes but that form the groundwork for a larger bid elsewhere. Applications are welcomed from any country and from applicants of any nationality.

Applications for salary costs are permitted, providing a full justification is given, but if awarded all legal and financial liability will lie with the applicant (see: Categories of expenditure for which the Palaeontological Association does not provide support, below).

Other conditions:

- Proposals must fit with the charitable aims of the Association.
- Preference is given to applications for a single purpose (rather than top-ups of grants for existing projects). We particularly encourage applications with an innovative aspect, such as engaging with new media, and especially cases that will disseminate good practice. We also encourage applications aimed at supporting under-represented groups in palaeontology (see the Diversity Study for more details).
- If the principal applicant is a member of the Association they should be signed into the website when submitting the form. Applicants can contact the Executive Officer Dr Jo Hellawell (e-mail <**executive@palass.org**>) for further information regarding membership.
- Preference will normally be given to candidates who have not previously won an award. The application deadline is **1st September** and funds will normally be available from 1st November each year. The awards will be announced at the Annual General Meeting.

Proposals will be ranked on the following criteria:

- Fit to the charitable aims of the Association
- Imaginative quality, innovation, and likely spread and impact of the proposal
- Feasibility, value for money and cost effectiveness
- Track record of the investigator in engagement and education initiatives

At the end of the award period a final report (including receipted accounts) will be submitted for review by the Trustees or, where appropriate, external referees. Appropriate parts of the final report will be published in the Association *Newsletter*. Any publicity associated with the activity must mention the support of the Association.

Applications must be submitted electronically via the webpage. Feedback on unsuccessful applications will be provided upon request to the Secretary.

Categories of expenditure for which the Palaeontological Association does not provide support:

Applicants are advised that the Association does not offer funding for the following costs, and hence none of these items may be included in any budget proposal submitted to the Association.

- Core funding or overheads for institutions. The Association will fund the directly-incurred costs of the engagement/educational initiative but, as a charity, we expect the general running costs (*e.g.* indirect costs, estate costs, support services, directly allocated staff costs) to be otherwise covered. We will therefore not fund on a proportion of full economic costs (fEC) basis. Attention is drawn to paragraphs 3.31 to 3.37 of the Science and Innovation Investment Framework 2004–2014, HM Treasury (July 2004), which explains arrangements for the provision of overheads linked to charity funding to academic institutions.
- Individual items of equipment over £1,000 GBP, sites, buildings or other capital expenditure. Artwork and similar specially-commissioned outreach tools are not considered to be equipment, and will be considered for funding.
- A shortfall resulting from a withdrawal of or deficiency in public finance.
- Student tuition fees and summer research bursaries. If you would like to support a summer research project see the Undergraduate Research Bursaries for more detail.

The application deadline is **1st September** and funds will normally be available from 1st November each year. The awards will be announced at the Annual General Meeting. For more information please contact the Association's Outreach Officer (e-mail <**outreach@palass.org**>).

Small Grants Scheme

The Association offers multiple awards each year, in honour of four donors, to fund palaeontological research, travel and fieldwork; these are integrated together under the Small Grants Scheme. These grants are open to any member of the Association, although preference is given to students, early-career researchers, and members of the Association who are retired.

- Sylvester-Bradley Awards: Multiple awards of up to £1,500 each, for palaeontological research.
- Callomon Award: An award of up to £1,500 for a project which is normally field-based.
- Whittington Award: An award of up to £1,500 for a project which is normally based on museum collections.
- Stan Wood Award: An award of up to £1,500 for projects in vertebrate palaeontology, and ideally involving fieldwork and fossil collecting.

There is one online application form with a deadline of **1st November**. The successful applications will be reported at the December Council meeting, and at this meeting Council will decide on the allocation of the awards based upon the nature of the project made in the application. The awards will be announced at the AGM, and funds will normally be available from 1st January.

Successful applicants will be required to produce a final project report that will be published in the Palaeontological Association *Newsletter*, and are asked to consider the Association's meetings and publications as media for conveying the research results.

Further information, including eligibility criteria, and a full list of terms and conditions for the Small Grants Scheme can be found on the appropriate page of the Association's website. Enquiries may be made to the Secretary (e-mail <**secretary@palass.org**>).

The deadline is **1st November** each 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**>).

Career Development Grant

The Career Development Grant is to assist talented early-career researchers who have recently completed their PhD to strengthen their CVs to help them achieve a career in palaeontology (research or curation). The grant provides funding of up to £2,500, to be paid after submission of thesis and cessation of funding, for any purpose that would lead to the strengthening of the CV via completion of a measurable activity or output. Successful applicants will be notified in the December following the application deadline, with funding available for use from January of the

calendar year following the deadline. Under normal circumstances, applicants must be able to take up the funding by April of the calendar year following the deadline.

The grantee is also automatically enrolled in the PalAss mentoring scheme and will be assigned a mentor by agreement.

Some examples of things that the grant could be used for include (but are not limited to):

- Help with living costs while turning a PhD chapter into a publication;
- Help with living costs while writing a fellowship or grant application;
- Further data collection that would allow a chapter to become publishable;
- A training course that would lead to skills enhancement;
- A training or research internship in another research group.

The grant cannot be used to pay overheads, open access or page charges, and cannot be used to support employment of another *e.g.* a student research assistant. Applicants must be members of the Association, should be submitting their PhD in the near future or have recently submitted their PhD (within one year), and should have no other form of substantial financial support on cessation of PhD funding. Applicants who have been awarded a postdoc or fellowship after their PhD, or who have already held a postdoc or fellowship, are not eligible to apply. Upon completion of the activity, applicants are asked to write a short report, which may be published in the Association's *Newsletter*. Proposals to make up a funding shortfall from other sources are not eligible. Proposals must fit within the charitable aims of the Association and will be subject to appropriate research ethics considerations.

Proposals will be ranked on the following criteria:

- Demonstrable need for funding;
- A clear and well-explained future career plan;
- How the funding will help the candidate to strengthen their CV to achieve their future career plan;
- Feasibility;
- Value for money and cost effectiveness.

The deadline is **7th October** each year. Successful applicants will be notified in December and funds will normally be available in January. A full list of awards will be announced at the AGM.

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 Council 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 deadline for the Annual Meeting is **1st August 2023**. Successful applicants will be notified as soon as possible after the deadline.

Awards and Prizes 2022

(NB: The prizes from last year's publications were decided too late for inclusion in *Newsletter* 112.)

Best Paper Prizes 2022

Each year we award Best Paper Prizes for *Palaeontology* and *Papers in Palaeontology*. Winning papers should combine high levels of scientific rigour and excellent presentation with originality and significance, preferably both within and outside their subdiscipline. Nominations are made by our 33 Handling Editors and voted on by the Editorial Board. 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 the author or a nominated co-author) within the following 18 months. We offer our congratulations to the authors of the two winning papers for 2022.

Employing a range of innovative methods to correlate mammal faunas across regions and illuminate mammalian evolution and biogeography in the Neogene and Pleistocene, the winner this year for *Palaeontology* is:

A coherent biostratigraphical framework for Old World Neogene and Pleistocene mammals. By GIBERT, C., ZACAI, A., FLUTEAU, F., RAMSTEIN, G., CHAVASSEAU, O., THIERY, G., SOURON, A., BANKS, W., GUY, F., BARBONI, D., SEPULCHRE, P., BLONDEL, C., MERCERON, G. and OTERO, O. <**https://doi.org/10.1111/pala.12594**>.

For *Papers in Palaeontology*, the winner is an elegant morphological study of a new echinoderm from the Cambrian of China which shows that early echinoderms were able to attach to hard substrates:

The first edrioasteroid echinoderm from the lower Cambrian Chenjiang biota of Yunnan Province, China.
By ZHAO, J., RAHMAN, I. A., ZAMORA, S., CHEN, A. and CONG, P.
<**https://doi.org/10.1002/spp2.1465**>.

The following papers were also shortlisted:

BAULT, V., CRÔNIER, C. and MONNET, C. 2022. Morphological disparity trends in Devonian trilobites from North Africa. *Palaeontology*, **65**(5), e12623. <**https://doi.org/10.1111/pala.12623**>

CULLEN, T. M., ZHANG, S.-Q., SPENCER, J. and COUSENS, B. 2022. Sr-O-C isotope signatures reveal herbivore niche-partioning in a Cretaceous ecosystem. *Palaeontology*, **65**(2), e12591. <**https://doi.org/10.1111/pala.12591**>

GIBERT, C., ZACAÏ, A., FLUTEAU, F., RAMSTEIN, G., CHAVASSEAU, O., THIERY, G., SOURON, A., BANKS, W., GUY, F., BARBONI, D., SEPULCHRE, P., BLONDEL, C., MERCERON, G. and OTERO, O. 2022. A coherent biostratigraphical framework for Old World Neogene and Pleistocene mammals. *Palaeontology*, **65**(2), e12594. <**https://doi.org/10.1111/pala.12594**>

NESBITT, S. J., STOCKER, M. R., EZCURRA, M. D., FRASER, N. C., HECKERT, A. B., PARKER, W. G., MUELLER, B., SENGUPTA, S., BANDYOPADHYAY, S., PRITCHARD, A. C. and MARSH, A. D. 2022. Widespread azendohsaurids (Archosauromorpha, Allokotosauria) from the Late Triassic of the western United States and India. *Papers in Palaeontology*, **8**(1), e1413. <**https://doi.org/10.1002/spp2.1413**>

PANCIROLI, E., BENSON, R. B. J., FERNANDEZ, V., HUMPAGE, N., MARTÍN-SERRA, A., WALSH, S., LUO, Z.-X. and FRASER, N.C. 2022. Postcrania of Borealestes (Mammaliformes, Docodonta) and the emergence of ecomorphological diversity in early mammals. *Palaeontology*, **65**(1), e12577. <**https://doi.org/10.1111/pala.12577**>

RAKSHIT, N. and RAY, S. 2022. Bone-bearing coprolites from the Upper Triassic of India: ichnotaxonomy, probable producers and predator-prey relationships. *Papers in Palaeontology*, 8(1), e1418. <**https://doi.org/10.1002/spp2.1418**>

SROKA, P. and STANICZEK, A. H. 2022. Evolution of filter-feeding in aquatic insects dates back to the Middle Triassic: new evidence from stem-group mayflies (Insecta, Ephemerida) from Grès à Voltzia, Vosges, France. *Papers in Palaeontology*, **8**(4), e1456. <**https://doi.org/10.1002/spp2.1456**>

TOMAŠOVÝCH, A., GARCÍA-RAMOS, D.A., NAWROT, R., NEBELSICK, J.H. and ZUSCHIN, M. 2022. How long does a brachiopod shell last on the seafloor? Modern mid-bathyal environments as taphonomic analogues of continental shelves prior to the Mesozoic Marine Revolution. *Palaeontology*, **65**(6), e12631. <**https://doi.org/10.1111/pala.12631**>

VIGLIETTI, P. A., ROJAS, A., ROSVALL, M., KLIMES, B., ANGIELCZYK, K. D. 2022. Network-based biostratigraphy for the late Permian to mid-Triassic Beaufort Group (Karoo Supergroup) in South Africa enhances biozone applicability and stratigraphic correlation. *Palaeontology*, **65**(5), e12622. <**https://doi.org/10.1111/pala.12622**>

ZHAO, J., RAHMAN, I. A., ZAMORA, S., CHEN, A. and CONG, P. 2022. The first edrioasteroid echinoderm from the lower Cambrian Chenjiang biota of Yunnan Province, China. *Papers in Palaeontology*, **8**(4), e1465. <**https://doi.org/10.1002/spp2.1465**>

Paul D. Taylor
Editor in Chief

ASSOCIATION MEETINGS

67th Annual Meeting of the Palaeontological Association
University of Cambridge, UK *11 – 15 September 2023*

The 67th Annual Meeting of the Palaeontological Association will be held at the University of Cambridge, UK. The organizing committee is chaired by Dr Alex Liu. The e-mail address for all meeting matters is <**annualmeeting2023@palass.org**>.

Information about the Meeting is provided in the yellow supplement at the back of this *Newsletter* and on the PalAss website at <**www.palass.org/meetings-events/annual-meeting/2023/annual-meeting-2023-cambridge-uk-overview**>.

The abstracts for the talks and posters will be made available on the PalAss website, and will be included in the conference pack at the Meeting. We look forward to welcoming you to Cambridge!

Abstract of Annual Address

The Annual Address, a public lecture, will be delivered at 16:30 on Wednesday 13th September.

Fossils, molecules and arthropods

Dr Gregory D. Edgecombe F.R.S.
Natural History Museum, London, UK

Palaeontologists have persuasively made the case that fossils improve morphological phylogenetic analyses. The fossil record provides otherwise unknowable insights into the sequence of character acquisition in ancient stem lineages, as exemplified by the lobopodian roots of the panarthropod phyla. As is the case across the tree of life, many questions in arthropod phylogeny were effectively answered as molecular phylogenetics transitioned from analyses of a few loci to the genomic scale; some clades that were not widely anticipated by morphologists (*e.g.* several major groups within Pancrustacea) are now part of an extant-taxon scaffold into which fossil taxa are integrated. The necessity of fossils for total-evidence / tip dating has revitalized the nexus through which fossils and molecular sequences speak a common language – coding phenotypic characters for extant organisms. The evolution of arthropod appendages illustrates a methodology for reconstructing the origin of complex phenotypic novelties that draws on similarities in morphology and gene expression, phylogenomic evidence for a single origin, the sequence of character transformations in exceptionally preserved fossils, and gene knockdown. Advances in knowledge of early arthropods will continue to be triggered by discoveries from new Konservat-Lagerstätten, improvements in morphological imaging, and refinements in how we build and date trees.

Meeting support

The organizers of the 67th Annual Meeting gratefully acknowledge the support of our sponsors:

Agisoft

Cambridge Philosophical Society

Elsevier

Fossils journal (MDPI)

Geological Society of London

IAS

Indiana University Press

Palaeocast

Palaeontographical Society

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Prof. D. J. Field

Scudamores

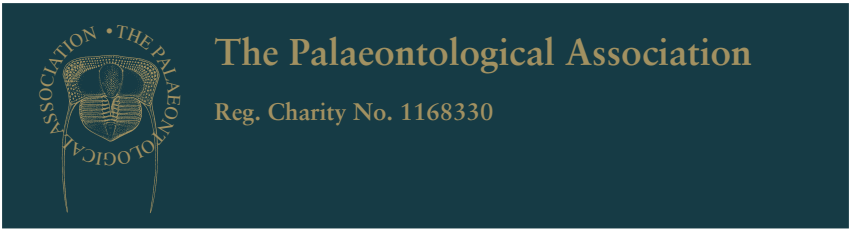
Sedgwick Museum of Earth Sciences

The Treatise on Invertebrate Paleontology

Trinity College, Cambridge

Cambridge 2023

The Palaeontological Association Annual Meeting



Code of Conduct for Palaeontological Association meetings

The Palaeontological Association was founded in 1957 and has become one of the world's leading learned societies in this field. The Association is a registered charity that promotes the study of palaeontology and its allied sciences through publication of original research and field guides, sponsorship of meetings and field excursions, provision of web resources and information, and a programme of annual awards.

The Palaeontological Association holds regular meetings and events throughout the year. The two flagship meetings are the Annual Meeting, held at a different location each December, and the annual Progressive Palaeontology (ProgPal) meeting, run by students for students with the support of the Palaeontological Association. The Association Code of Conduct relates to the behaviour of all participants and attendees at annual events.

Behavioural expectations: It is the expectation of the Palaeontological Association that meeting attendees behave in a courteous, collegial and respectful fashion to each other, volunteers, exhibitors and meeting facility staff. Attendees should respect common sense rules for professional and personal interactions, public behaviour (including behaviour in public electronic communications), common courtesy, respect for private property and respect for intellectual property of presenters. Demeaning, abusive, discriminatory, harassing or threatening behaviour towards other attendees or towards meeting volunteers, exhibitors or facilities staff and security will not be tolerated, either in personal or in electronic interactions.

Digital images and social media: Do not photograph a poster or record a talk without the author's express permission. While the default assumption is to allow open discussion of presentations on social media, attendees are expected to respect any request by an author to not disseminate the contents of their talk or poster.

Reporting unacceptable behaviour: If you are the subject of unacceptable behaviour or have witnessed any such behaviour, you can report it to us (anonymously if you choose to) via our online reporting form at <**https://www.palass.org/meetings-events/report-meeting-code-conduct-violation**>.

Anyone experiencing or witnessing behaviour that constitutes an immediate or serious threat to public safety, or a criminal act, is expected to contact the emergency services by phoning 999. Those witnessing a potential criminal act should also take actions necessary to maintain their own personal safety.

news

Palaeontology in the news

Tillyardembiids: launching a new fashion in the Permian

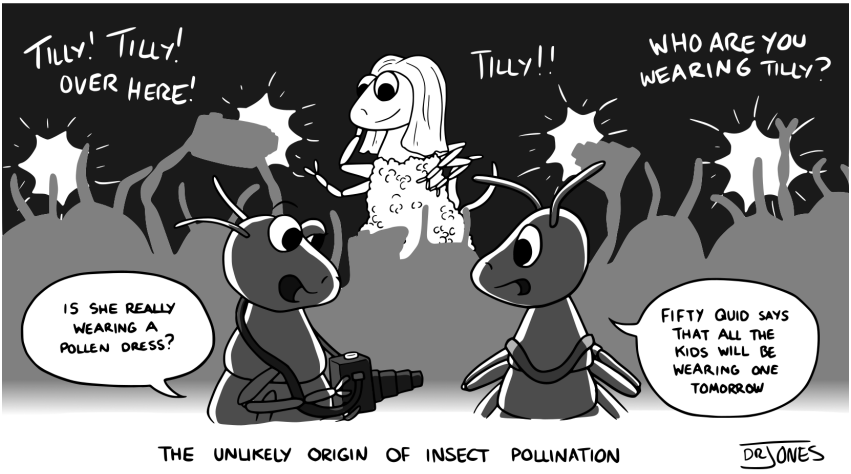
Evolution likes to experiment with new trends. Most of them are not successful, but when something works, you can be sure that everybody will follow the new fashion. It is the case in the co-evolution of plants and their pollinators – a mutually beneficial relationship that helped angiosperms, the plants producing flowers and fruits, to quickly conquer our lands. Without pollinators, the landscapes of our planet would have looked completely different.

But when did everything begin? Well, according to a recent discovery, the first attempts of collaboration between plants and pollinators may be older than expected. A recent study of 280-million-year-old insects known as tillyardembiids that were found in the Urals revealed that they were covered in pollen. The insects had clumps of pollen on their heads, bodies and legs. The pollen belongs to a plant from the gymnosperm group, that evolved earlier than angiosperms and does not produce fruits or flowers. All conifers, for example, are gymnosperms.

Even if the currently-available evidence doesn't prove that there was a true co-evolutionary relationship between tillyardembiids and gymnosperms, it does seem that these insects, with their wings, could have helped in the process of dispersing the pollen – starting a trend that exploded with the appearance of angiosperms and is still successful nowadays.

KHRAMOV A. V., FORAPONOVA, T. and WĘGIEREK P. 2023. The earliest pollen-loaded insects from the Lower Permian of Russia. *Biol. Lett.* **19**: 20220523. <**http://doi.org/10.1098/rsbl.2022.0523**>.

Scientists discover fossils of oldest known potential pollinators. *The Guardian*. <**https://www.theguardian.com/science/2023/mar/01/scientists-discover-fossils-of-oldest-known-potential-pollinators**>.



<http://www.ratbotcomics.com/>

'Real-time' evolution. How woolly mammoths became woolly.

Think about the Ice Age. For sure, one of the first things you will picture in your head is a woolly mammoth. These fascinating and iconic creatures possessed all the physical characteristics to survive in the freezing environment of the Siberian steppes: small ears, large fat deposits and, of course, their fluffy body hair.

But when they did start growing their pullover? To answer this question, a group of scientists compared the genomes of 23 Siberian woolly mammoths with 28 modern-day elephants. By doing so, they discovered that most of the traits that are needed to make a woolly mammoth were already genetically encoded in the earliest specimens.

However, the oldest woolly mammoth may have been not so woolly, with a reduced fur coat and larger ears. The influence of the cold environment was crucial for the development of the typical woolly mammoth traits. This reconstruction was done thanks to the comparison between a 700,000-year-old genome from a woolly mammoth and 22 more 'modern' specimens of woolly mammoth that are only 100,000 years old.

This technique allowed scientists to observe evolution in "real time", even if after thousands of years. The researchers were able to isolate several genes that were adaptive for woolly mammoths. These genes were related to living in cold environments, and some of them are shared by unrelated modern-day Arctic mammals such as reindeer and polar bears.

DÍEZ-DEL-MOLINO, D. *et al.* 2023. Genomics of adaptive evolution in the woolly mammoth. *Current Biology*, **33**, **9**, 1753–1764. <**https://doi.org/10.1016/j.cub.2023.03.084**>.

Genetic research sheds new light on woolly mammoth evolution. *The Guardian*. <**https://www.theguardian.com/science/2023/apr/07/genetic-research-sheds-new-light-on-woolly-mammoth-evolution**>.

A different scenography for early human evolution?

Our ancestors first appeared in Africa, therefore their evolutionary history is entangled with those of the African landscape and climate.

So far, scientists have reconstructed the Africa of 21 million years ago as a territory covered by vast forests. What better place for the earliest ancestors of humans and apes to thrive? However, nothing lasts forever, and around 10 million years ago the climate changed globally. It became cooler and drier, causing the progressive reduction of forests. Slowly the landscape changed, giving room to grasses and shrubs that were a better fit for the increasingly dry conditions in eastern Africa.

This dramatic change turned into an opportunity for the earliest hominids who ventured outside the forests towards the savanna. The rest, as it is said, is history. But are we sure that things happened exactly like this? For a long time, human traits such as walking on two legs, or using tools, have been linked to the expansion of the grasslands. However, two recent papers published by two multidisciplinary teams show a different perspective on hominoid evolution.

The key fossils are teeth and other remains of *Moropithecus*, the oldest ape with a very interesting backbone. The bony attachments for back muscles indicate that this ape had a stiff lower back, the same characteristic that allows modern apes to climb upright into trees. On top of that, in the same fossil site where *Moropithecus* was found, another bone was discovered. It is a fossil ape thigh bone,

short, strong, and characteristic also of living apes. Again, it helps them climb up and down trees with a vertical torso.

So far, it seems that fossil pieces of evidence are conservative with the hypothesis of fruit-eating apes living in luscious forests. However, in the same excavation layer, another fossil was found – a jaw fragment with elongated molars, with well-developed shearing crests between the cusps. These kinds of teeth are good for slicing leaves, but not very efficient for fruit-eating. The question is, why did apes show skeletal adaptation to climbing trees searching for fruit, but at the same time have leaf-eater's teeth?

To answer this question, a multidisciplinary study was carried out to determine what the environment of Moroto, a site in Uganda, was like 21 million years ago. The plant fragments and pollens from the palaeosols point towards an open woodland environment rather than a closed forest habitat. According to the traditional palaeoenvironmental reconstructions, this kind of environment should have appeared in Africa around 10 million years ago; however, this recent study on the Moroto site dates it back to 21 million years ago.

Even though the increasing dryness of the African climate and the spreading of grassland habitats played a role in ape and human evolution, a process that lasted millions of years, the Moroto pieces of evidence highlight that the divergence between humans and apes cannot be due only to the emergence of grasslands.

As Darwin said in his *Origin of Species* in 1859, "Light will be thrown on the origin of man and his history". Even though we know a lot about our origin nowadays, there are still many shadows in human evolution waiting to be lit.

MacLATCHY, L. M. 2023. The evolution of hominoid locomotor versatility: Evidence from Moroto, a 21 Ma site in Uganda. *Science*, **380**, 6641. <**https://doi.org/10.1126/science.abq2835**>.

PEPPE, D. J. 2023. Oldest evidence of abundant C4 grasses and habitat heterogeneity in eastern Africa. *Science*, **380**, 6641, 173-177. <**https://doi.org/10.1126/science.abq2834**>

MacLATCHY, L. M., PEPPE D. and McNULTY K. 2023. Wooded grasslands flourished in Africa 21 million years ago – new research forces a rethink of ape evolution. *The conversation*. <**https://theconversation.com/wooded-grasslands-flourished-in-africa-21-million-years-ago-new-research-forces-a-rethink-of-ape-evolution-203532**>.

Crowdfunding palaeontology

Crowdfunding is a way of raising money to finance projects and businesses via online platforms. It was successfully used to buy the equipment necessary to study one of the most important fossil deposits found in mid-Wales.

In 2020, a fossil deposit dating back 460 million years was found in the private land of Castle Bank. The discovery was made by researchers and the residents, Dr Joseph Botting and Dr Lucy Muir, who are not employed as academics and therefore do not have access to funds and equipment to study the fossils.

That is why they decided to crowdfund the purchase of a microscope to study the rare, soft-bodied organisms from Castle Bank. As Dr Botting said, "In some ways this is a real community effort to reveal this fauna, because it wouldn't have been possible for us to do it without the support of a large number of people".

Among the fossils discovered in Castle Bank, there are the youngest known specimens of opabiinids and wiwaxiids, together with the oldest known specimens of insect-looking animals, and many different species of sponges, worms, barnacles, starfish and a primitive horseshoe crab.

The work in Castle Bank has barely begun, and it promises to give new insights into how life evolved during the great Ordovician biodiversification event.

'Very rare' fossils found in Wales with crowdfunded help'. BBC news. <**https://www.bbc.com/news/uk-wales-65450335**>.

Nicola Vuolo
Publicity Officer

News bites

What would scare you the most: swimming in the dark depths of the sea knowing that there may be a shark near you or seeing one thanks to its bioluminescence?

A recent paper by Ferrón reveals that most squalomorphs originated in neritic environments from where they colonized deep waters on several separate occasions during the Upper Jurassic and Lower Cretaceous, predating most of the previous estimates of the timing of this event. This research reveals that shark bioluminescence evolved in a complex scenario that combines elements of several previous proposals, and enriches our perspective on the sequence of events that characterized the vertebrate conquest of the deep sea.

FERRÓN, H. G. 2023. Illuminating the evolution of bioluminescence in sharks. *Palaeontology*, **66**: e12641. <**https://doi.org/10.1111/pala.12641**>.

When we are not familiar with something, it can be that we end up calling it a "monster". This is the case with the poor *Tullimonstrum gregarium*, Tully monster to friends, that is a well-known phylogenetic enigma.

Recently, the possibility that *Tullimonstrum* was a vertebrate has attracted much attention and Mikami *et al.* tried to resolve the debate around the Tully monster's phylogenetic position with the help of technology. They collected 3D surface data from 153 specimens of *Tullimonstrum* body fossils using a laser 3D scanner and conducted X-ray micro-computed tomography (μCT) analysis of stylets on the proboscis. The result of the investigation casts doubt upon the hypothesis that *Tullimonstrum* was a vertebrate, and suggests that it must have been either a non-vertebrate chordate or a protostome.

MIKAMI T., IKEDA T., MURAMIYA Y., HIRASAWA T. and IWASAKI, W. 2023. Three-dimensional anatomy of the Tully monster casts doubt on its presumed vertebrate affinities. *Palaeontology*, **66**: e12641. <**https://doi.org/10.1111/pala.12646**>.

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.*

From our Correspondents

A Palaeontologist Abroad

Highlighting early-career researchers who have taken posts outside their home country and the opportunities they used. This issue's palaeontologists are Dr Sulia Salim Goeting and Dr Karen Samonds.

Dr Sulia Salim Goeting is a Bruneian Postdoc scholar at the University of Lausanne (UNIL), Switzerland.

Photo courtesy of Sulia Salim Goeting.

Q1: How did you end up in Switzerland?
After completing my studies in Brunei and my PhD in Italy, I applied for the Swiss Excellence scholarship, which allowed me to pursue my own research project. It was an incredible opportunity to focus on isotope geology at UNIL, a renowned institution. I am studying foraminifera from the Brunei shelf, expanding my research to include isotopes and investigate how the foraminiferal assemblage and isotopic composition change throughout the core samples from World War-era wrecks. Now here I am, continuing my scientific journey.

Q2: How is your position funded?
My position is funded by the Swiss Excellence scholarship.

Q3: What is your project about?
My project is about benthic foraminifera from the Brunei shelf. The cores collected from several World War-era wreck sites are picked for foraminifera, and I will use specific species of interest for isotope analysis to explore the changes in assemblages and isotopic composition throughout the cores.

Q4: What has been the biggest challenge for you living in Switzerland?
There has not really been a big challenge but I would say that it is never easy to adapt to a new language environment.

Q5: What is the best thing for you about living in Switzerland?
The food, the people, the scenery, everything is really the best! Living here is like being in a fairytale. Everything is well organized, and the country is clean. I can't imagine anything like Switzerland. It really is a place I can see myself living in the future if I have the opportunity.

Q6: Apart from friends and family, what do you miss most about Brunei?
It is definitely the food. It has been hard adjusting to a particular diet, but it is not bad at all. I grew up always eating rice; here I had to get used to eating a bit less rice, and it is also difficult to find the spices I need for my cuisine.

Q7: What forms of support for an expat in your position have been the most helpful for you? What form of support do you miss most?
The support of colleagues and professors has been really helpful throughout my first postdoc here. They have taught me well and have shown me many things that will help me advance in my career.

I mainly miss the support of my family back home.

Q8: What role does the language of Switzerland play in your academic and private life? Has the language been a challenge and how did you go about tackling this?
The French language is really a challenge especially in terms of pronunciation. However, I feel that this language is definitely useful in my career as it gives me possibilities to use it for future work and communicating with people who speak the same language.

Q9: What was the biggest benefit of your move abroad? What was the biggest sacrifice?
I really feel that moving abroad has made me more independent, and given me the chance to see the world and meet interesting people from different cultures and nationalities in professional and casual settings.

Leaving my family was the biggest sacrifice as my culture is very family-oriented, particularly because I had only just started living on my own during my PhD in 2018. However, this has made me a different individual than I was before and opened me up to a better life.

Q10: What are your experiences with DEI (diversity, equality, inclusion) aspects in Switzerland? We are curious about your personal experiences as well as observations on policies and attitudes.
I think that Switzerland is very diverse and inclusive. There are many opportunities for foreigners to work here. I am one of the many examples of people with the opportunity to work in an environment that accepts everyone regardless of their social background.

Sulia is on ResearchGate at <**https://www.researchgate.net/profile/Sulia-Salim-Goeting**>.

Dr Karen Samonds is an American Professor at Northern Illinois University, USA, doing research in Madagascar.

Q1: How did you end up in Madagascar?
I took an anthropology class at the University of Massachusetts, USA, and had a wonderful and inspiring professor. She encouraged me to apply to graduate school, and there I pursued my own research programme in Madagascar.

Q2: How is your position funded?
I have been funded through multiple different organizations, but National Geographic has given me the most support.

Q3: What is your project about?
My research tried to answer the question of how, when and from where Madagascar's amazing biodiversity arrived on the island. This information has remained unknown due to a 65-million-year gap in the fossil record that occurs precisely within the time period during which we think most of these animals colonized the island.

Q4: What has been the biggest challenge for you living in Madagascar?
Working in Madagascar comes with a lot of challenges, as life can be unpredictable and not go according to plan. I have learned to be more flexible and adjust my plans, and also be more open to creative solutions in order to get my fieldwork done.

Q5: What is the best thing for you about living in Madagascar?
Madagascar is an amazing place to conduct fieldwork! It is one of the world's biodiversity hotspots, and it is thrilling to be surrounded by plants and animals that are found nowhere else in the world.

Q6: Apart from friends and family, what do you miss most about the USA?
Sometimes I miss having access to more of life's 'comforts', as when I conduct fieldwork I camp and live in a tent. Many of my palaeontological sites are accessible only by boat, so we can only take the minimum of what we need to conduct the research.

Q7: What forms of support for an expat in your position have been the most helpful for you? What form of support do you miss most?
My colleagues and friends in Madagascar have been the biggest support. Through working there for more than 20 years, I have built a strong foundation of support and a broad network of colleagues, and I am grateful for all of their assistance.

I definitely miss having a fast internet connection, and access to my library – it is difficult to write up my research and stay in touch with colleagues back in the USA.

Q8: What role does the language of Madagascar play in your academic and private life? Has the language been a challenge and how did you go about tackling this?
I have learned a lot of Malagasy through my time there, but I would love to be fluent. Knowing French and having some functional Malagasy has made a big difference in connecting with local communities.

Q9: What was the biggest benefit of your move abroad? What was the biggest sacrifice?
The biggest benefit has been the friends and colleagues I have made, and the fossils I have discovered. None of this would have been possible without work 'on the ground' in the country. The biggest sacrifice has been that for more than 20 years (until COVID-19) I had never had a summer 'off', as I teach August–May, and then work in Madagascar June–August.

Q10: What are your experiences with DEI (diversity, equality, inclusion) aspects in Madagascar? We are curious about your personal experiences as well as observations on policies and attitudes.
I have tried to create an inclusive team when I do palaeontological research, relying on mainly Malagasy students, professors and local people.

<**https://www.niu.edu/clas/biology/about/faculty/samonds/index.shtml**>

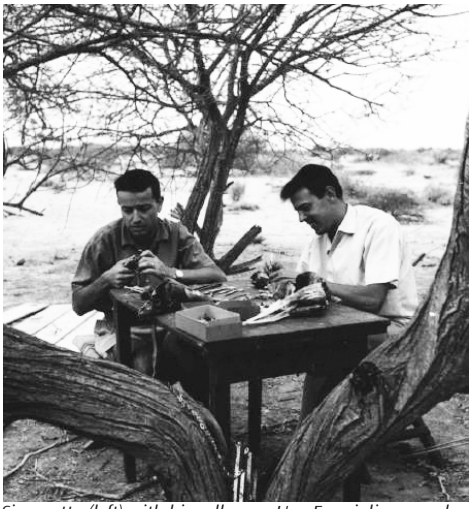
<**https://www.sadabe.org/Samonds/Index.html**>

(Photos courtesy of Karen Samonds.)

Legends of Rock

Alberto Mario Simonetta

Alberto Mario Simonetta (1930–2021) embraced the characteristics of the naturalists of the decades between the end of the nineteenth century and the early twentieth century, while leading his research activity during the second half of the twentieth century. We are often amazed by the numerous disciplines in which naturalists of the European Industrial Revolution period were well-versed. The reason behind this versatility may be a survivor bias because we keep track of only the most 'successful' amongst these naturalists, but also because the sum total of knowledge in each field was much less than from the 20th century on. As our knowledge has exponentially increased over time, individuals like Alberto Mario Simonetta have become increasingly rare, making his achievements even more impressive.



Simonetta (left) with his colleague Ugo Funaioli engaged in taxidermic work of material collected during the field session of 1959 at El Bur (Somalia). Photo from A. M. Simonetta archive (Ceccolini 2022), courtesy of F. Ceccolini.

Simonetta was born in Pisa, Italy, in 1930. He showed the first signs of his varied scientific interest in his youth. After obtaining a high school diploma, he first enrolled in medical school and, after his graduation in 1952, he decided to enrol in the natural sciences course at the University of Florence, Italy, earning his degree in 1956 (Ceccolini 2022).

He began his naturalist career at the University of Florence, initially working as Junior Assistant and later progressing to Senior Assistant, serving in this role until October 1969. During his tenure at the University of Florence he was a lecturer in comparative anatomy and zoology (Ceccolini 2022). In November 1969, he relocated to the University of Camerino, Italy, and continued his academic journey there until October 1994. During his time at Camerino, he held the position of Professor of zoology for six years and of comparative anatomy for over 15 years. He also taught history of science for a period. Between 1977 and 1979, he conducted zoology courses at the Somali National University, Somalia (Ceccolini 2022). In November 1994 he returned to Florence, where he concluded his academic career as a Professor of zoology. He retired from his position on 31st October 2002 (Ceccolini 2022).

Alongside his institutional duties, he carried out important scientific work in Somalia in the 1950s, ranging from work in the medical sciences to intensive zoological research. He conducted studies on the evolution of cranial bones in vertebrates and arachnid evolution and diversity, describing new species and contributing to the wildlife safeguarding of the area (Ceccolini 2022).

In 1960, thanks to a grant from the National Academy of Sciences, Simonetta had the opportunity to pursue another scientific interest of his: palaeontology. He travelled to the USA, spending several months there, during which he examined the fossil collection from the Burgess Shale housed in the Smithsonian Museum. This experience marked the beginning of his extensive research in palaeontology, predating the more famous work of Harry B. Whittington and students on the Burgess Shale (Ceccolini 2022). While some of Simonetta's ideas were later overturned, in part due to advancements in palaeontological techniques, his work served as an important precedent, and maintained focus on this crucial site for palaeontological research (Gould 1990).

Some of Simonetta's ideas represent the first steps in the long process of reinterpretation taking place after Walcott's first description of the Burgess Shale fauna. His early work on the Burgess Shale, particularly the extinct arthropod *Habelia optata* (Simonetta 1964), has been particularly influential on my own PhD research. Simonetta interpreted this species as having thoracic biramous appendages and an undefined structure below the tail spine. After Simonetta's work, the dominant interpretation was that this species lacked these features, for example, as suggested by Whittington (1981). However, more recently these features have been re-evaluated and incorporated into the anatomical description of *Habelia optata* (Aria and Caron 2017).

While writing my PhD thesis, the discovery that an Italian palaeontologist was involved in the study of the Canadian Burgess Shale struck me as strange and unexpected. Although palaeontology is now a globally practised science, this was not the case during the previous century. Historically, palaeontology had been primarily focused on the 'Atlantic' region. As an Italian palaeontologist myself, I have derived immense pleasure and personal identification from reading original papers that describe and interpret the Burgess fauna in my native language. I believe that Alberto Mario Simonetta deserves recognition not only for his scientific contributions but also for inspiring a new generation of Italian palaeontologists.

Lorenzo Lustri
University of Lausanne, Switzerland

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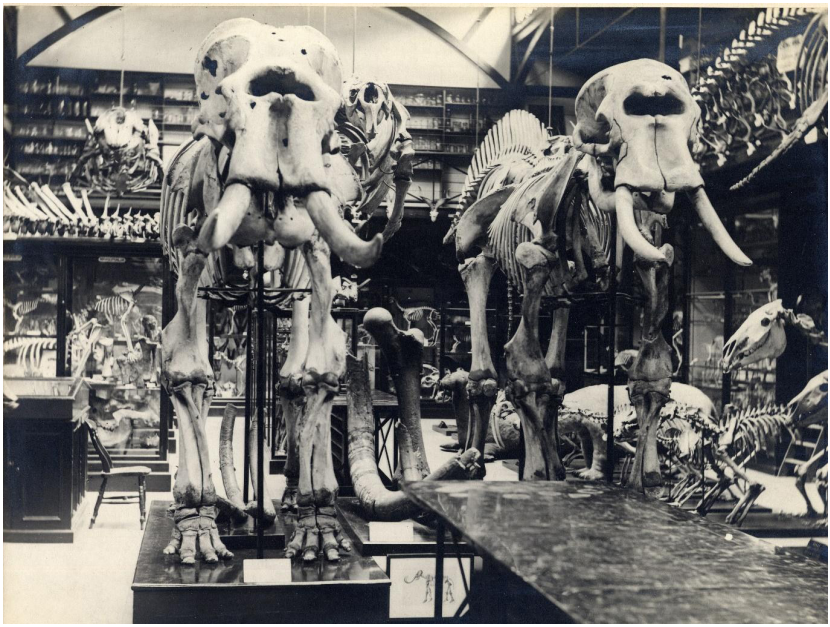
Behind the Scenes at the Museum

University Museum of Zoology, Cambridge

The University Museum of Zoology, Cambridge (UMZC), UK, was formed in 1865 to house the collections of the University of Cambridge's Museum of Comparative Anatomy and the Cambridge Philosophical Society. Today the UMZC shares the newly refurbished David Attenborough Building on the University's New Museum Site in Cambridge with the Department of Zoology and the Cambridge Conservation Initiative.



The UMZC in 1890. © University of Cambridge.

Specimens in the UMZC cover all animal groups, and include important historical specimens, such as specimens that Charles Darwin collected on his voyage on *HMS Beagle* and specimens from Alfred Russel Wallace. These include some of the famous Galapagos finches, as well as slides Darwin prepared during his study of barnacles.

The fossil vertebrates collection includes material collected during field expeditions throughout the twentieth century led by Sir Clive Forster-Cooper, Francis Rex Parrington and Prof. Jenny Clack, with additional collections from David Meredith Seares Watson. They represent key material that has been used to interpret the origins and evolution of fishes, tetrapods, reptiles and mammals. Forster-Cooper (Museum Director, 1914–1938) and Parrington (Museum Director, 1938–1972) built extensive collections of fossil fishes through multiple expeditions to Devonian localities throughout the UK.

The Museum of Zoology after the reopening post development in 2018. Photograph by Julieta Sarmiento. © University of Cambridge/Julieta Sarmiento Photography.

Through the work of Jenny Clack, the UMZC has a substantial collection of early tetrapod material from the Devonian of Scotland. Clack's work transformed our understanding of the transition of tetrapods onto land, including the origins of locomotory and sensory adaptations for life out of water, as well as the tempo and mode of early diversifications. All tetrapod taxa and specimens from the Scottish localities are new to science, and the Museum has multiple holotypes and other material under study.

The UMZC hosts key fossils for understanding critical stages in vertebrate evolution such as the diversification of synapsids, the evolution of mammalian and reptilian hearing, and the early evolution of archosaurs, which were studied by Parrington. Parrington also collected extensive records of early mammals and lepidosaurs from late Triassic fissure-fill deposits in Wales and the West Country of the UK. Additional UMZC material illuminating crucial stages in mammalian evolution includes the collections of Watson, with specimens elucidating the early evolution of Palaeozoic tetrapods and mammal evolution in the Tertiary.

The UMZC also has a wealth of Pleistocene invertebrate material, much of it collected and studied by Richard Preece and his students over the last four decades. This material is stored as both raw sediment samples and sorted fossil assemblages; the former represent an invaluable resource for future research, since many of the localities are now difficult or impossible to access. Fluvial, lacustrine, tuffaceous and cave sequences are all represented, providing a wide range of environmental data reaching back into the early Pleistocene. The fossils (molluscs, ostracods, vertebrates, insects and plant macrofossils) have formed the basis for contributions to hundreds of peer-reviewed articles on British Quaternary stratigraphy (and further afield), and this corpus of data continues to yield significant further insights into environmental and climatic changes over the last two million years or so. This timeframe is critical for understanding human evolution in North West Europe against a backdrop of long-term climatic change. Many of the molluscan and mammalian contributions have helped elucidate the climates and

environments at important hominin sites of the UK, such as Pakefield in Suffolk and Happisburgh in Norfolk, both of which pushed the earliest known human occupation of the UK back to the early Pleistocene. The fossil assemblages also provide crucial biostratigraphical control and have yielded detailed palaeoclimatic records against which current climatic trends can be contrasted. Our invertebrate fossil collections include critical Holocene sequences examined during construction of the Channel Tunnel at Holywell Coombe, Kent, UK, Holocene molluscan assemblages from Lake Baikal, Russia, and lake cores from Ioannina, Greece, that have provided high-resolution pollen records from which significant insights into recent climate change have been derived.

The Museum of Zoology, Cambridge, is open for research on these collections, with facilities such as the Cambridge Biotomography Centre, whose MicroCT scanner has a resolution of up to 3 micrometres and produces stacks of 2882 images 2882×2882 pixels in size. Photographic facilities for photo-stacking and photogrammetry are also available.

Emily Mitchell
Curator of non-insect Invertebrates, University Museum of Zoology, Cambridge, UK
Assistant Professor, Department of Zoology, University of Cambridge, UK

Tom White
Principal Curator of non-insect Invertebrates, Natural History Museum, London, UK

For more information on the Museum, including its catalogue, see the website <**http://www.museum.zoo.cam.ac.uk**>.

Follow the Museum on Twitter at `@ZoologyMuseum`.

Scaling the depths

There are times when things become very *literal*. Fieldwork for me lately has shrunk, for one reason or another, to be exactly that – and in the singular, to boot. It's no longer craggy Welsh hillsides of Silurian slate, or the almost perfectly forest-covered accretionary prism of the Sudetan Mountains[1], or a Canarian supervolcano, or some other excuse to range across the wide blue yonder. It's the field just across the road – a perfectly ordinary ploughed field of the English Midlands, with a perfect absence of rock crags. But, it is a field ploughed into boulder clay, so at least there are pebbles to idly pick up during the day's constitutional, just to keep one's hand in. By and large, it's a comforting repetition of the major themes brought in from the north, of flint and vein quartz, of the 'liver-coloured quartzites' of the old literature, of rough Jurassic limestone with fossil oysters. Workaday pebbles, really, of the kind that one has looked at, and measured, and counted, and taught students about, and made dull by familiarity. Then, one was idly picked up that opened up a whole new world.

It didn't look much at first, until the hand lens was brought to bear. Flecks on it turned out to be beautifully preserved gastropods, appearing in naturally polished section in a chert. A miniature silica world, entrapping small but perfectly formed skeletons. Something different, therefore, and obviously a bit special: the equivalent of a Fabergé egg compared with the run-of-the-mill stuff all around. So, I kept my eyes open, as one does. More of these oddities turned up: some packed with sponge spicules, some with ooids, and some with an assortment of delicate and beautiful fossils that were mostly alien to me, but here and there I could recognize fragments of crinoid, bryozoan, brachiopod, and tiny, many-chambered foraminifera. All were three-dimensional, all preserved as silica in a silica cement some of which was clear and glassy enough for the fossil debris to be seen suspended in it, as if in some bizarre petrified aquarium. All new to me, and the kind of thing that makes one need to start from the very beginning again.

There's a lot of chert about, of course, not least as the flint that's so ubiquitous that one mostly passes it by without a second thought. But this was different: older, for a start. The few fossils I could half-recognize had a Carboniferous demeanour about them, and that chimed with another of their remarkable quirks. Quite a few of these pebbles had holes and dimples filled with tiny amounts of coarse, tightly cemented red sandstone, for which the only reasonable explanation was that these were little remnants of attached Permo–Trias sediment. And so, these pebbles bore the 50-million-year-long-or-so Variscan unconformity in microcosm, and moreover as miniaturized buried valley unconformities: akin to the classic buried landscapes of Charnwood Forest, but at the scale of centimetres rather than kilometres. To add yet another grace note, some bore little patches of what looked like desert varnish too. So these must be recycled pebbles, of Carboniferous chert, swept by ephemeral rivers across the desert Pangaean wastes, before being snatched up, very much later, by Ice Age ice, to be spread across my adopted field.

It's always a pleasure to stumble into terrain about which one is almost completely ignorant – or has just enough knowledge to fill one-quarter of the first-year undergraduate lecture devoted to 'minor lithologies', an exceptionally crowded hour shared with phosphates, evaporites

[1] Of which the late Malcolm Howells used to observe, with characteristic precision, 'Poor Polish geologists – always lost in the woods'; to be followed, as a corollary to ambitious PhD students poring over the few, moss-covered exposures, 'Don't go too far!'.

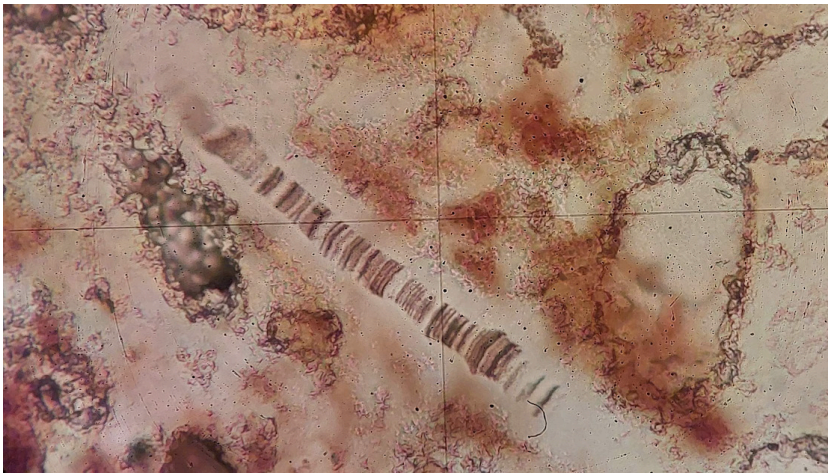
and ironstones. This rock clearly fell outside that cartoon scenario, as being neither flint, nor the diatom layers that pile up in volcanic lakes, nor the radiolarian layers that pile up on the abyssal ocean floor. This was a shallow sea of the kind that usually produces standard-ish shelly limestone – only with its mortal remains being transformed into silica and cemented by silica, early and often and clearly (to judge from my sample field) in large amounts. From the cartoon perspective – a little knowledge is a dangerous thing, and all that – silica is, by and large, not as soluble as, say calcium carbonate, so this kind of thing should be a rarity, rather than what was clearly a major rock-builder.

Were silica-rich volcanic springs at work here, to petrify on a huge scale this Carboniferous sea floor as one did on a small and exquisite scale the Devonian peat bog of the Rhynie Chert? Seemingly not. The finger of suspicion here, and in most cases of this kind, is usually pointed at the glass sponges of those times which, post-mortem, bequeathed some of their biogenic silica skeletons simply as fossil spicules left in the rock, and some to dissolve and replace and re-precipitate around most or all of the calcium carbonate skeletons that were buried together with them, to form the chert. I'd been vaguely aware of this mechanism, too, but it never quite seemed to make sense, and puzzling over the fruits of my new fieldwork made me realize what the glitch was. If the present is the key to the past, there should be quite a few modern analogues of this kind of shallow-carbonate-sea-floor-being-turned-into-silica, and I wasn't aware of any. The ignorance factor might, of course, have played a large part here, as it so often does. But not here – or at least not totally, thank goodness. A paper hove into view that finally made the penny drop, and made me aware of a small but significant part of the Earth machine – the shallow-water chert-making factory – that doesn't behave now as it used to behave in Carboniferous times. It was, in the words of P. G. Wodehouse after discovering the scandalous Flashman stories of George MacDonald Fraser, one of those watcher-of-the-skies-when-a-new-planet-appears moments.

This paper was the splendid 2011 review by Susan Butts and Derek Briggs on how silicification has changed through time. Among much to ponder was the quoting of a statistic that Jennifer Schubert and colleagues had dredged in 1997 from a mountain of literature: in Palaeozoic strata, more than a fifth of fossil faunas are silicified, while from Mesozoic times onwards this proportion drops to one in 25. Why so? The answer seemingly revolves around a hijacking of the global silica cycle, as that era began, from shallow waters to deep, where planktonic diatoms took over the role of chief silica middleman, while the shallow-living glass sponges declined. It's one of many biological power-shifts in Earth history, and one that here has gone on to spectacularly downsize the very distinctive part of rock transformation that is the silicification of fossils. Those eloquent chert pebbles represent one more kind of lost world.

A few thin sections looked at through a microscope yielded yet more surprises, with each pebble ever more resembling a little bran-tub of assorted conundrums. Firstly, the realization that desert varnish isn't just skin-deep: the iron oxides penetrated deep into the pebble, and often replaced fossils too, to form iron brachiopods and iron bryozoans. And, the central zones of some of the sponge spicules showed minuscule, ladder-like alternations of dark and light bands, each just a few microns thick. Perhaps some kind of growth pattern from which one might work out palaeo-tidal patterns, or the like? My ignorance of sponges being *really* near-complete, I showed these patterns to Joe Botting, whose understanding of these archaic beasts is encyclopaedic.

Oh no, he said, it's simply a diagenetic infill, a mineral growth – as of course it must be, once one realizes that these central zones were tubular holes in life. Like all good answers, though, it just leads to the next question. Why in that pattern? For, when graptolites or bivalve moulds fill with diagenetic mineral they fill with a meshwork of crystals, and not like here from one end to another, like a set of stacked coins within a cylinder – or, more precisely, with a structure and composition that is very like the banding of an agate. Indeed, these spicule-fills seem to be essentially hair-thin agates with successively stacked, rather than concentric, bands. Would, then, learning about the bands of typical agate, one of the Earth's most distinctive and widely recognizable mineral forms, help tell us what us going on here?



Thin section of a sponge spicule (a millimetre or so long) with its diagenetic internal agate. (c) J. Zalasiewicz.

Alas[2], one simply steps from one riddle into another. A paper on this topic (Moxon and Palyanova 2020) expresses it nicely in the title, 'Agate genesis: A continuing enigma', where they explore the long-standing and continuing difficulties in trying to work out how to fill a closed room (a frozen gas bubble within solid lava, say) with solid mineral – and indeed not just a closed room but one in which the solid walls are continually being thickened from the inside. That question aside, how do the bands form? Now, the major historical figure here is Ralph Eduard Liesegang, an artist *manqué* of the late nineteenth century. Deemed talentless at drawing and painting, he turned for solace to science and became one of the last polymaths, with chromosomes, television, aerosols and silicosis among his palette of interests: and, of course, the rings that he was to give his name to, most often seen as the iron oxide patterns so ubiquitous in weathered sandstones that one treats them with the same thoughtless disdain as one does a flint pebble. Now, I had not realized that this was the same phenomenon as the banding of agate, which Liesegang also worked on, but this seems to be the case. And, I had always thought that the sandstone patterns represent successive underground redox fronts, in a kind of diagenetic stratigraphy bearing witness to the history of groundwater movement. Wrong again. No such historical succession can be deduced from the rings, because they arise by quite another mechanism, from which this

[2] Or, (of course), 'Hooray!'

kind of history is excluded. The details are misty, but another nice review of agate, by Götze *et al.* (2020), puts them within the category of 'self-organizing phenomena', akin to the way that sand grains in a current assemble themselves to form ripples and dunes[3], but this time with silica and iron oxide molecules as the agents self-arranging themselves in patterns. For whatever reason, the insides of lava flows and of sponge skeletons are, in making an environment for this to happen, strange but effective partners.

Curiously, the unlikely world inside a sponge spicule came to mind as, a few weeks ago, a spaceship blasted off from French Guiana to explore horizons that are somewhat more distant in space, rather different in scale, but share a loose general description as hidden, water-filled spaces within which mysterious things happen. This was ESA's JUICE (Jupiter Icy Moons Exploration) mission, set to probe what lies below the icy crusts of – in this case – Ganymede, Callisto and Europa. Now, it is quite clear that the kinds of internal water oceans these worlds possess are common in our Solar System, outnumbering our own very singular surface ocean by – at a recent count – perhaps ten to one (Lunine 2017). And so, there is a rapidly growing literature devoted to what are probably 'normal' oceans in a cosmic sense rather than our own highly abnormal and bizarrely exposed one. Models of these distant ocean worlds are ingeniously constructed and tested from such little data as there are, on such things as how deep those oceans are, how they might be circulating, how salty (or not) they may be and, especially, on whether any form of life might exist down there. Among these, there is a niche that explores what should be a key part of that ocean world system: what kind of sediments might be present on their floors.

It's still a very tiny niche, with echoes of the degrees of freedom in speculation, a century or so back, about what might lie under the Earth's own ocean floor. The niche is made yet smaller because when an ocean becomes *very* deep, hundreds of kilometres, as in the case of Ganymede and Callisto, high-pressure forms of ice crystallize below the ocean, isolating it from the rocky cores beneath. There is not much scope here for sub-ocean rock-based strata – or for the nutrients that they can provide for any life-forms. But Europa has a shallower ocean, little more than 100 kilometres deep, and so here a rock/water contact *is* inferred. What strata might there be at the contact? The chain of logic here is every bit as ingenious, and as hopeful, as anything the nineteenth-century savants used. With the assumption of a rock-water contact, of some magma generation in the rock from tidal heating, of release of various chemical ions into the water, a salty ocean is conjured up – and therefore the possibility of precipitating evaporites. Bolt on to that some very sophisticated modelling and experimentation of the salts expected at Europa's temperatures and pressures, and the answer comes out as various hydrated sulphates of sodium and magnesium: salts, therefore, if of a different flavour to those of Earth's ocean (Thompson *et al.* 2021).

Another way to dive in spirit into Europa's oceans is to interrogate the tidal heating of the core more closely, as Daswani *et al.* (2021) did. The spacecraft data say that Europa's core is metallic, and for that to form, it must have reached a temperature of at least 1,250°C. And so, the overlying silicate rock of the Europa 'mantle' must have been metamorphosed and therefore must have released volatile elements into the ocean. The upshot again was seen as

[3] See 'Blowing in the Wind', *PAN* **63**.

evaporite deposition – this time pictured as a layer of gypsum as much as 10 kilometres thick on the seafloor.

Likely stories? If so, that might be the beginning of a more universal ocean world stratigraphy – possibly even a biostratigraphy, too, as evaporites can preserve microbial fossils. The Miocene 'stromatolitic selenites', complete with filamentous microstructure, that formed among the salts laid down on the parched Mediterranean floor at the height of the Messinian salinity crisis, are a nice example (Panieri *et al.* 2008). Even more scarily, there are the fossil microbes in 830 million-year-old Australian rock salt deposits, that might, just perhaps, say the researchers (Schreder-Gomes *et al.* 2022), with a distinct Grand Guignol frisson, *still be alive*.

The depths of time, indeed, and such examples of the living dead might have a home in the depths of space too, if the modellers are right with the ocean world strata. It's a long way away, of course – but if chert is ever found to possess palaeo-zombies of its own, then the local fieldwork will have to be approached with a little more trepidation.

Acknowledgements

My grateful thanks to Annika Burns and Mark Williams for provision of thin sections, to Mateusz Zalasiewicz and Camille Cosson for imaging them, and of course to Joe Botting for setting me on the right path for walking through a spicule.

Jan Zalasiewicz
University of Leicester, UK

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Palaeontology's greatest ever graphs

Punctuated equilibrium: half a century of evolutionary discovery

For me, one of the most exciting and rewarding aspects of palaeontological research is the quest to understand how evolution works, and the processes that have shaped how biodiversity has organized itself over geological time. Palaeontology can be credited with the inception of many novel and exciting evolutionary hypotheses, but perhaps one of the most iconic (and likely one of the most controversial) is the hypothesis of punctuated equilibrium. First published in 1972 by Niles Eldredge and Stephen Jay Gould (Eldredge and Gould 1972), punctuated equilibrium hypothesizes that most phenotypic change occurs at speciation events, after long periods of stasis within populations. Figure 1 shows an interpretation of this on a phylogeny, where the x-axis depicts morphological disparity and the y-axis represents geological time.

The graph shows little or no phenotypic or morphological change through time in lineages (at least, no consistent change that would result in anagenesis; Eldredge and Gould 1988), with larger jumps in morphology occurring at geologically rapid speciation events. Punctuated equilibrium was proposed as an alternative to phyletic gradualism, the original interpretation of Darwinian evolution, which describes slow and steady phenotypic change within populations that produces continuous almost indistinguishable sequences of change in lineages through time, or 'infinitely numerous transitional links' (Darwin 1859).

Although continuous sequences of evolution are not readily found in the fossil record, the incompleteness of the fossil record was thought to be the sole explanation for why these 'missing links' in the sequence have not been discovered. Punctuated equilibrium provided a possible alternative explanation; that these continuous sequences may not exist, and that evolution takes bigger steps, more rarely, at speciation events. Central to the original theory of punctuated equilibrium is the importance of allopatric speciation (where a subset of the original ancestral population becomes geographically isolated) and the speed (*i.e.*, within relatively few generations) by which morphological differences occur in this satellite population, generating distinct species (Eldredge and Gould 1972). Eldredge and Gould (1972) argued that, while the hypothesis of phyletic gradualism necessitates that any breaks in lineages through time be attributed to an exceptionally poor fossil record, punctuated equilibrium views these breaks as a true representation of the evolutionary steps that occurred. Today, it is little disputed that the fossil record provides an imperfect and incomplete record of past life on Earth, but this alone does not necessarily disprove the process of punctuated equilibrium. A perfect, continuous sequence of forms is not the only alternative hypothesis available when considering the gaps in the fossil record.

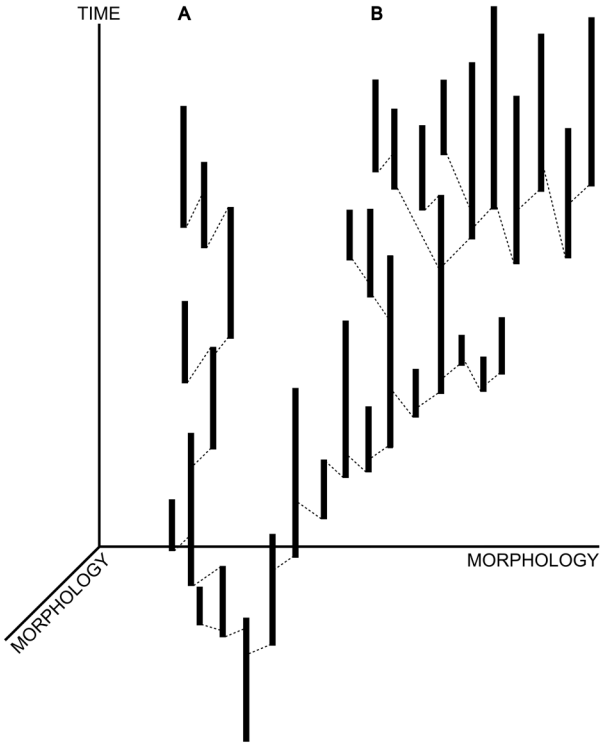

Figure 1 (redrawn from Figure 5.10 in Eldredge & Gould (1972)): 'Punctuated Equilibrium' depicted on a phylogeny. [Original caption: Three-dimensional sketch contrasting a pattern of relative stability (A) with a trend (B), where speciation (dashed lines) is occurring in both major lineages. Morphological change is depicted here along the horizontal axis, while the vertical axis is time. Though a retrospective pattern of directional selection might be fitted as a straight line in (B), the actual pattern is stasis within species, and differential success of species exhibiting morphological change in a particular direction.]

When the punctuated equilibrium hypothesis was first published, it is fair to say that it was a somewhat controversial idea, and it was met with some scepticism. Many felt that the hypothesis was virtually untestable, and that there was no real proof for this mode of evolution (Gingerich 1984). Of course, it is unlikely that either phyletic gradualism or punctuated equilibrium can fully explain all aspects of speciation or how evolution proceeds through time. It is more plausible that both evolutionary modes, as well as numerous other macroevolutionary pathways, occur in different clades and different regions at different times, depending on a myriad of other

biotic and abiotic factors (*e.g.* Benton and Pearson 2001; Jablonski 2017). However, although not all researchers necessarily agree with the interpretation, evidence for different aspects of punctuated equilibrium within lineages has been suggested numerous times over the last 50 years. Eldredge and Gould (1988) recognized evolutionary stasis in trilobites, arguing that the small changes reported over millions of years would not amount to anagenesis, despite the original author interpreting these as evidence for phyletic gradualism (Sheldon 1987). More recent research continues to find evidence for stasis (*e.g.* in brachiopods, Lieberman *et al.* 1995; in ammonites, Witts *et al.* 2020), and aims to try and understand these results within a more complex evolutionary framework. Other studies have sought to test whether morphological evolution is more often associated with speciation events (another cornerstone of punctuated equilibrium). Support for this speciation-driven model can be found across multiple clades (*e.g.* in ratites, Laurin *et al.* 2011; in fishes, Rabosky 2013; in multiple vertebrate clades, Cooney and Thomas 2021). Overall, these results begin to build a picture of complexity and diversity in evolutionary mode throughout geological time and across clades, but they certainly support a place for punctuated equilibrium among the working models.

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BOX: Extensions of punctuated equilibrium

In the years since 1972, the phrase 'punctuated equilibrium' has been reinterpreted and reimagined in a multitude of ways. The broadest definition of punctuated equilibrium relates to periods of stasis in biological systems punctuated by rapid and significant change. In this most simplified form, stasis punctuated by change has been recognized at multiple levels of biological organization. Figure 2 (another excellent graph that I felt deserved a cameo in this piece; edited to show only panel A from Fig. 1 of Blanco *et al.* 2021) is taken from a more recent study that used an exceptional mammal fossil record from the Iberian Peninsula and found three periods of functional stasis in mammal communities over 21 million years, broken up by two rapid and clear periods of turnover and ecological change with no intermediate faunas (Blanco *et al.* 2021). This study also found that taxonomic turnover was decoupled from the timing of change in ecosystem functioning, suggesting that ecological niches persist and are refilled by novel taxa during periods of ecosystem stasis. The pattern of 'punctuated ecological equilibrium' proposed here acts on entire mammal communities rather than on individual species.

While some disagree that punctuated equilibrium should be interpreted or used in any way other than its original inception (as a hypothesis for species-level phyletic change; *e.g.*, Jablonski 2017), recognizing repeating, broad patterns across different biological levels and disciplines may begin to reveal something about the entire organization of life on Earth, and how can we hope to discover anything more profound than that?

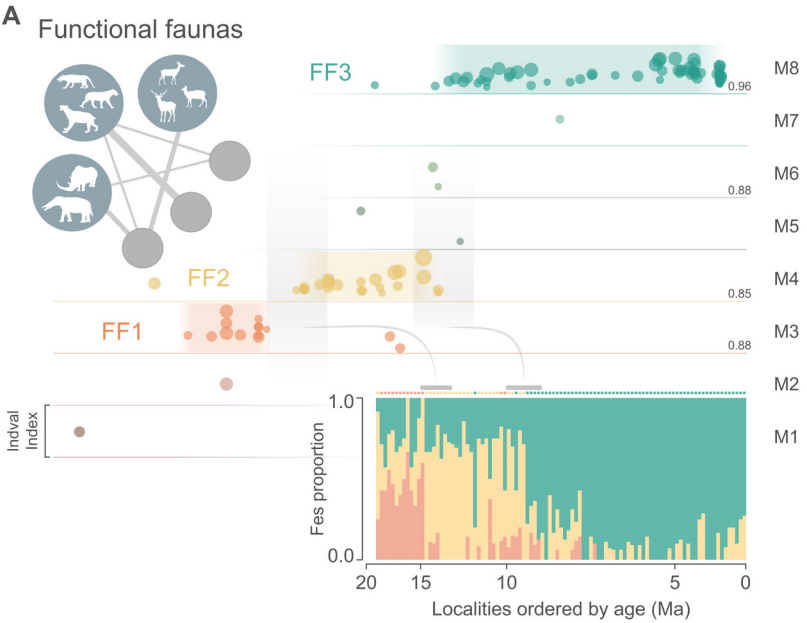

Figure 2 (a version of Figure 1A from Blanco et al. *(2021), provided by the lead author Dr Fernando Blanco): Prolonged periods of stasis followed by rapid change in functional faunas. [Original caption: Temporal trends of Iberian mammal communities over the past 21 Myr. Localities colored by modules (M) are plotted against time. Dots indicate communities (localities), and each dot's size is proportional to the species richness of that community. Modules derived from the functional network analysis show the succession of FFs. The height of the points reflects relevance within the module (IndVal index). Numbers above the module line indicate the module robustness as the probability of being found in different runs of the community detection algorithm (only values above 0.8 are shown). Color-shaded areas indicate the three long-lasting FFs. Vertical gray bars indicate the transitions between FF1 to FF2 and FF2 to FF3. (Inset) The proportion of functional entities belonging to the three main FFs in each locality (dots).]*

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Although the hypothesis of punctuated equilibrium undoubtedly was (and remains to some to this day) controversial, there is no denying that the ideas presented in Figure 1 from this seminal work by Eldredge and Gould (1972) had a monumental effect on palaeontology and macroevolutionary theory. Love it or hate it, or even remain on the fence, it is clear to see that this has helped to fuel debate and drive forward the development of statistical tests exploring evolutionary ideas over the last half a century. Additionally, in their original chapter on the subject, Eldredge and Gould (1972) highlight and discuss our tendency as scientists to collect data and interpret results in light of preconceived ideas and hypotheses. They challenged the

reader to acknowledge their unconscious biases, and consider the effects of these when reaching conclusions. For these reasons, I feel that Eldredge and Gould's now infamous depiction of punctuated equilibrium on a phylogeny (Figure 1) deserves a spot in the 'Palaeontology's Greatest Ever Graphs' Hall of Fame.

Gemma L. Benevento
Senckenberg Biodiversity and Climate Research Centre (SBiK-F), Germany

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Spotlight on Diversity

The international student's conference dilemma

When I left my home in Bangladesh nine years ago for my undergraduate degree in the USA, I knew I was giving up time with my family. I knew that due to the distance (over 12,000 km), the time it took to travel (30–40 hours), and most importantly, the cost ($1,300–1,700 USD for a round-trip ticket), I would only be travelling home once, or at best twice, a year.

Every international student has first-hand experience of the euphoria of having our own lives but also the gut-wrenching feeling of missing being in our home country. Some people were fortunate to be able to take more frequent trips home, and have their family visit more often. Others were less so. I staunchly maintained my once-a-year schedule of going to Bangladesh (except at the height of the pandemic), but along with that frequency, I also had to decide on duration and timing. Duration was easy – if I am spending that much money, it would have to be for long enough to make the cost worth it. Given that I don't get to see my family for weekends, birthdays, short holidays – a luxury that domestic students who could afford visits have – I wanted to be home for long enough to feel all the love I didn't get over the year and to be driven crazy by my parents and want to leave again. For me, the sweet spot was about a month.

But when could I possibly have the time to be gone from college, or my master's degree, or my PhD for a month? I know my parents would rather have me be home during important celebrations. For me, as someone of Islamic heritage, this is during one of the two Eids. For people of other cultures and faiths, it may be during their New Year's, or during Pujas. The timing of these important cultural festivals (*i.e.* family time) are at odds with work life in the USA and Western Europe where, despite their secular nature, the Christian calendar dominates. Everyone takes time off for Christmas. It's the one time of year when no one would bat an eye if you weren't working, as there's a general air of celebration and festivity around.

Studying and working in the USA and Western Europe, Christmas is the one time of year when if I disappeared for a month, no one would think I was shirking responsibilities. So, this determined when in the year I could go home for a month guilt free, even though it cost me about $200 USD more than if I travelled home at some other time of the year.

Until I moved to the United Kingdom in 2021.

The distance home is now considerably shorter (almost 8,000 km), and I can get home in 16–20 hours, but it still costs £900–1,100 GBP to buy a ticket. If I'm strategic about my travel dates, I can sometimes get a ticket for £800 GBP, but it's still a lot of money for someone living on a student stipend not designed with overseas travel in mind.

Moving to the UK, a new issue arose. Important conferences in the UK such as the Palaeontological Association Annual Meeting and the British Ecological Society Annual Meeting take place in December, often the week before Christmas. These are the kind of events where I should be presenting, being visible and networking to maximize the chances of landing a job post-PhD. Less than a week before Christmas, when the rest of the world celebrates, all of us at conferences are still working.

I understand the logistics, and frankly the appeal, of a December meeting – it accommodates the UK teaching calendar, better allowing women, who disproportionately have teaching responsibilities, to be able to participate in conferences. With lectures and exams having ended, room availability is also much easier. It also ends the calendar year on a high note; we get to see our colleagues, many of whom are friends, and it's a solid cut-off date for when to stop working and go home to our families.

That's not the case for foreigners – whether they're working in the UK or foreigners in a different country. In a globalized world, the number of international scientists has massively increased, and we are a valuable part of the UK scientific community. I can only speak for the former group because that's my lived experience, but in the two years I've lived in the UK, a late December meeting upended my travel plans, cut into my personal time, and cost me and my family more than it should.

I'm lucky now to have a loved one in Germany. The affordability and shorter distance mean I no longer have to go a year between visits to my nearest and dearest folks. But of course, I had committed the cardinal sin of being born with a 'third world passport', which means I need to apply for visas for pretty much everything. Therefore, there's no flexibility if things change at short notice. When the December 2021 Palaeontological Association Annual Meeting went virtual at the last minute, the fact that my visa to visit my partner in Germany wasn't due to start until the meeting ended meant I couldn't travel early to avoid the sudden COVID-19 restrictions that came into force because of Omicron. European borders to the UK closed, and I was only allowed to enter Germany on the condition of a strict 14 day quarantine. My partner and I made the difficult decision to spend Christmas on our own, instead of with his family. So much for a holiday celebration.

I did attend the British Ecological Society's Annual Meeting during 18–21 December 2022. I felt obligated to, given that in 2022 I hadn't presented or networked enough in the UK. The meeting was an extremely valuable learning experience for me, but once again, the dates meant that I couldn't travel to Bangladesh until 22nd December at the earliest. It also took a full day to travel there. My flight ticket home, which a week earlier would have been £900 GBP, cost me over £1,200 GBP.

In 2022, I paid £300 GBP more to be able to have family time because I felt obligated to put my career first. In 2021, I took away my partner's family time because I felt obligated to put my career first. This is the story of only one international PhD student in the UK, but I suspect there are many other international researchers who are members of the Palaeontological Association who have, over the years, had to make similar sacrifices, whether money or time.

A December meeting outside of term time does allow more people to participate without neglecting their teaching duties, many of whom may also be international. People also tend to have fewer fieldwork and workshop commitments in December (though I myself was unable to attend Cork 2022 because of a workshop in California). So what's the solution? I propose that the Association's Annual Meetings remain in December, but organizers make every effort to host the meeting in the third week of December, and end (not start) the meeting a week before Christmas. So, in 2024, end the meeting by 20th December (ideally earlier, but I'll not complain), in 2025 by the 19th, and in 2026 by the 18th. In the second and third week of December not many

universities in the UK are actively teaching, but are in the winter graduation or exam phase. The third week of December is still late enough in the year to have that 'we're done with work!' feeling, and for the international community, it's far enough away from Christmas that, should we choose to travel to see family, we don't have to pay an arm and a leg.

Being flexible with meeting dates by just one week accommodates a part of our community who already face sometimes insurmountable issues that home scientists do not. I'm fully aware that I am just one PhD student who has yet to carve her niche in the academic sphere, but let's not forget that structural reasons were why the world of science used to only host Western European older white men.

During the Christmas break of 2022/23 when I did stay home for a month, the January teaching term had already started, department events were already taking place, and I wasn't around. The guilt-free Christmas breaks I used to take don't exactly feel guilt free anymore.

When I left home nine years ago for a different world, I (and every other international researcher) knew I would be giving up a lot; the kind of things so many of us take for granted. Two of my grandparents died in those nine years. I couldn't be there for my family either time, mostly because my parents were pragmatic individuals who decided paying over a thousand pounds or dollars for a week-long stay was simply unreasonable. I haven't had Eid with my family for eight years. They've accepted that there will always be a Ming-sized hole in their hearts during important celebrations because their children have responsibilities in regions where the cultural calendar doesn't accommodate a religion other than Christianity.

Don't make vital conferences be the thing that takes even more away from us.

Ming Khan
University of Cambridge, UK

>>***Future*** Meetings of Other Bodies

2nd Asian Palaeontological Congress (APC2)
Tokyo, Japan *3 – 7 August 2023*

Following the success of APC1 in Beijing, China in 2019, the University of Tokyo will host the second edition of this congress with the theme 'Science in deep time in a new epoch'. APC2 will be held in-person but there will be one 'online day' where all participants can give/see online presentations and communicate with other delegates via the Internet. The topics of the congress will include all aspects of palaeontology, including a full range of themes and scientific sessions. There will be pre- and post-conference field-trips. In order to promote networking and scientific growth of younger participants, the organizers are offering discounted registration fees for students, as well as best poster awards. Registration will be open until 15th July 2023, although the abstract deadline is 31st March 2023.

Meeting website: <**https://www.apc2.org/**>.

3rd Crossing the Palaeontological-Ecological Gap (CPEG)
Hybrid/Vilnius, Lithuania *28 – 31 August 2023*

The purpose of this conference is to connect palaeontologists and ecologists by means of building and co-developing concepts, theory, analytical approaches and sharing raw empirical findings. This conference will bring together ecologists, palaeontologists, Earth system scientists and biogeographers who are interested in fundamental drivers, applications of (palaeo)ecological patterns in understanding past and present, and preserving biological diversity and ecosystem functions for the future. The meeting will be hosted by Vilnius University and the Nature Research Centre, Vilnius, with in-person and online options.

Meeting website: <**https://www.cpeg2023vilnius.chgf.vu.lt/**>.

Bivalves – Where are we going?
University of Cambridge, UK *5 – 8 September 2023*

This conference, focused solely on bivalved molluscs, is intended as a successor to the bivalve meetings that took place in London (1977), Drumheller (1995), Cambridge (1999) and Barcelona (2006). The aim is for a relaxed, open, in-person meeting to continue the tradition of convivial review of all aspects of current bivalve research (living and fossil).

For more information, contact Liz Harper by e-mail to <**emh21@cam.ac.uk**>.

Palaeoverse Workshop and Hackathon
London, UK *7 – 8 September 2023*

Palaeoverse is pleased to announce the first edition of the 'Palaeoverse Workshop and Hackathon'. The event will take place on the 7th and 8th of September 2023 at University College London, UK. The workshop component of this event will introduce databases (*e.g.*, the Paleobiology Database), building workflows in R (*e.g.*, data cleaning), developing functions, and the versatility R has to offer. The hackathon component of the event will provide the opportunity for researchers to work together in small focus groups to develop workflows, functions and novel tools to address challenges in palaeobiology. The goal of the hackathon will be to develop code which could be incorporated into the Palaeoverse R package. This event will provide an opportunity for attendees to work and network with different researchers, and gain experience of working collaboratively in R to generate reproducible research. We are grateful to the Palaeontological Association who have provided us with a Grant-in-Aid (PA-GA202203), and the Paleontological Society who have also given us funding, enabling us to run the event free of charge.

For more information see <**https://palaeoverse.org/events/workshop-hackathon.html**>.

94th Annual Meeting of the Paläontologische Gesellschaft (PalGes)
Jena, Germany *18 – 22 September 2023*

For the first time since the founding of the Paläontologische Gesellschaft in 1912, the annual meeting will take place in Jena in central Germany, only the second time the meeting has been held in Thuringia since the 1925 meeting in Weimar. The Institute of Geosciences (IGW) at the Friedrich-Schiller-Universität Jena will be hosting the meeting in the city on the river Saale. Thuringian palaeontology has a long tradition and is famous for fossils from the Permian, Triassic and Quaternary; there will be a diverse range of excursions available covering fossil sites from the late Palaeozoic to the Quaternary. The main theme of the meeting will be 'From Early Life to the Neandertals'. The first circular is available on the website with more details to come.

Meeting website: <**https://www.palaeontologische-gesellschaft.de/en/conferences/annual-conference/**>.

XIth International ProGEO Symposium
Loughborough, UK *9 – 11 October 2023*

The organizing committee and the International Association for the Conservation of Geological Heritage (ProGEO) invite you to take part in the XIth International ProGEO Symposium. The meeting is being organized by the Charnwood Forest Geopark and will take place in Loughborough, UK. The symposium is an international event open to scientists, students, educators, professionals, decision-makers and anyone involved in geoheritage and geoconservation. The meeting will promote communication and collaboration among attendees from all over the world, and provide a space to discuss new challenges and threats in geological conservation. The Symposium will include a special session on the conservation of palaeontological heritage. Meeting website: <**www.progeo2023.com**>.

Geological Society of America (GSA) Annual Meeting
Pittsburgh, PA, USA *15 – 18 October 2023*

The annual meeting of the Geological Society of America is a large meeting held in October each year covering a wide range of topics, including palaeontology. The Paleontological Society have their annual meeting and banquet at the event and sponsor a wide range of short courses, topical and discipline sessions relating to palaeontology. For 2023 there will be a short course on ecological niche modelling and the Schuchert Talk will be given by Melanie Hopkins.

Meeting website: <**https://community.geosociety.org/gsa2023/home**>.

11th European Conference on Echinoderms (ECE11)
Lyon, France *16 – 20 October 2023*

The European Conference on Echinoderms is a rare opportunity to bring together scientists from different countries, disciplines and generations, in one meeting dedicated to both extant and extinct echinoderms. The 11th edition will take place at the Université Claude Bernard Lyon 1, France. It will include a pre-conference excursion (11–15 October) to the Villefranche-sur-Mer marine station (close to Nice, on the French riviera), four days of indoor sessions in Lyon (16–17 and 19–20 October), and one mid-conference excursion to Ardèche, including a visit to the Callovian (Middle Jurassic) La Voulte Lagerstätte. This long-awaited meeting will be the first in-person echinoderm meeting after an almost four-year hiatus due to the COVID-19 pandemic. Registration opens on 31st March and abstract submission closes on 15th May.

Meeting website: <**https://ece11.univ-lyon1.fr/fr**>.

Society of Vertebrate Paleontology (SVP) 83rd Annual Meeting
Cincinnati, OH, USA *18 – 21 October 2023*

The annual meeting of the Society of Vertebrate Paleontology (SVP) is a large international conference for vertebrate palaeontology researchers. This year the meeting will take place in October and will be held at the Duke Energy Convention Center located in downtown Cincinnati, close to local landmarks and places of interest. As in previous years there will be three days of technical sessions, specialist symposia, an awards banquet, exhibitions and field courses. Abstract submission is expected to open in early April 2023. For more details see the website.

Meeting website: <**https://vertpaleo.org/**>.

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**>.

OBITUARIES

Fiona Elizabeth Fearnhead
1957 – 2022

Photo courtesy of Stephen K. Donovan.

Dr Fiona Fearnhead was a late starter in academic palaeontology, but made up for it in shear application and energy. Before training in geology in her 40s, Fiona had been overly influenced by 'advice' from family. She had been pushed into teaching by her parents, despite her father being an academic scientist at the University of London. Fiona studied for her Cert. Ed. (CNAA) at Cheltenham where she met Markus, her first husband. She continued to listen to people who made poor suggestions, such as studying for a one-year diploma course in geology as a 'taster' before a degree; it was another year's delay in her academic progress. We met at the PalAss Annual Meeting in Cambridge in 2002, by which time she was teaching at Barnet College in north London while studying for her undergraduate degree at Birkbeck College (BSc (Hons) 2005). At that time her heart belonged to the Jurassic, guided by the late Phil Palmer at the Natural History Museum, London. I must admit that I led her astray, again, but to excellent effect, to examine mid-Palaeozoic crinoids, a passion that she retained for the rest of her life.

I became Fiona's second husband in 2005 and we lived together with my family in the Netherlands until 2008, when she returned to the UK for a teaching post. We continued to work together after divorce in 2009; indeed, we became better friends and a more productive publishing duo. Most of the research, including fieldwork, for Fiona's PhD was undertaken when she was resident in the Netherlands, with an honorary position as a guest researcher at the Nationaal Natuurhistorisch Museum in Leiden. Areas for fieldwork were various, including the Pentland Hills (*e.g.* Fearnhead 2008), south-west Scotland (Fearnhead and Harper 2007), Shropshire (Fearnhead and Donovan 2007) and south-west and mid-Wales.

Fiona's PhD thesis, Systematics and Palaeobiology of British Llandovery Crinoidea (Fearnhead 2009), was supervised by Charlie Underwood and remains the only major study devoted solely to the crinoids of this interval. As such, it formed the basis of her contribution to The British Silurian Crinoidea (Donovan *et al.* 2009–2012). Publication of such a detailed monographic study of the internationally important British Silurian fauna was long overdue. The only previous such volume was an unpublished PhD thesis (Ramsbottom 1953).

Fiona's contribution in less than 20 years of working on the systematics and faunistics of mid-Palaeozoic crinoids was immense. We can only sympathize with the many talented authors who struggle to complete a Palaeontographical Society monograph with all the other demands in their life, yet Fiona co-authored two. In addition to the three-part Silurian volume, she co-authored The British Devonian Crinoidea (Donovan and Fearnhead 2014–2021). The Devonian crinoids had been monographed at the end of the nineteenth century and then had received little attention for over 100 years. We had an equitable division of labour, with Fiona concentrating on making new collections (*e.g.* Fearnhead and Donovan 2015), while I reviewed old museum collections (Donovan and Fearnhead 2017).

Fiona finally found a job worthy of her many talents and abilities when she joined the Natural History Museum, London (NHM) as the geologist in the Angela Marmont Centre for UK Biodiversity. Here she made good use of her network both in and out of the NHM to identify specimens, submitted by the public, as completely as possible. I have happy memories of taking the first flight into London, early enough to have breakfast at the NHM. Fiona, Dave Lewis and I would be joined by the latest boxes of difficult specimens. With over 80 years of experience between the three of us, bacon, eggs and identifications combined for a fun and instructive breakfast. Sadly, after too few years, Fiona was forced to take early retirement as her final illness took over. She leaves behind Barry, her third husband.

Stephen K. Donovan
Swinton, Greater Manchester, UK

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James W. Valentine 1926 – 2023

Jim Valentine, who died on 8th April 2023 aged 96, was one of the most distinguished and influential palaeontologists of the twentieth century, best known for his ground-breaking research on macroevolution and the origin of major animal groups. A prolific author, the development of his ideas is marked by his benchmark books including *Evolutionary Paleoecology of the Marine Biosphere* (Prentice Hall 1973), *Evolution* (Freeman 1977), *On the Origin of Phyla* (Chicago 2004), and *The Cambrian Explosion* (Roberts and Company 2013).

James W. Valentine in 1991. Photo by Saxon Donnelly, courtesy of UC Berkeley.

Following military service with the US Navy during the Second World War, Jim graduated with a BA from Phillips University in Oklahoma in 1951 and a PhD from the University of California, Los Angeles (UCLA) in 1958. Jim's initial faculty appointment was at the University of Missouri, Columbia, which he left in 1964 to spend the rest of his career in his native California, first at UC Davis (1964–78), then UC Santa Barbara (1978–90), and finally as professor of integrative biology at UC Berkeley. He was a member of the National Academy of Sciences, a Paleontological Society medallist (1996), and the Palaeontological Association awarded him the Lapworth Medal in 2004.

Jim's early research was on the Pleistocene molluscs of California. The resulting papers, published in the 1950s and 1960s, considered influences on species distribution including temperature gradients and ocean currents. The emphasis was on assemblages as opposed to species ranges and established a palaeoecological approach to interpreting larger biogeographic and environmental controls on distribution patterns. The first of two particularly influential papers from this period, the product of a Guggenheim Fellowship which Jim spent at the universities of Oxford and Yale, was published in *Palaeontology* in 1969. Here he provided an account of the diversity and ecology of shallow water biotas through the Phanerozoic. Jim illustrated how the now widely-recognized pattern of early animal evolution involved establishing body plans at the outset, followed by diversification within these higher taxa (*i.e.* evolution from the top down). The ecological corollary was the narrowing of niches to accommodate new species, which Jim called "the progressive canalization of ecospace". The second paper, co-authored with Eldredge Moores in *Nature* in 1970, was one of the earliest to relate the evolution of global diversity to the then revolutionary new paradigm of plate tectonics, specifically the assembly and fragmentation of continental landmasses. These were pioneering papers on global diversity patterns through time, anticipating subsequent research by Jack Sepkoski and others.

Jim became one of the first palaeontologists to incorporate genetics into his palaeobiological research with a series of papers with Francisco Ayala quantifying genetic variability in marine animals, including brachiopods and krill. Jim was an advocate of using patterns at different levels in the taxonomic hierarchy to investigate diversification. He regarded genetic regulation as an agent in the evolution of novel morphologies offering a possible explanation for the rapid evolution of major body plans during the Cambrian. These ideas are already evident in the classic textbook *Evolution* (1977), which Jim wrote with Ayala and his other UC Davis colleagues Theodosius Dobzhansky and G. Ledyard Stebbins. It opens with Dobzhansky's famous quote "Nothing in biology makes sense except in the light of evolution". Jim also explored how the completeness of the fossil record might affect analyses of diversity. He used modern and Pleistocene bivalves and gastropods to show that a high proportion of living molluscs are represented in the Pleistocene record of California (*Paleobiology* 1989) inferring that the marine invertebrate fossil record yields good samples of faunas that include animals with more durable skeletons.

Much of Jim's later research focused on the origin of metazoans – the macroevolution of phyla. He refined his ideas on the role of developmental systems arguing that the Cambrian explosion was a product of repatterning of gene regulators that had evolved millions of years earlier (*Development* 1999). In due course this research led to his six-hundred-page *On the origin of phyla* (2004). Jim was a significant collector of Darwin's books (he donated his holdings to the American Philosophical Society in Philadelphia), so it is no surprise that he regarded his own magnum opus as a homage to the great biologist. *On the origin of phyla* is focused on the Cambrian radiation, and integrates a remarkable range of data based on Jim's familiarity with gene sequences, evolutionary development, and the fossil record. He considers the nature of phyla and methods for exploring their inter-relationships, deals with the spotty nature of the fossil record, and reviews the major animal body plans with an emphasis on the importance of stem taxa as evidence of ancestral features. The book concludes with a description of the geologic history of the major groups and reflections on 'why are problems of early metazoan evolution so hard'. Jim's last book, *The Cambrian Explosion, the construction of animal biodiversity* (2013), which he wrote with his former graduate student Douglas Erwin, is an updated account of similar issues aimed at a more general audience. Jim's ideas on the origin of metazoan groups are as relevant today as they ever were and continue to set the agenda for future research.

Jim Valentine was a quiet, self-effacing individual in spite of all his achievements and the recognition they brought. He was always quick to acknowledge the contributions of others, including his peers, but particularly his graduate students and postdocs. This remarkable scientist published papers into his nineties and leaves a legacy of ideas that continue to inform and inspire much palaeobiological enquiry.

Derek E. G. Briggs
Yale University, USA

Research Grant REPORT

Controls on bioturbation and ichnological signatures in Cambrian shelf facies of SW Baltica

Neil S. Davies
Department of Earth Sciences, University of Cambridge, UK

The deep time evolution of burrowing animals initiated profound and unidirectional changes to the Earth system. Compared to the pre-bioturbation planet, the marine sediment–water interface transformed into a heterogeneous 3D construction, the seafloor underwent widespread oxygenation, nutrient cycling accelerated, and particulate matter was redistributed: effects that together revolutionized the planet's biogeochemical cycles and triggered trophic escalation among benthic organisms (Mángano and Buatois 2017). Yet, despite the significance of the evolution of bioturbation, controversy surrounds the evolutionary timeframe of its origin, and the duration of geological time over which the mixed-layer developed within marine sediments (Tarhan *et al.* 2015; Mángano and Buatois 2017; Gougeon *et al.* 2018).

The objective of this research was to provide new insights into both early marine bioturbation and anactualistic sedimentary controls on the ichnological record through an integrated ichnological and sedimentological field study of the Lower Cambrian in south-central Sweden and Bornholm, Denmark, as well as their correlative strata in southern Norway (Nielsen and Schovsbo 2007). These strata have been intermittently studied from a process sedimentology perspective and are generally considered to record mixed tide- and storm-influenced sedimentation in coastal and shallow-marine shelf environments (Skjeseth 1963; Hamberg 1991; Calner *et al.* 2013; Clemmensen *et al.* 2017; Lorentze *et al.* 2019). The age of the strata means they are key successions in understanding Early Palaeozoic sedimentary systems and how they controlled the sedimentary and ichnological record.

The Cambrian of southern Scandinavia records a long-term transgression onto the Baltic shelf, during which large areas of the craton flooded and were transformed into an extensive epeiric sea. The ongoing relative sea level rise culminated in the deposition of the distal Alum Shale Formation from the Middle Cambrian onwards. In the shallower environments that prevailed during the Early Cambrian, the already limited amount of available accommodation space was being supplied with an overabundance of terrigenous clastic material. This caused the available accommodation space in any given place to rapidly fill up, which is reflected by the fact that the bulk of the Lower Cambrian of Scandinavia consists of rapidly deposited quartzites.

The persistence of rapidly deposited quartzites on the Baltic shelf appears to reflect a dynamic environment dominated by substrate erosion, sediment reworking and rapid deposition that would have been hostile for any potential trace fossil makers. Yet, previous studies have described a

surprisingly diverse array of trace fossils of the Mickwitzia Member of the File Haidar Formation (Jensen 1997), which is the basal Cambrian unit of central Sweden. This study has documented a similarly diverse array of trace fossils in the Redalen Member of the Ringstrand Formation of southern Norway, that includes intricately detailed small trace fossils such as *Cochlichnus*, *Oldhamia* and *Didymaulichnus*, as well as larger trace fossils such as *Teichichnus*, *Palaeophycus* and *Cruziana* (Figure 1).

Figure 1. Didymaulichnus miettensis *in the Redalen Member of eastern Norway. Scale bar is 1cm.*

These relatively diverse assemblages are consistent with previous studies that describe the potential diversity of trace fossils in Early Cambrian marine environments. However, this potential is not consistently reflected in most of the Lower Cambrian of Baltica, as diverse assemblages seem to occur exclusively within facies deposited in environments that were sheltered from the dynamic processes that prevailed on the Baltic shelf. In contrast, the rock record of these more dynamic environments consists predominantly of amalgamations of thick-bedded cross-stratified quartzites that are generally lacking in trace fossils. The most common trace fossil assemblages

in this quartzite facies are low diversity – sometimes monospecific – communities of *Skolithos*, *Diplocraterion*, *Arenicolites* and/or *Monocraterion*. Although such low-diversity assemblages are sometimes accompanied by high degrees of bioturbation, these rapidly deposited quartzites are less likely to capture diverse trace fossil assemblages.

The occasional presence of diverse trace fossil assemblages shows that areas of the Baltic shelf hosted a diverse array of trace fossil makers whose behaviour has the potential to be preserved in an intricately detailed way. However, the finding that such assemblages are a rare occurrence in the rapidly deposited quartzites that dominate the Early Cambrian of Baltica illustrates the inconsistency of the early Palaeozoic ichnological record. Understanding this inconsistency is a crucial aspect of the debates surrounding the earliest Phanerozoic ichnological record and timing of the origin of the bioturbated mixed-layer. This project contributes to ongoing research into the Early Palaeozoic depositional environments and their sedimentary and ichnological records.

Acknowledgements

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Small Grant REPORT

A diverse early Pleistocene shark teeth assemblage from southern Taiwan

Chien-Hsiang Lin
Biodiversity Research Center, Academia Sinica, Taiwan

Introduction

Fossil elasmobranch teeth are well-represented in the Cenozoic marine deposits globally and are often the only solid evidence elucidating the past diversity of these top-trophic level predators. However, the elasmobranch fossil record is nearly lacking from the subtropical West Pacific and hinders our comprehensive understanding of how these fish evolved and diversified over time (Lin *et al.* 2021). For example, Taiwan's study of fossil shark teeth has been lagging and stagnant for almost three decades (Lin *et al.* 2021). Although continuous fossil collecting has been carried out since the beginning of the twentieth century, formal palaeontological studies in Taiwan are still at an early stage. Major challenges include a lack of extensive well-preserved material (Lagerstätten) and systematic sampling design. Nevertheless, small fossils such as fish teeth and otoliths are abundant. They can be locally diverse, providing significant insights into the poorly-known past fish fauna of the region (Lin *et al.* 2022a; b).

This project focused on shark teeth from an early Pleistocene locality in southern Taiwan (see below), with an attempt to clarify taxonomic composition and its significance in the West Pacific under a broader spatial and temporal context. The project includes the revision and description of the museum collections in the light of new morphological data and current systematics; and field-based fossil sampling for additional materials, including surface and bulk sediment samples. Visits to the localities facilitated documentation of detailed geological and stratigraphic information, which needs to be added to earlier collected specimens. The results of this project were published late last year (Lin *et al.* 2022b).

Material and methods

The target fossil site is in the Niubu area, Chiayi County, southwestern Taiwan (Figure 1). The locality is known for its rich and diverse marine fossils exposed along the Dahan River, which cut through the early Pleistocene Liuchungchi Formation (1.90–1.35 Ma) in the Western Foothills. The locality is below a steep slope that floods during the wet season. Multiple field-trips were conducted to sample fish fossils during the dry season (January to April) in 2022, and a systematic description of the stratigraphy was achieved (Lin *et al.* 2022b). However, although large bulk sediment samples were sieved, fossil shark teeth were rare.

The project used three museum collections to compensate for the need for adequate specimens: the Biodiversity Research Museum, Academia Sinica, Taipei, Taiwan (n = 277); Chiayi Municipal Museum (n = 390); and National Taiwan Museum (n = 30). Most of the specimens in these collections

were collected by the late Xue W-J during the 1980s and 1990s. These collections facilitated a reconstruction of the detailed taxonomic composition of the Pleistocene fauna in Taiwan.

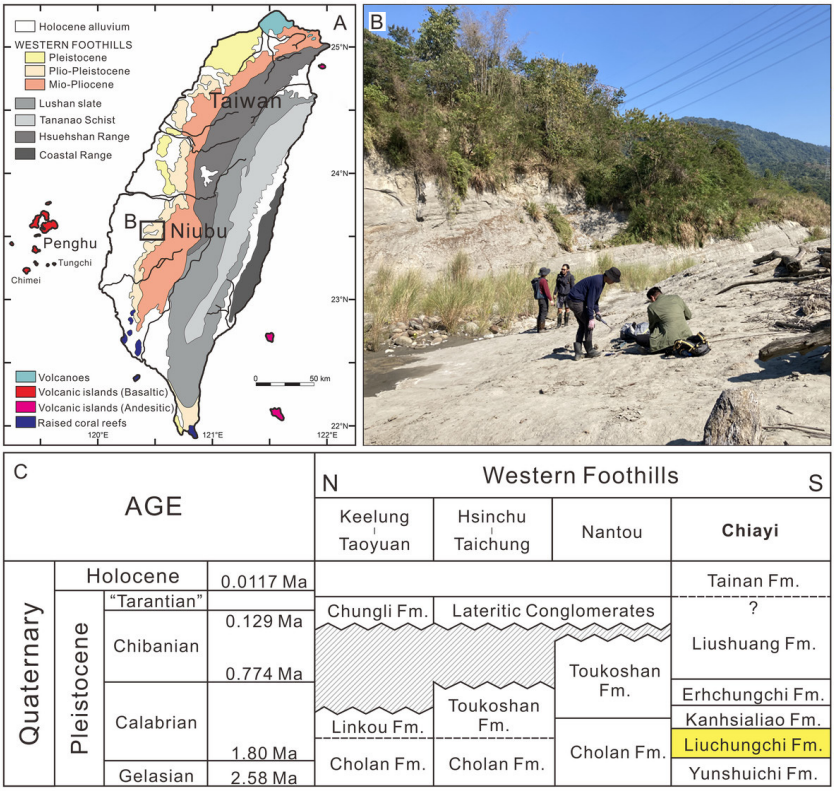

Figure 1. Summary of the sampling sites (after Lin et al. *2022b). A) General geological map of Taiwan; B) General view of the Niubu locality; C) stratigraphic correlation of the Western Foothills (after Chen 2016). Liuchungchi Formation is indicated in yellow.*

Results and discussion

In this project, we examined a total of 697 elasmobranch teeth through three museum collections from the Niubu locality in southern Taiwan (Figure 2). The taxonomic work revealed the existence of at least 20 taxa that belong to nine families, which are dominated by two genera, *Carcharhinus* and *Carcharodon* (Lin *et al.* 2022b). The abundant teeth of *Carcharodon carcharias* in the collections and the high numbers of their estimated body lengths exceeding 4 m were of particular interest because this species has not been recorded in the living fauna of the west coast of Taiwan. Another intriguing record is the occurrence of †*Hemipristis serra*, which is the first Pleistocene record in the area.

The taxonomic composition of the assemblage suggests a shallow-water environment during the early Pleistocene in southern Taiwan. Apart from the elasmobranch teeth, the abundant marine fossils, including molluscs, crabs, sea urchins and fish, further suggest a once prosperous and thriving marine ecosystem in a nearshore shallow-water palaeoenvironment. Taken together,

the here-described elasmobranch fauna is regarded as the most comprehensive and diverse from the whole subtropical West Pacific to date. The diversity indices indicate that this fauna is highly diverse, even compared to other contemporary faunas from the temperate and tropical Pacific regions. This project exemplifies traditionally overlooked or unstudied material that can provide crucial insights into the rarely known past fauna in the highly under-represented tropical–subtropical West Pacific.

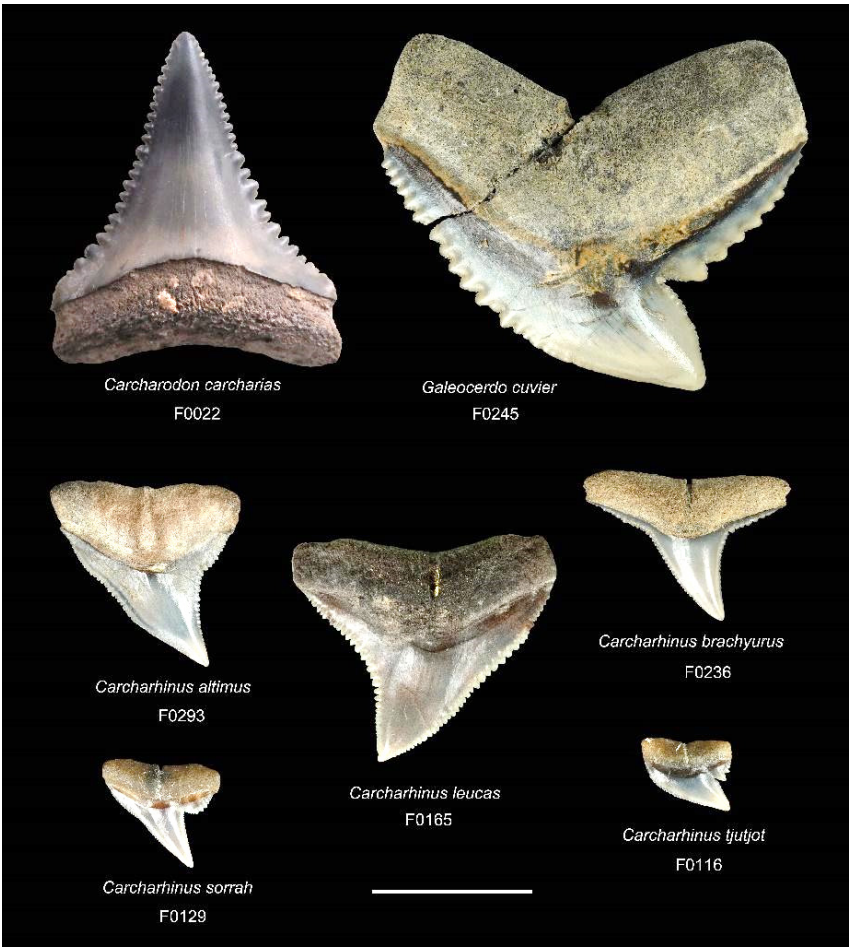

Figure 2. Examples of shark teeth from the early Pleistocene Liuchungchi Formation, southern Taiwan. Specimens are deposited and registered at the Chiayi Municipal Museum (CMM). Scale bar is 10 mm.

Future directions

The present biodiversity hotspot of the West Pacific region, including subtropical Taiwan–southern Japan, tropical Southeast Asia and Australia, originated during the early Miocene through a complex geological history related to tectonic movements (Yasuhara *et al.* 2022). The fossil record provides essential evidence of how various communities responded to these geological and environmental

events that led to the formation of this biodiversity hotspot. Thus, the future of studying marine fossils in the West Pacific, specifically in Taiwan, is exciting. There are numerous potential deposits full of materials, even though they are typically of smaller scale and often with less exquisite conditions. Future studies should fill the gap in understanding the historical marine fauna in this area and attain detailed insights into the spatiotemporal dynamics of biodiversity in the West Pacific.

Acknowledgements

I would like to thank those who assisted in the field, especially members of the marine palaeontology lab (<**https://otolithlin.biodiv.tw/**>). This work was supported by the Palaeontological Association's Small Grant Scheme, Stan Wood Award PA-SW202102.

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Undergraduate Bursary **REPORTS**

The dinosaurs of Tendaguru (Late Jurassic, Tanzania): bringing dark data into the light

Charlie R. Scherer
Department of Earth Sciences, University College London, UK

Introduction

The uppermost Jurassic sections of the Tendaguru beds (~155–145 Ma) of the Lindi Region in Tanzania are a hotbed for the remains of numerous species and genera of sauropod dinosaurs from various clades (Fraas 1908; Janensch 1914; Remes 2009; Mannion *et al.* 2019). Our knowledge of the majority of this diversity stems from an abundance of fossils excavated at the start of the twentieth century during expeditions led by scientists from the Museum für Naturkunde in Berlin, Germany. These expeditions led to the discovery and description of the holotype material for the particularly famous taxa *Dicraeosaurus* (Janensch 1914) and *Brachiosaurus brancai* (now referred to as *Giraffatitan brancai* (Taylor 2009)).

After the First World War, further expeditions to the Tendaguru Formation were led by the British Museum (Natural History) (now the Natural History Museum, London, UK). These expeditions were carried out from 1924 to 1931 and, like those before, recovered abundant sauropod material, which to this day is housed in the collections of the Natural History Museum, London. However, the vast majority of this material remains undocumented and undescribed, meaning that any scientifically significant material has gone unrecognized for decades.

Methods and materials

In 2022, I systematically identified, diagnosed and catalogued the hundreds of individual specimens collected during the British expeditions. This enabled me to elucidate the diversity of the Tanzanian sauropods housed in the Natural History Museum, London collections. Taxonomic identifications were assigned to all specimens using synapomorphy- and autapomorphy-based approaches, using the published descriptions of the holotype and referred specimens of the named Tendaguru sauropod taxa. A review of the sauropod phylogenetic literature, concerning the synapomorphies and general features of numerous sauropod clades, allowed me to confidently refer elements to clades and in some instances to a certain species.

Unfortunately, most of the material consists of heavily damaged and/or isolated elements, making identification below family level difficult. However, some elements can be confidently associated with each other on the basis of geographical proximity (due to historic field notes), lack of element overlap and the overall sizes of the respective elements, demonstrating that a few of these were the remains of associated individuals.

Results and discussion

Systematic palaeontology

Sauropoda, Marsh 1878

Neosauropoda, Bonaparte 1986

Macronaria, Wilson and Sereno 1998

Brachiosauridae, Riggs 1903

Giraffatitan brancai, Janensch 1914

Examination of the sauropod material identified numerous specimens that can confidently be referred to the brachiosaurid *Giraffatitan brancai*, which collectively represent three different growth stages of this taxon. These specimens largely consist of hind limb and pelvic girdle material with the largest and smallest individuals known only from isolated ilia, with the intermediate-sized individual represented by almost complete hindlimbs (lacking pedes) and four metacarpals. The ilia (Figure 1) are almost complete and belong to early juvenile and subadult individuals of *G. brancai*. They can be referred to this taxon on the basis of a tubercule on the ventral margin of the preacetabular process, the strong lateral deflection of the preacetabular process and the strong anterodorsal inclination of the iliac blade. To our knowledge, the smallest individual of *G. brancai* in the collection of NHMUK is the smallest-known individual of this taxon, making it a useful, albeit highly fragmentary, specimen.

Figure 1. Referred right ilium of a young juvenile Giraffatitan brancai *(NHMUK R 38059). Scale bar is 10 cm.*

Due to the aforementioned nature of the collection, novel information regarding ontogenetic change in *Giraffatitan brancai* is limited to the hindlimbs and pelvic girdle. However, it can be seen that the hindlimb of this taxon did not vary greatly in terms of gross morphology or in features seen in mature specimens, but rather in more typical ways, with elements being more gracile in the youngest individuals and more robust in larger/older individuals.

Sauropoda, Marsh 1878

Neosauropoda, Bonaparte 1986

Diplodocoidea, Marsh 1884

Dicraeosauridae, Harris and Dobson 2004

Dicraeosaurus sattleri, Janensch, 1914

A handful of specimens can be referred to the diplodocoid taxon *Dicraeosaurus sattleri* (Figure 2). Two femora and a partial pelvic girdle (lacking only the ilia) can be assigned to *Dicraeosaurus* on the basis of the presence of a lateral fossa on the ventral portion of the ischiadic plate (Wilson 2002; Whitlock 2011) and the presence of a nutrient foramen on the femoral shaft. They can further be referred to *D. sattleri* due to the overall higher gracility of the femur and the pelvic girdle (Schwartz-Wings and Bohm 2012; A. Campbell 2022, personal communication).

Figure 2. Selection of referred specimens of Dicraeosaurus sattleri. *Left: left femur (NHMUK R 38012); right: right pubis (NHMUK R 38242). Scale bars are 10 cm.*

The referral of the femora to *Dicraeosaurus sattleri* also strengthens the separation of this species from its sister taxon, *D. hansemanni*, using both morphometric analysis (Schwartz-Wings and Bohm 2012) and robustness indices (RI, *sensu* Wilson and Upchurch 2003). The average RI of the femora of *D. sattleri* used by Schwartz-wings and Bohm (2012) are almost identical to that of the large femur at the Natural History Museum, London (0.208 and 0.207 respectively). The RI of the holotype and other specimens of *D. hansemanni* used by Schwartz-Wings and Bohm (2012) range from 0.23 to 0.24. This indicates that the two species can be separated by measurements of robustness as well as more quantitative morphometry-based approaches.

Work to fully accession these specimens and the rest of the Tendaguru collection is currently ongoing and a comprehensive catalogue of the specimens in the collection will be published in due course.

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I am grateful to the Palaeontological Association for providing the funds necessary for me to carry out this research (grant number PA-UB202201). These funds allowed me to travel to and from the Natural History Museum, London each day in order to complete this project. I also extend my thanks to Paul Barrett for supervising this project, Philip Mannion for additional support, and to Susannah Maidment and Matt Porter for collections help. I would also like to thank Amy Campbell for insight into the pelvic anatomy of *Dicraeosaurus*.

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Engagement Grant REPORTS

Fossils in t' Hills and where to find them

Jed W. Atkinson
West Craven High School, Lancashire, UK

Rebecca F. Bennion
University of Liège and Royal Belgian Institute of Natural Sciences, Belgium

Jacob D. Morton
Centre for Life, Newcastle upon Tyne, UK

The majority of the UK public associate fossils with the coast and are unaware of the palaeontological diversity on their local doorstep. This is particularly the case for Yorkshire, whose geological story is often told only by the Lower Jurassic-aged coastal regions which make up a small part of this large county. Yorkshire has a rich geological and palaeontological heritage – ranging from Carboniferous coral reefs and coal swamps to Ice Age hyena dens – which deserves wider recognition in the public eye. Early in 2021 two of us (JWA and RFB) set up a science communications initiative called *Fossils in t' Hills* on Twitter, Facebook and Instagram. Our mission is to increase public awareness and connection to local palaeontology and geology, focusing on inland fossils from Yorkshire and the north of England.

The Fossils in t'Hills *team (left to right: Jed, Becky, Jake) and* Pholiderpeton. © *Fossils in t' Hills.*

The project rapidly broadened its horizons, seeking to engage with the public in a face-to-face manner, using activities to get the public thinking about the rocks and landscapes around them. With the financial backing provided by the Palaeontological Association's Engagement Grant we were

able to run an activity stall at the Yorkshire Fossil Festival in 2022. Since 2014 the Yorkshire Fossil Festival has been a three-day celebration of everything palaeo, drawing in exhibitors from universities and museums across the nation and members of the public from across the region.

Activities

Our stall consisted of two activities. The main activity revolved around a large magnetic geological map of Yorkshire and adjacent regions: "Pin the Fossil on the Map". This activity invited visitors to handle a range of fossils (both real and replica) and asked them to determine what the fossil was and what environment that organism might have lived in. From this they were asked to place a magnetic representation of that fossil onto our simplified geological map which was annotated with palaeoenvironmental reconstructions linked to each of the major rock divisions. The collection of specimens used on the stall included a range of fossils from six major geological divisions across the region: Carboniferous coral reef fossils from the Yorkshire Dales; Carboniferous plant fossils from the Millstone Grit river delta; Carboniferous coal swamp fossils from the area around Bradford; Middle Jurassic plant fossils from the North York Moors; Late Jurassic fossils from the tropical lagoon of the Vale of Pickering; and Cretaceous chalk fossils from the East Riding. We avoided the use of Lower Jurassic fossils, which many people are familiar with, in order to better highlight the geodiversity of the region.

This activity proved to be immensely successful and its flexibility was a key part of this – some people engaged incredibly well with the map, whereas others preferred to handle and discuss the fossils on the table. The sheer range of specimens brought with us allowed us to tailor the experience for each visitor to show them fossils that were found in similar rocks in their local area and to consider what the environment would have been like in the geological past. One man brought a fossil coral with him for identification and took great pride in being able to match it to our palaeoart reconstructions and place a magnet on our map to show where in the Yorkshire Dales he had collected it.

Jake Morton discussing Cretaceous fossils with a visitor (photo taken with parental permission). © Fossils in t' Hills.

Some of the excellent Edestus *reconstructions from across the weekend. © Fossils in t' Hills.*

Our second activity focused on one incredible inland Yorkshire fossil, the whorl-toothed shark *Edestus newtoni* from Huddersfield (now classified under *Lestrodus*). Inspired by the many fantastical reconstructions of its relative *Helicoprion*, we invited children to create their own! We obtained permission from the British Geological Survey to create a 3D printed replica of the type specimen for visitors to handle and use to inspire their imagination. This activity was our "messy" creative activity, which helped to draw in young families. We got some amazing reconstructions over the course of the weekend. Children loved being able to use their own imagination and for there to be no bad ideas or wrong answers. Shortly after the Festival we were contacted by a young child who wanted to find out more about *Edestus* as, inspired by our stall, he was giving a presentation on the fossil at his school for a science competition.

One of the major pull factors to our stall was the use of toys alongside the fossils; this was not something that many other stalls had done and really caught people's attention, particularly the specially commissioned 0.5 scale plushie (1m long) of the Bradford early tetrapod *Pholiderpeton*, one of Yorkshire's most significant fossils and a powerful tool to engage people on little-known West Yorkshire palaeontology.

Outcomes

We were extremely busy all day on the Saturday and barely had time to eat lunch. Sunday was much quieter with significantly reduced numbers attending the Festival as a whole. We handed out around 210 stickers, which is a minimum estimate for the number of people interacted with. From the weekend there were a number of highlights for us. These included meeting a family from Skipton who had been following us on social media since *Fossils in t' hills* began – they loved that someone was sharing fossils and geology from their local area. We also met a family from Huddersfield who took part in the *Edestus* activity and who were amazed at the incredible fossil from their hometown! Additionally, a family from Malton were able to learn about the rocks around their home, to which they had previously not given any thought, and were extremely keen to apply their new-found knowledge the next time they went for a walk in the hills.

Following this successful first *Fossils in t'Hills* in-person outing, we have taken our stall to various events in 2023, including the Yorkshire Geology Day (in late April at the National Coal Mining Museum near Wakefield) and this year's Yorkshire Fossil Festival (held in June at Whitby Museum). We have also had several requests for school visits and geological walks, and are in contact with several museums to run activities with them.

Acknowledgements

We would like to thank the Palaeontological Association for making these outreach activities possible. We are also extremely grateful to the following: Palaeoplushies (Rebecca Groom) who created an amazing reconstruction of *Pholiderpeton*, the British Geological Survey, the Sedgwick Museum of Earth Sciences and the Yorkshire Museum who gave permission to 3D-print replicas of their specimens, and Liam Herringshaw for all his efforts in organizing the Yorkshire Fossil Festival.

Fossils go to school

Caiubi Emanuel Souza Kuhn
Faculty of Engineering, Federal University of Mato Grosso, Brazil

Introduction

This project involved the development of an itinerant exhibition of fossils, rocks, minerals and replica fossils, which reached schools located in cities and communities close to important palaeontological and archaeological sites in the state of Mato Grosso. In addition, the project included some schools located in the state capital, Cuiabá. The project also involved providing blind and vision-impaired people access to the scientific collections through touchable replicas. The exhibition we developed makes use of the objects and replicas to approach the history of the planet, from the origin of the Solar System to the latest extinctions, the emergence of man and the use of natural resources. Altogether, the exhibition was attended by more than 4,000 students and over 200 teachers, from the municipalities of Barra do Bugres, Rosário Oeste, Jangada, Cuiabá and Chapada dos Guimarães. The project was developed by the Instituto Ecossistemas e Populações Tradicionais (ECOSS), the Museum of Natural History of Mato Grosso and the Mining Engineering Course at the Federal University of Mato Grosso.

The importance of the project

The Natural History Museum of Mato Grosso, founded in 2006, has been dedicated to popularizing science and developing research, as well as building a significant collection to tell the natural history of this important region. The project *Fossils Go to School* arose from the need to build a connection between schools and communities located close to important palaeontological and archaeological sites in the state of Mato Grosso and the Museum's collections. Since the nineteenth century, numerous scientific expeditions have been carried out in the region of Mato Grosso, but a large part of the collected material has been transported to be safeguarded in other regions of Brazil, or even in museums abroad.

Mato Grosso has an area of 903,207 km², almost three times the size of Germany, and has an average population density of 3.36 inhabitants/km². State museological institutions are scarce and, in general, restricted to the largest cities in the state. Such a demographic scenario creates a large distance between most of the population and the museums. Furthermore, the average family income in 2021 was R$ 1,362, around £220.26 GBP, which makes access to institutions onerous, especially for the poorer population. In this scenario, communities located just a few kilometres from sites where important palaeontological remains have been found and studied by scientific expeditions have never been in touch with the material collected.

The absence of, or little, contact with the scientific objects collected in the communities may represent a risk for the palaeontological sites themselves, because by not knowing the collections and understanding the importance of these sites, the local population may end up not understanding the importance of preserving places where scientific findings have been made. Another relevant factor is that other potential sites for research may exist in the areas surrounding these known sites. Therefore, the itinerant exhibitions aimed to promote the democratization of science in public schools and in communities located in regions where important scientific discoveries have occurred, providing access to fossils and other scientific objects and promoting heritage education.

Exhibition script and collections used

The exhibition was planned so it could be transported in a pick-up truck, with the aim of keeping costs low. The travelling collection consists of fossils of stromatolites, arthropods, trilobites, tentaculites, bivalves, brachiopods, mesosaurs, sauropods, *Eremotherium laurillardi*, *Pampatherium humboldti* and mastodon. Replicas of different types of fossils were produced to facilitate an understanding of the shapes and sizes of animals from the past. The archaeological collection consists of prehistoric artefacts such as chipped stone spearheads, polished stone axes and ceramics, along with historical artefacts found in old farms from the eighteenth and nineteenth centuries, such as iron tools, copper, European crockery, as well as ceramics made by enslaved people. The geological collection is composed of igneous, metamorphic and sedimentary rocks and different types of minerals. Explanatory banners were developed to facilitate the explanation of the materials on display.

Actions

Ten exhibitions were held, in five different municipalities, reaching 4,047 students and 244 teachers (Figures 1 and 2).

Figure 1. Photos of the exhibitions held at: A) Santa Helena Municipal School; B) and C) Jula Paré Indigenous State School; and D) Arnaldo Estevão de Figueiredo State School. Photo © Caiubi E. S. Kuhn.

One of the schools visited was the Municipal School Santa Helena, located in the rural area of Chapada dos Guimarães, in the same community where fossils of *Pycnonemosaurus nevesi* from the Upper Cretaceous were found. The urban region of the same municipality is located close to important finds of marine invertebrates from the Devonian Period, so exhibitions were held in the area at the Escola Estadual Prof. Ana Tereza Albernaz and at the Rafael de Siqueira State School. Located in the region of occurrences of stromatolites, Neoproterozoic fossils and megafauna fossils, are the Prof. Benedita Augusta Lemes Rural State School, the Arnaldo Estevão de Figueiredo State School, the Izac Rodrigues de Mesquita Municipal School, and the Jula Paré Indigenous State School. The Instituto dos Cegos do Estado de Mato Grosso was chosen as a partner due to their excellent

Figure 2. Photos of the exhibitions held at: A) Izac Rodrigues de Mesquita Municipal School; B) Rafael de Siqueira State School; C) Escola Estadual do Campo Prof. Benedita Augusta Lemes; and D) Prof. Ana Tereza Albernaz. Photo © Caiubi E. S. Kuhn.

work carried out with people with additional visual needs. State school Dr. Estevão Alves Corrêa and the State School Prof. Benedito de Carvalho were the first to be visited in the metropolitan region of Cuiabá. Other schools did get in touch; however, due to budget limitations they were not visited by the project.

Project legacy

The material in Braille, developed for the project, will be available in the permanent exhibition of the Museum of Natural History of Mato Grosso. The collection of replicas and banners made for this project will be used in future exhibitions, which will be easily facilitated through partnerships with the municipalities and future funding from other sources to cover the costs for transportation, accommodation and food.

Acknowledgments

I am grateful to the Palaeontological Association for making this project possible with grant number PA-OE202102. I would also like to thank the teams at the Museum of Natural History of Mato Grosso and the Instituto Ecossistemas e Populações Tradicionais (ECOSS).

Voices for the Future – Mary Anning

Frances M. Lynch
Artistic Director, Electric Voice Theatre, London, UK

Electric Voice Theatre (registered charity number 1194881) is an award-winning contemporary music-theatre a cappella ensemble specializing in creative multi-disciplinary collaborations with women working in STEMM. Singing, music and art reach people in deep, impactful ways, with the power to expand expert talks into interactive participation, diverse community engagement and entertaining, pedagogical performance. With this in mind, our project set out to raise awareness not just of Mary Anning, but through her story to glimpse the breadth and scope of palaeontology, its concepts, and the many women who have contributed to the discipline.

With the help of Emma Bernard, Curator of Fossil Fish at the Natural History Museum, London, UK and science historian Dr Patricia Fara, Emeritus Fellow of Clare College, University of Cambridge, UK, we took participants and audiences on a series of magical digs through layers of scientific, historic and musical strata.

A slide from Emma's talk, showing all the different things she does at NHM, London. Courtesy of Emma Bernard.

There were three main areas (feedback given in italics):

Primary school workshops (years 3 and 4, ages 7–9)

"Mary Anning Megasongs", supported by Sidmouth Science Festival and Lyme Regis Fossil Festival

It was amazing

They felt so proud of the final outcomes

They felt important and valued to have these experts talking with them

We met palaeontologists and Electric Voice Theatre…

… and we met several hundred eager and talented children who created a series of clever, creative and scientifically sensational Megasongs. Each project took place over five weeks – mainly on Zoom – with talks by Emma and Patricia. The children were fascinated to hear about Emma's work, all the different types of people she works with and her other interests – when they learnt she had been a ballet dancer, one group put her into their song as the ballet teacher of Peppermint the Plesiosaur!

Some of the work took place onsite with the children creating jigsaw clay models of some of Mary Anning's finds, and they had a visit from Mary Anning herself (well me dressed up!) with a basket of fossils.

Mary Anning found loads of fossils like the pterosaur Dimorphodon

We looked at fossils, it was great

The coprolite made everyone laugh!

I worked closely with Emma to create a solid palaeontological foundation for the Megasongs. We divided the classes into four groups, each writing about a different stage of the fossil's existence – from its living environment, through fossilization, where and how it was found millions of years later, and finally how scientists study fossils today. This was then translated by the children into poetry, stories, songs, ear worms, drawings and clay models in a fun learning process infused with British Sign Language.

We learnt about belemnites, ammonites, coprolites and fossilization

We wrote about how scientists discover fossils and look at them in their labs

The verses were connected by a chorus about Mary Anning to make their Megasongs complete, then they practised and practised until they were ready to record them. Finally, our artist, Jack Sewell, created an animated film for their music using their artwork. You can watch these wonderful videos on our project pages: <**https://www.electricvoicetheatre.co.uk/projects/**>.

Our flyer featuring the Mary Anning statue in Lyme Regis by sculptor Denise Dutton, commissioned by Mary Anning Rocks.

Mary Anning song competition

The song competition was designed to encourage individual children to write verses for what would become "A Song for Mary Anning", which was sung at the unveiling of her statue on 21st May 2022 in Lyme Regis by Mrs Ethelston's Primary Academy Choir to an audience of 2,000 people! Among the judges were Judith Weir, Master of the King's Music, Evie Swire, Founder of the Mary Anning Rocks campaign, and palaeontologist Dr Xiaoya Ma, University of Exeter and the Natural History Museum, London. You can watch the video made by our artist to accompany the song via this link: <**https://www.electricvoicetheatre.co.uk/a-song-for-mary-anning/**>.

Public and private performance events

The children's Megasong videos were shared at various in-school events with the whole school, their parents and friends. They performed their choruses live to show off their voices and their palaeontological BSL signing! We created a new production, "Mary Anning and her Sisters in Science", including a talk by Emma and music especially composed to honour both Mary Anning and fellow female palaeontologists. We first performed it for a lively family audience at Lyme Regis Fossil Festival. Several performances featured our Virtual Choir who sang "NOT Mary Anning – She Sells Sea Shells on the Sea Shore" (<**https://www.youtube.com/watch?v=oySaKVI0ROw**>), a fun piece I created to explain that this popular rhyme actually has nothing to do with Mary Anning, who of course sold fossils from her shop!

Voices for the Future

Aside from the myriad voices raised for palaeontology in workshops, performances and Zoom calls, the project has produced some enduring online content which has already received considerable attention:

- Seven fabulous Mary Anning Megasong videos by Chaddlewood, Sparkwell, Awliscombe, Peyhembury, Sidmouth and Newton Poppleford Primary Schools;
- "A Song for Mary Anning" by children aged 5–11 (video by Jack Sewell) with comprehensive materials for learning to sing and sign the song so that children everywhere can join in and write their own songs too;
- Profile pages for some of the women scientists and participating schools on our Minerva Scientifica website (<**https://minervascientifica.co.uk/earth-science/**>);
- Recordings of live and Zoom performances/talks on our YouTube channel @electricvoicetheatre and for our popular podcast series Women of Science & Music: 30 Celebrations (<**https://www.electricvoicetheatre.co.uk/podcasts/**>).

These online footprints in music, art and palaeontology will continue to leave deep impressions as many more young composers, singers and palaeontologists lift their voices to sing the praises of palaeontology for the future.

Some of the children's clay models, created with a little help from artist Jack Sewell. Clockwise from top left: Jane Dories the dapedium; Peppermint the plesiosaur; Pixy the ichthyosaur and Pterolita the pterosaur. © Electric Voice Theatre.

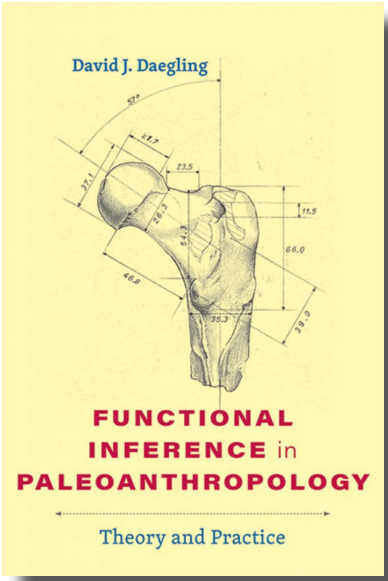
Acknowledgements

Huge thanks to the Palaeontological Association for supporting this project through an Engagement Grant (PA-OE202103), and to Emma Bernard and Dr Patricia Fara who inspired us and so many of the participants. Thanks also to Sidmouth Science Festival and Lyme Regis Fossil Festival, Mary Anning Rocks, Arts Council England, Ambache Charitable Trust, RVW Trust, and especially all the primary school staff and pupils who dug down into the strata of the project with such sparkling enthusiasm.

Reviews

Functional Inference in Paleoanthropology: Theory and Practice

David J. Daegling, 2022, John Hopkins University Press, ISBN: 9781421442945.



Functional Inference in Paleoanthropology: Theory and Practice by David J. Daegling is an informative insight to what bones can tell us about movement, diet, function, and everything in between. Daegling is one of the leading specialists in functional morphology and his expertise is present on every page as he leads the reader through the basics, the concepts, the many theories and, most importantly, the many problems palaeoanthropologists face when trying to correlate morphology with function. The occasional joke and light-hearted comments make the book easy to digest for those with a basic understanding of the topic and ensures the reader's attention is captivated.

The book begins with a very honest account of the author's own experiences and pitfalls in the field, alongside comments on the fast-paced, evolving nature of scientific research. As an early-career scientist myself, such comments were very reassuring to read from the get-go that we can all make mistakes and that is what allows us to grow as a scientist. The book begins with a preface detailing a conference he attended some years before in which the delegates were instructed to consider their own research specialization and consider 'what was known, what was unknown, and what was unknowable'. Daegling uses this framework in his writing to instruct the reader on what functional morphology can and cannot tell us.

Daegling takes the reader on a journey through human evolutionary theory, encompassing this framework. The first stop was *'unresolved problems in human evolution'*. This chapter briefly introduces the reader to hominins and the questions concerning how evolutionary pressures might have shaped the aspects that define humanity: bipedalism, tool manufacture, diet and language. This list forms the outline of the rest of the book. My first criticism arises in this introductory chapter. Despite believing that this book would be an introductory text to the field, I was surprised by the assumption that the reader should already have a decent background in evolution. Whilst I was not expecting a full introduction to the topic, a few short paragraphs as a 'reminder' was expected. Leading on from this, elsewhere in the book there are references to specific specimen identification numbers with the assumption that the reader should already know the taxonomic assignment of the specimen.

The book is divided into seven sections, including an introduction to evolutionary functional morphology, the methods a palaeoanthropologist might use to infer function from morphology, the origins of bipedalism (and the difficulties of determining whether or not a hominin could have walked habitually upright), changing diets amongst the hominins, and comments on bone adaptation to activity.

In Chapter 2, Daegling presents a historical overview of the topic of morphology, interspersed with debates regarding form *versus* function. This chapter provides an important theoretical background needed for any student in the field. Chapter 3 is associated with the more practical side of the topic, informing the reader about some of the methods that palaeoanthropologists can use to investigate morphologies. Nevertheless, the chapter is still quite heavy in theory. The reader should expect to leave this chapter knowing about ways in which functional inferences can be gleaned from fossil data but should not expect to leave knowing how to implement such methods. In Chapter 4, Daegling presents the difficulties faced by palaeoanthropologists analysing postcranial morphology: how can researchers understand when, how and why bipedalism arose? And why do researchers not agree on the conclusions? This is a difficult topic to navigate without inserting one's own bias and I enjoyed reading this chapter which mostly remained unbiased. This is surely a positive spin for students reading this text. Chapter 5 moves up the body, dealing with the cranium and dietary adaptations amongst the hominins, whilst Chapter 6 brings everything back together in a discussion on bone adaptation to loading and environment.

These sections are well partitioned and well-written, but a lack of coloured figures is somewhat disappointing. Whilst the book is a good introduction to functional morphology/mechanobiology, readers who are new to human evolution might struggle with the 'who's who' of the discussion and would be better placed to first read an introductory text to the wider topic, or at least consult a cladogram. Speaking of which, it was disappointing not to find some sort of cladogram/phylogenetic tree in the introductory chapter as would be expected in such a text. There are many other diagrams throughout to help illustrate difficult concepts, but these will need to be read in close connection with the associated text as the figures are not self-explanatory, which is my main criticism.

The language of the book is fluid, but certain terminologies are lacking an explanation. Whilst this is fine for those with a basic understanding of biomechanics, anyone new to the field might find themselves having to google certain key words. I understand that not every term can be explained, but as this text is advertised somewhat as an introductory text, I would have expected a bit more explanation of the terms. Overall, the book offers a good overview of the topic and is best suited to individuals with at least an undergraduate level of knowledge. The book is best classed as a textbook, rather than as a popular science communication book, although there are the occasional moments of informality to help keep the reader's attention on track. The reader should not expect exciting tales of human evolutionary theory, but rather text which is heavy in technical terminology and often straight-to-the-point. This would not be a text for bedtime reading or to sit and read from cover to cover; rather, it is a book to be read with intent. For example, it will be well-suited as an introductory text for students.

I enjoyed reading this book and learned many things along the way – and I am sure that I will be referring back to sections of the book in the future during my own research and/or teaching. Daegling has a breadth of knowledge in the field, evident through the many case studies, trivia and discussions throughout the book. Quite refreshingly, Daegling avoids inserting too much of his

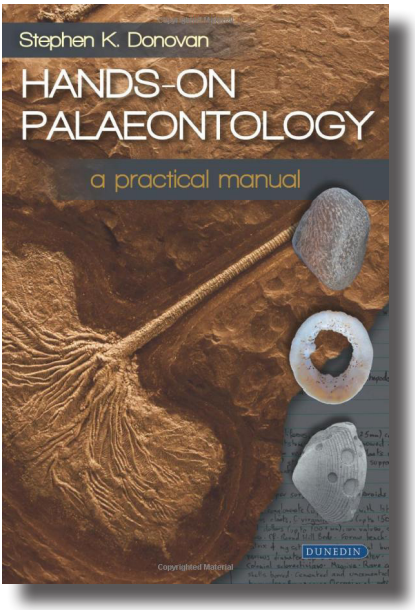
own bias and leads the reader towards a well-balanced argument of each particular topic, although do not expect to leave the book knowing how and when humans started walking upright or what they ate, because – as Daegling rightly states from the beginning – we will probably never know the answers to these questions; but that does not mean we should stop finding new ways to tackle the problem.

Would I recommend this text? It will be very informative for teaching staff and students interested in functional morphology. This would not be a text for someone with a general (*i.e.*, non-academic) interest in the topic. In conclusion, I believe that the book offers a comprehensive overview to the field and will likely become a staple textbook on the shelves of palaeoanthropologists.

Ashleigh L. Wiseman
Ashleigh is a Leverhulme Trust Early-Career Fellow at the University of Cambridge in the UK. Ashleigh can be found on Twitter `@ExploringArchaeology` *and also on her website at* **<https://walkinginthepast.co.uk/>**.

Hands-On Palaeontology: A Practical Manual

Steven K. Donovan, 2021, Publisher: Dunedin Academic Press, ISBN: 978-1780460970.



Maybe, like me, you're a palaeontologist from a biological background, forever feeling uninitiated into the Mysteries of Geology? Or instead, an old hand looking for a short dippable reference book to quickly help you sort your *Fodinichnia* from your *Pascichnia*? Perhaps even a complete palaeontological novice trying to work out where to begin collecting fossils?

Any of these people are likely to find *Hands-on Palaeontology* by Steven K. Donovan a useful bookshelf addition. Donovan aims to "spread the hands-on aspects of palaeontology before the reader", providing an accessible fossil-collecting reference guide which can be read cover to cover or dipped into as you please. He does this in a fairly slim, robust paperback volume of 250 pages, divided into five sections each organized into short, 3–5-page chapters. All chapters are clearly written in a succinct and engaging style, lavishly illustrated with photographs and diagrams, and thoroughly referenced for those who wish to follow up on their contents. The main text is followed by a glossary and index to remind you what exactly a crinoid pluricolumnal is and where you read about it.

The first four of the book's five sections take you from finding your first fossil to getting your work published. *'Getting started'* gets straight down to business by offering advice on how, what and

where to collect fossils. Clear overviews are given on the basic geological principles underlying interpreting a site, some special fossil situations, such as beachcombing or looking in caves, advice on key tomes you might want to get hold of, and field safety. *'Theoretical aspects'* introduces some light theory to help you navigate the processes underlying fossil collecting. Again these are firmly focused on those things that will be useful to fossil collecting and so cover the whole journey of an organism dying millions of years ago to its being discovered by you, *Hands-on Palaeontology* in hand. *'Working on your collection'* takes us through the necessary steps to curating and describing your fossil spoils, giving advice on how to store, label, photograph and describe your collection. *'The Wider Field'* then offers advice on engaging with the palaeontological community, from collaboration with individuals, to societies, to conferences, and maybe even publishing in journals (*Palaeontology* perhaps?). All of these sections are accompanied by real examples from Donovan's own experience, making them a lot more compelling to read than they might otherwise be.

The final section of the book is a bit different: *'Fossils in Many Fields'* gives examples of several field excursions. Most of these are fossil-collecting trips in England, with guides taking us to the Cretaceous of Norfolk, the Isle of Wight, and the Carboniferous of Lancashire and Derbyshire. A couple are less traditional – an *Aktuo-paläontologie* trip to Southport and a Piltdown Man trail – while two more take us overseas – on a palaeontological city tour of The Hague and a holiday to Antigua. These are clearly explained, with maps of sites where needed. Advice on travel and important landmarks *(i.e.* pubs) is also given. Again, these are based firmly in the author's interests and experience, with a focus on ichnofossils and places he has collected in the past.

I thought the best way to put *Hands-on Palaeontology* to the test was to undertake one of these trips myself. Alas, my charm proved insufficient to persuade the PalAss Reviews Editor to send me to Antigua[1], but I did manage to make it to Salthill Quarry in Clitheroe, Lancashire[2]. Clutching my copy of *Hands-on Palaeontology*, I successfully followed its directions to the Mississipian carbonate ramp preserved there and began the hunt. By judiciously following Donovan's instructions to keep my eyes close to the ground (*i.e.,* parking myself in the muck) I was able to find many fossilised crinoids!

The reviewer getting his hands on some palaeontology. Photo courtesy of R. Dearden.

[1] Editor's note: enquires were made but, alas, a trip to the Caribbean for Richard was not seen as a good use of the Association's resources.

2 Editor's note: we didn't pay for this either…

Donovan certainly meets his aim with this book, providing a clearly-written, well-organized and authoritative guide to palaeontological practicalities. One of the main strengths of the guide is its basis in the author's own experience, which livens up passages that might otherwise be dry and gives the reader a sense of the logistics of different steps. Inherent in this approach is that certain parts of the book, especially the field guide, will perhaps be of most interest to budding palaeontologists living in the UK, and England at that. It also means that the ever-expanding horizons that new technologies open to the amateur palaeontologist aren't quite fully explored: for example, photogrammetry, or the organization of references with referencing software, both of which are fairly easy for the home-based amateur to deploy. However, these are minor quibbles: the field guides are more broadly useful as examples of the genre, and information on modern imaging methods is freely available online.

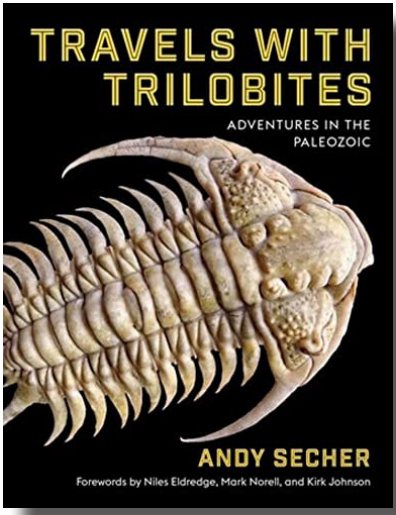
Because of this, I enthusiastically recommend *Hands-on Palaeontology* as a palaeontological bookshelf addition. It won't tell you everything there is to know about palaeontology but it will certainly get you on your way.

Richard Dearden

Richard is a postdoctoral research fellow at Naturalis Biodiversity Center, Leiden, in The Netherlands. A fan of fossil fishes of all flavours, Richard is especially interested in the early evolution of sharks and rays. He can be found on Twitter `@Euphanerops`.

Travels with Trilobites: Adventures in the Paleozoic

Andy Secher, 2022, Columbia University Press. ISBN: 9780231200967.



There are not enough books about trilobites, that is a simple fact! Given how many books about dinosaurs are being published every year, trilobites are vastly under-represented despite being as iconic a symbol of palaeontology as those stem birds! That said, every new book about trilobites is a treasure for every enthusiast interested in Palaeozoic ecosystems. When I found out there is a new book about these long-extinct arthropods, I knew I needed it – regardless of its formal quality. It was a great choice because *Travels with Trilobites* from Andy Secher is actually a pretty great book. The author is a field associate in palaeontology at the American Museum of Natural History (New York) and a passionate trilobite collector.

In over 360 pages full of astonishing photographs and fervent essays, Andy presents trilobite diversity from all around the globe. Apart from the introduction, the book is naturally subdivided into six chapters. Five of them cover trilobites from a particular time slice (Cambrian, Ordovician, Silurian, Devonian, and Carboniferous & Permian). Each of these five chapters includes a series of essays that

generally focus on particular trilobite-bearing strata, such as Latham Shale in California, Valongo Formation in Portugal, or Rochester Shale in New York. You can visually travel to visit trilobites from Australia, Bolivia, China, Czechia, Canada, Germany, Morocco, Portugal, Russia, the USA, and many other countries. Secher gives a nice overview of the fossil sites and illustrates the everyday life of trilobite collectors. One can feel the author's passion for these ancient 'bugs' (or 'crayfishes', to use the Czech slang of trilobite collectors) from every page of his book.

At the end of each section, there is a photo gallery with additional trilobite photographs that are as stunning as the ones that serve as illustrations for individual essays. The pictures are technically perfect in most cases and the selected specimens are very illustrative. As someone who actively works on trilobites, I can say that many of the images can be easily used for comparison or for creating phylogenetic matrices in research articles (a most needed thing in trilobite palaeontology, in fact). Sadly, there are a few pictures that would probably deserve slightly higher resolution. It is, however, true that in cases of rare specimens, sometimes an imperfect image is better than no image. On the other hand, some images seem to have very good resolution and would deserve a larger print.

The last chapter of the book gathers the author's thoughts about various aspects of trilobite collecting. This includes discussions of trilobite values, fake trilobites, and trilobite preparation, as well as showing behind-the-scenes of the American Museum of Natural History or the other top trilobite museums around the world. I particularly like the discussion over restrictions and rules related to fossil collecting, as this is currently a widely-debated topic full of emotional discussions. I personally know several people defending wholly opposite opinions. Some want to stop private (or hobby) fossil collecting entirely, while others support no restrictions at all once the site is not protected. The reality is that this is a complicated debate, and it is great to have opinions from various people who work with fossils.

Despite being almost perfect, two things could have made the book even better. Firstly, as a researcher, I would probably appreciate a bit more information about trilobite palaeobiology and evolution in the essay part. Although the author included some of them in the text, they tend to be rather general. But I understand that the mission of the book is not to be a comprehensive treatise of trilobite palaeobiology. Secondly, with the book, the reader can surely travel across the world, but in reality, many of the essays focus on North American localities. This is, however, completely understandable, given that the author is from the USA and is probably most familiar with such localities. These minor comments do not reduce the value of the book, which is surely one of the best books about trilobites published in recent decades.

The current price for *Travels with Trilobites* is about $40 USD (or €38 EUR) for a hardcover. Considering the quality of the colour images, the number of pages, and the amount of information in the book, this is more than good value for the money. In fact, it is cheaper than most of the real trilobite fossils you can buy on eBay. To sum up, this book is definitely a must-have for every trilobite enthusiast and I would recommend it also to other persons interested in palaeontology, as well as to school teachers who teach natural sciences.

Lukáš Laibl
Lukáš is a researcher at the Czech Academy of Sciences, an arthropod fan, trilobite worshipper, nature explorer, and father of one little Homo sapiens. *He is on Twitter as* `@lukas_laibl`.

Books available to review

We are commonly approached by publishers to review books, and normally Thomas approaches appropriate reviewers. But, we are always looking for new reviewers – so if you are interested in reviewing a book, or you have some media you would like to review, please contact Thomas and we can find the right project for you! e-mail: <**bookreview@palass.org**>.

Here are the items we currently have awaiting reviewers, all books:

- *The Old Red Sandstone*, by Hugh Miller.
- *Humans: Perspectives on Our Evolution from World Experts*, edited by Sergio Almécija.
- *Life Sculpted: Tales of the Animals, Plants, and Fungi That Drill, Break, and Scrape to Shape the Earth*, by Anthony J. Martin.
- *The Next Supercontinent: Solving the Puzzle of a Future Pangea*, by Ross Mitchell.

Dr Thomas Clements
PalAss Reviews Editor,
c/o GeoZentrum Nordbayern
Friedrich-Alexander-Universität Erlangen-Nürnberg
Schlossgarten 5
91054 Erlangen
Germany

Careers Q & A

Professional palaeontologists in the wider world

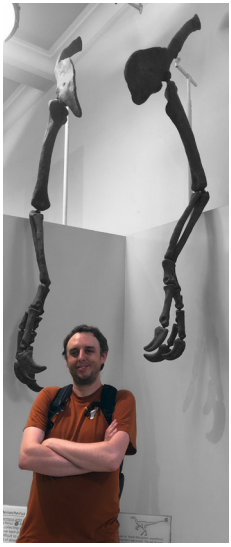
Graeme Lloyd completed his PhD in 2008, before various teaching and postdoctoral jobs in the UK (Bristol, Leeds, London, Oxford) and Australia (Sydney). Since 2021 he has worked as a statistician on criminal justice for the Scottish Government.

When you were a child, what did you want to become when you grew up?
The first thing I remember wanting to be was a fighter pilot. Now I think pursuing a job as a Lego designer or NASA employee would have made more sense. Currently I want to be a mathematician when I grow up.

How did you first get interested in palaeontology and what alternatives did you consider? Did your environment support your choice?
I think the two biggest influences were probably visiting the Natural History Museum in London for my fifth birthday and the movie *Jurassic Park*. In hindsight I was probably more drawn to the mathematical and computational aspects of the story. I guess being middle class, white and male there weren't too many obstacles for me so I didn't consider alternatives at that stage, although I somehow decided geology was the only way into palaeontology and possibly a different route would have suited me better.

What was the biggest highlight of your work as a palaeontologist?
As I have always been more of a theoretician I don't think you can ever have a past highlight. Darwin was more proud of his barnacle monograph than *On the Origin of Species* and that makes sense to me. I came up with my first ever mathematical proof recently and assuming it survives peer review I would probably say that if I had to give an answer.

What made you pursue your current job?
Talking to a good friend who already made the same leap from academia.



What are the main responsibilities of your job?
I lead the production of a statistical bulletin that gets published annually and then our team deals with more specific requests for the underlying data. I also line-manage one person and am part of the in-house R training team.

What gives you the most satisfaction in your job?
I think the main thing is feeling genuinely part of a team. Even though I collaborated a lot in academia it never felt like 'real' teamwork. Aside from this, it is knowing that the work I do actually matters. Our data are used to guide policy and measure real world impacts that affect an entire country. I don't think anything I ever did in academia 'touched' the real world in any tangible way.

What are the worst things about your job?
We deal with a lot of requests for data but have

no control on when these show up. This means our team can get extremely busy at times and it is challenging to manage longer-term tasks around this. Additionally, although we mostly deal with 'just the numbers', there is some exposure to the underlying details of very traumatic events.

What was the process of deciding to leave academia like? Did you have good information and support or was it a leap in the dark?
For me it was a very easy decision as my experience in my final post was sufficiently miserable that it was clear anything else would be better. In hindsight I should have left sooner, but I am not sure I can give general advice here except perhaps to say that not everything that is hard to obtain is good to have.

Do you have any tips for palaeontologists who are considering taking a similar career path? For example, if they want to develop skills that would give them more career options?
Government jobs definitely have their own peculiarities and culture that are just as unique as academia, albeit very different. As such, my best recommendation would be to try to get in touch with someone already working in government to get some advice about an application. I know where I work they do open days as part of the recruitment process and I would recommend attending these. So attending career panels and fairs is probably my best tip.

Do you miss anything from your time in academia?
Not really. But I don't feel like I had to give anything up. Friends I made through academia are still my friends. The research I do was never dependent on access to labs, collections or expensive equipment, so I can still carry on the bits and pieces I do anyway. There is much, much more that I do not miss – that's for sure.

What opinion prevails in your field about people with academic background?
I haven't experienced any stereotyping at all in this regard. Certainly many of my colleagues have diverse backgrounds, including academic ones. I have also had colleagues both arrive from and return to academia and we interact with academics who use government data in their work.

If you could take a workplace habit from one field to the other, what would it be?
Pretty boring, but probably flexi-time. I clock in and out at the start and end of the day and when I take breaks, this makes for a clear distinction between work and not work. It also means my hours are tracked so I can 'earn' extra leave when I build up credit. A lot of people champion the flexibility of academia but I think this incorrectly characterizes the reality of other jobs and tends to mask just how common unpaid overtime is in the academy.

Is there a skill you wish you had been taught that would be useful in industry? What turned out not to be useful at all?
Probably the most important skill is simply how to apply for jobs. I think many people who feel stuck in academia are really just missing the skills required to market themselves outside the peculiarities of the academic job market. I think this is changing in a lot of degree programmes now with students being actively taught how to write CVs and cover letters *etc*. Many interview processes nowadays will also involve some kind of task and being familiar with how these work is also useful. I wouldn't say other skills I have are useless but probably a surprising thing for me is that despite being badged as a statistician the only numerical skills I use with any frequency are counting and percentages. It is far more important for us to make sure the numbers are correct than to apply fancy modelling techniques to them that we would be unable to explain to the public.

What are your future ambitions?
In the short term I hope to make my current temporary promotion permanent. I am also hoping to dramatically improve some hideous SAS legacy code currently required to produce our bulletin.

Palaeontology

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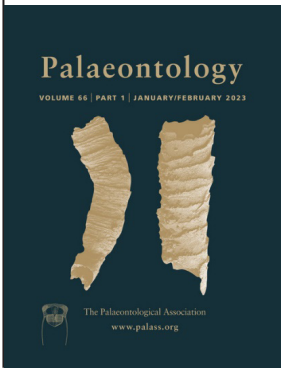

Cover illustration: *Cloudina* from the upper Ediacaran of Lijiagou in Shaanxi Province, China (image courtesy of Prof. Shuhai Xiao). Specimen height approx. 2–3 mm.

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Cover: Silicified phylloporinid bryozoan from the Ordovician Edinburg Formation of Virginia, USA. NHMUK PD5424; SEM image taken by P.D. Taylor. View≈approximately 2 mm.

Papers in Palaeontology

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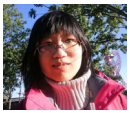
Original Articles

Regional Correspondents

Hiu Wai Lee



Region: **Hong Kong**; Affiliation: University of Hong Kong
Position: PhD student
Research/job focus: Interested in how the skull evolves and develops in archosaurs, particularly in pseudosuchians.

Miguel Díaz de León

Region: **Mexico**; Affiliation: The National Technological Institute of Mexico
Position: Substitute teacher. Pronoun: he/him
Research/job focus: Vertebrate paleontology, virtual paleontology

Christina Ozeki

Region: **Japan**; Affiliation: Kyoto University
Position: PhD candidate
Research/job focus: The stages of decomposition of large, marine vertebrates through geological time.

Lukáš Laibl

Region: **Czech Republic;** Affiliation: Czech Academy of Sciences, Inst. of Geology
Position: Researcher. Pronouns: he/him
Research/job focus: The morphology, evolution and development of various Palaeozoic arthropods.

Devapriya Chattopadhyay

Region: **India**; Affiliation: Indian Institute of Science Education & Research Pune
Position: Associate Professor. Pronouns: she/her
Research/job focus: Understanding how marine molluscs respond to their physical and biological environment in ecological and evolutionary timescales.
(Photo courtesy: Science Media Centre, IISER Pune)

Miky Lova Tantely Ravelson

Region: **Indian Ocean**; Affiliation: ASJA University Antsirabe
Position: Researcher. Pronouns: he/him
Research/job focus: sauropod dinosaurs.

Jean Vannier

Region: **France**; Affiliation: Université Claude Bernard Lyon 1
Position: Senior Researcher
Research/job focus: Early life, late Precambrian and lower Palaeozoic faunas and marine ecosystems (based of Fossil-Lagerstätten).

Rudy Lerosey Aubril

Region: **USA**; Affiliation: Harvard University
Position: Research Associate
Research/job focus: Cambrian exceptionally preserved biotas

TAXONOMY/NOMENCLATURE UPDATE

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.

Newsletter copy

Information – whether copy as such or Newsletter messages, review material, news, emergencies and advertising suggestions – can be sent to Newsletter Editor Emilia Jarochowska via e-mail to <**newsletter@palass.org**>).
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The Palaeontological Association website can be found at <**http://www.palass.org/**> and includes information about the Association, and PDF copies of the *Newsletter*. Internet Officer Russell Garwood can be reached by e-mail at <**webmaster@palass.org**>.

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