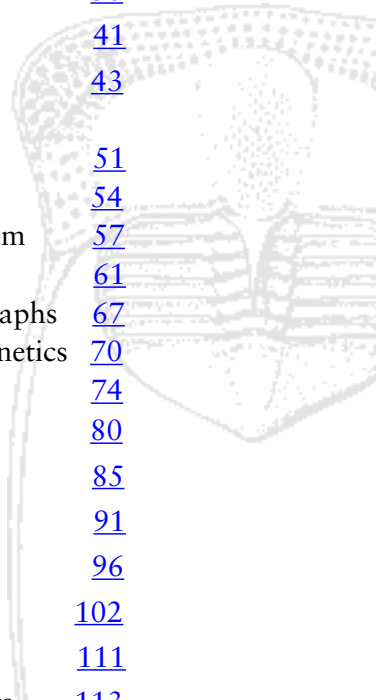


The Palaeontology Newsletter

Contents

Editorial	2
Association Business	3
Association Meetings	38
News	41
Featured Articles	43
From our correspondents	
A Palaeontologist Abroad	51
Legends of Rock: Jon Cutbill	54
Behind the Scenes at the Museum	57
The Fossil Man	61
Palaeontology's greatest ever graphs	67
Introduction: Bayesian Phylogenetics	70
Spotlight on Diversity	74
Future meetings of other bodies	80
Meeting Reports	85
Obituaries	91
Grant Reports	96
Film and Book Reviews	102
Careers Q & A	111
Association Journals: Content Alerts	113
<i>Palaeontology</i> vol. 64 parts 3 & 4	114-115
<i>Papers in Palaeontology</i> vol. 7, part 2	116-118



Reminder: The deadline for copy for Issue no. 108 is 4th October 2021.

On the Web: <<http://www.palass.org/>>

ISSN: 0954-9900



Editorial

As parts of the world emerge from the pandemic, we are happy to announce that the 65th Annual Meeting is scheduled to take place as an in-person conference with some virtual access and remote participation. In this Newsletter issue, the impact of the pandemic on the palaeontological profession is documented in several aspects. Palaeontologists Abroad interviewees for this issue, Konstantina Agiadi, Patrycja Dworczak and Shamindri Tennakoon, name isolation and distance from family as a major factor affecting their work and well-being. But as Brendan Anderson writes in a series of interviews on palaeontologists with care responsibilities, *“It is difficult to disentangle COVID-specific issues with employment from the general anxiety of the academic job market but it definitely has not helped”*. To address the broader situation of early-career palaeontologists in the job market, Masters student Namra Sikilkar contributed a Featured Article on unemployment among palaeontologists. The piece includes suggestions on what universities and funding institutions can do to prevent palaeontologists from becoming unemployed, as well as advice for early-career researchers themselves. It also offers a critical perspective on what they perceive as the key obstacles in career advancement. Hopefully these points will stimulate a broader discussion on how career paths in palaeontology can be diversified and what mentoring is needed in the rapidly changing world. We start this discussion with reports by two mentees of the ongoing Palaeontological Association Mentor Scheme. I hope these reports will encourage further palaeontologists to participate in the scheme and help inform the mentoring process to offer the best help. To this aim, I would like to encourage all current and past mentors or mentees to share their contributions on the benefits and demands of this scheme.

As Fiona Gill reports in her contribution on the ‘Picture A Scientist’ screening and discussion panel organized by the Association, respondents of the post-panel survey expressed the need for further discussion panels. We also have reflections on the discussion by panel members, as well as an independent report by Aija Zāns. Stories of transitions into non-university jobs in this issue include the Legends of Rock piece by Liz Hide on Jon Cutbill and Careers Q & A with Katrin Heindel, on her move from academia to industry. If you would like to share a story on your experience as a palaeontologist outside of academia we would love to hear from you.

Finally, in the age of travel restrictions, we look virtually behind the scenes in Cape Town’s Iziko South African Museum, and take a new perspective on the legacies of two researchers who supplied palaeontology with abundant controversies: Jan Zalasiewicz writes on Jean-Baptiste de Lamarck and Niklas Hohmann on Van Valen’s “New Evolutionary Law”. But these historical perspectives on evolution are counterbalanced with the most modern approach in the new piece on Bayesian phylogenetics by April Wright, who calls for questions to be answered in the next issue. I would like to encourage the Newsletter readership to share their reactions, suggestions and criticism – please get in touch with me. Although we cover many problems in this issue, I hope the prospect of an in-person Palaeontological Association Annual Meeting and the initiatives such as the Mentor Scheme and the discussion panel will offer a silver lining.

Emilia Jarochovska

Newsletter Editor

<newsletter@palass.org>

 @ThePalAss

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



Association Business

Annual Meeting 2021

Notification of the 2021 Annual Meeting, AGM and Annual Address

The 2021 Annual Meeting of the Palaeontological Association will be held at the University of Manchester, UK, on 18–20 December, organized by Dr Rob Sansom and colleagues. Council will inform the membership via e-mail regarding details of the AGM in due course.

AGENDA

1. Apologies for absence
2. Minutes of the 64th AGM
3. Trustees Annual Report for 2020
4. Accounts and Balance Sheet for 2020 and election 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 2020

Minutes of the Annual General Meeting held on Thursday 17th December 2020. This meeting was held virtually due to the coronavirus pandemic.

- 1. Apologies for absence.** Dr Uwe Balthasar and Dr Liam Herringshaw.
- 2. Minutes.** The minutes of the 2019 AGM were agreed a true record by unanimous virtual poll.
- 3. Trustees Annual Report for 2019.** The report was agreed by unanimous virtual poll.
- 4. Accounts and Balance Sheet for 2019.** The accounts were agreed by unanimous virtual poll. The proposal to reappoint M.R. Corfield of Corfield Accountancy Ltd as the Association's independent examiner was also agreed by unanimous virtual poll.

5. Election of Council and vote of thanks to retiring members.

5.1 Prof. C.H. Wellman extended a vote of thanks to the following members of Council who were retiring from their positions this year: Prof. T.R.A. Vandenbroucke, Dr P. Winrow, Dr B.H. Lomax, Dr G.T. Lloyd, Dr T.J. Challands, Prof. M.E. McNamara, Dr U. Balthasar and Prof. R.C.M. Warnock.

5.2 The following members were elected to serve on Council: President: Dr P.J. Orr, Vice-Presidents: Dr F.L. Gill and Prof. R.J. Butler, Treasurer: Dr M. Sakamoto, Secretary: Dr C.T.S. Little; Chair of the Editorial Board: Prof. M.A. Purnell; Editor Trustees: Prof. N.J. Butterfield and Dr S.C.R. Maidment, Newsletter Editor: Dr E. Jarochowska, Book Review Editor: Dr T. Clements, Publicity Officer: Dr S.J. Lydon, Education Officer: Ms E. Wallace, Outreach Officer: Ms Z.E. Hughes, Internet Officer: Dr R.J. Garwood, Meetings Coordinator: Dr U. Balthasar, Diversity Officer: Dr F. Saleh, Ordinary Members: Dr T.H.P. Harvey, Dr L. Hide, Dr S. Giles and Mr R. Theodore.



5.3 Dr R. Sansom and colleagues will organize the Annual Meeting in 2021 at the University of Manchester, UK.

6. Resolution to amend the Constitution. A resolution to update the Constitution was agreed by a majority of the membership in a virtual poll (Yes 374; No: 7; Abstain: 34). The updates include: changes to the electronic voting procedure; replacing 'Editor-in-Chief' with 'Chair of the Editorial Board' to reflect operational changes to our publications team; and introducing gender-neutral terms throughout the document where appropriate.

7. Association Awards. The following awards were announced:

7.1 The Lapworth Medal was awarded to Dr A.B. Smith (Natural History Museum, London, UK).

7.2 The President's Medal was awarded to Prof. X. Xing (Institute of Vertebrate Paleontology and Paleoanthropology, Beijing, China).

7.3 The Hodson Award was presented to Dr E.E. Saupe (University of Oxford, UK).

7.4 The Mary Anning Award was presented to Mrs M. Wood (South Queensferry, UK).

7.5 The Gertrude Elles Award for public engagement was presented to Dr J. Murray for The History of Life project (NUI Galway, Ireland).

7.6 Research Grants were awarded to: Dr N. Davies (University of Cambridge, UK), *Controls on bioturbation and ichnological signatures in Cambrian shelf facies of SW Baltica*; Dr K. Hickman-Lewis (Università di Bologna, Italy), *Microbial silicification in Yellowstone hot springs: a tool for interpreting the Precambrian fossil record*; Dr E. Panciroli (University of Oxford, UK), *Biomechanics and the Competitive Replacement of Tritylodontids*.

7.7 Under the Small Grants Scheme, the following awards were announced: the Whittington Award to Mr J. Hennekam (University of York, UK), *Morphological divergence of the island ruminant Myotragus balearicus*; Stan Wood awards to Dr L. Liebe Delsett (University of Oslo, Norway), *First plesiosaur from the early Cretaceous of Arctic Canada and the biogeography of marine reptiles during the J–C transition* and Dr H. Zhang (University of Bristol), *Laetoli: uncharted crossroad in elephant evolution?*; and Sylvester-Bradley awards to Ms S. Lusso (Harvard University, USA), *Comparative isotopic analysis of exceptional fossils preserved through calcite from two Paleozoic Konservat-Lagerstätten*, Ms J. Órfão (University of Aveiro, Portugal) *On captorhinids: is skull sculpturing a good criterion to distinguish taxa?*, and Ms V. Rossi (University College Cork, Ireland), *Taphonomy of the plumage of a Late Pleistocene Eurasian griffon vulture preserved in a pyroclastic flow from Central Italy*.

7.8 Undergraduate Research Bursaries were awarded to: Ms S. McCormack, University of Liverpool, UK, supervised by Dr K.T. Bates, *Variation in human foot bone shape: the key to understanding the evolution of hominin bipedalism*; Ms M. Harbich, University of Edinburgh, UK, supervised by Dr T.J. Challands, *Environmental changes during the emergence of the modern vertebrate fauna*; Ms P. Spruce, University of Leeds, UK, supervised by Dr A.M. Dunhill, *Deep-fried calamari? The effect of Early Triassic extreme global warming on cephalopod biogeography*; Ms B. Pittard, University College London, UK, supervised by Dr P.M. Mannion, *Systematic and biogeographic affinities of the early titanosaur sauropod dinosaurs from the Early Cretaceous of the UK*; Mr T. Green, University of Leicester, UK, supervised by Prof. M.A. Purnell, *Treeshrews as dietary analogues for Paleocene*



mammals: testing hypotheses of diet using microwear texture analysis; and Mr J. Rawson, University of Bristol, UK, supervised by Prof. E.J. Rayfield, *Testing Williston's Rule: a network analysis of skull evolution across the water to land transition*.

7.9 Engagement Grants were awarded to Ms S. Chakravorti for *Museum on Wheels: when you cannot come to the museum, the museum comes to you*; Mx F. Keeley for *EvoArcade*; and Dr C. Martínez-Pérez for *The hospital's fossils: an educational resource for paediatric patients*.

7.10 The 2020 Best Paper Awards were presented to Prof. R.D.K. Thomas and colleagues for their paper '*Pelagiella exigua*, an early Cambrian stem gastropod with chaetae: lophotrochozoan heritage and conchiferan novelty' (*Palaeontology*), and to Dr J.R. Thompson and colleagues for 'Phylogenetic analysis of the Archaeocidaridae and Palaeozoic Miocidaridae (Echinodermata, Echinoidea) and the origin of crown group echinoids' (*Papers in Palaeontology*).

7.11 President's Prizes were awarded to Ms A. Cribb, Ms S. Guttara Diaz and Mr A. Xafis.

7.12 Council Flash Talk Prizes were awarded to Dr E.M. Dunne, Mr E. Furness, Dr C. Blanco Moreno and Ms J. Reeves.

7.13 Council Poster Prizes were awarded to Ms B.J. Allen, Ms S. Guttara Diaz, Ms P. Spruce and Ms L. Austin Sydes.

8. Annual Address. A talk entitled 'Tales from the Cambrian Explosion' was given by Prof. Rachel Wood (University of Edinburgh, UK).

Trustees Annual Report 2020

The Trustees present their report with the financial statements of the charity for the year ended 31 December 2020. The Trustees have adopted the provisions of *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 2015).

1. OBJECTIVES AND ACTIVITIES

1.1 Aims and objectives: The aim of the Association is to promote research in Palaeontology and its allied sciences by (a) holding public meetings for the reading of original papers and the delivery of lectures, (b) demonstration and publication, and (c) by such other means as the Council may determine. In order to meet these objectives, the Association continues to increase its range and investment in public outreach and other charitable activities, whilst continuing to support research, publications, and student and speaker attendance at national and international meetings including our flagship Annual Meeting.

1.2 General statement about the COVID-19 pandemic: The coronavirus pandemic had a significant impact on Association activities in 2020, particularly on in-person meetings, which from March onwards either had to move online (e.g. Council meetings, Annual Meeting, Progressive Palaeontology, Lyme Regis Fossil Festival) or were postponed (Yorkshire Fossil Festival and many external meetings and workshops).



1.3 Grants-in-aid for meetings and workshops: The Association provided funds to support the following meetings and workshops: 18th International Nannoplankton Association Meeting (INA 18) (Dr C.T. Bolton, CEREGE, Aix-en-Provence, France); Developing a taxonomic framework for the Ediacaran Macrobiota (Dr F.S. Dunn, University of Oxford, UK) and 9th International Meeting on Taphonomy and Fossilization (TAPHOS) and 6th ICAZ Taphonomy Working Group Meeting (ICAZ-TWG) (Dr Y. Fernández-Jalvo, Museo Nacional de Ciencias Naturales, Madrid, Spain).

1.4 Public meetings: Two public online meetings were held in 2020, and the Association extends its thanks to the organizers of these meetings.

64th Annual Meeting. The Association's Annual Meeting is its flagship meeting and this year was an online event held 16th–18th December, hosted by the Oxford University Museum of Natural History. The meeting was organized by Dr J.J. Matthews and colleagues, and included a symposium entitled 'New Ideas on Old Fossils: A Symposium of Early Career Palaeontologists from Around the World'. There were 500 registrants. The Annual Address was given by Professor Rachel Wood (University of Edinburgh, UK), entitled 'Tales from the Cambrian Explosion'. President's Prizes for best 15-minute oral presentations by early-career researchers were awarded to Ms A. Cribb (University of Southern California, USA), Ms S. Guttara Diaz (University of Bristol, UK) and Mr A. Xafis (University of Vienna, Austria). Council Flash Talk Prizes for best five-minute presentations by early-career researchers were awarded to Dr E.M. Dunne (University of Birmingham, UK), Mr E. Furness (Imperial College London, UK), Ms C. Blanco Moreno (Universidad Autónoma de Madrid, Spain) and Ms J. Reeves (University of Manchester, UK). Council Poster Prizes for best poster presentations by early-career researchers were presented to Ms B.J. Allen (University of Leeds, UK), Ms S. Guttara Diaz (University of Bristol, UK), Ms P. Spruce (University of Leeds, UK), and Ms L. Austin Sydes (University of Manchester, 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 2020 meeting was organized by Ms B.J. Allen and a team of other students at the University of Leeds, UK, and held online 11th – 13th June, with over 140 virtual delegates.

1.5 Publications: The journals *Palaeontology* and *Papers in Palaeontology* are produced by Wiley. During 2020, the following volumes were published: *Palaeontology* volume 63, comprising six issues; and *Papers in Palaeontology* volume 6, comprising four issues. As announced at the AGM in 2019, paper copies ceased to be printed following these volumes and publishing will move to online only. Council thanks Mr N. Stroud for assistance with the typesetting and production of the *Palaeontology Newsletter*.

1.6 Research Grants: A total of 22 valid applications for Palaeontological Association Research Grants were received. Three were recommended for funding in 2020, totalling £16,227, and were awarded to: Dr N. Davies (University of Cambridge, UK), 'Controls on bioturbation and ichnological signatures in Cambrian shelf facies of SW Baltica'; Dr K. Hickman-Lewis (Università di Bologna, Italy), 'Microbial silicification in Yellowstone hot springs: a tool for interpreting the Precambrian fossil record'; and Dr E. Panciroli (University of Oxford, UK) 'Biomechanics and the Competitive Replacement of Tritylodontids'.

1.7 Small Grants Scheme: The scheme received 15 valid applications. Six were recommended for funding in 2020, totalling £8,281. Small grants were awarded as follows: Mr J. Hennekam (University



of York, UK) received the Whittington Award; Dr L. Liebe Delsett (University of Oslo, Norway) and Dr H. Zhang (University of Bristol, UK) received Stan Wood Awards; Ms S. Losso (Harvard University, USA), Ms J. Órfão (University of Aveiro, Portugal) and Ms V. Rossi (University College Cork, Ireland) received Sylvester-Bradley Awards.

1.8 Undergraduate Research Bursary Scheme: The scheme attracted eight applications, of which six were recommended for funding in 2020, totalling £14,649. The awardees were as follows: Ms S. McCormack, University of Liverpool, UK, supervised by Dr K.T. Bates; Ms M. Harbich, University of Edinburgh, UK, supervised by Dr T.J. Challands; Ms P. Spruce, University of Leeds, UK, supervised by Dr A.M. Dunhill; Ms B. Pittard, University College London, UK, supervised by Dr P.D. Mannion; Mr T. Green, University of Leicester, UK, supervised by Prof. M.A. Purnell; and Mr J. Rawson, University of Bristol, UK, supervised by Prof. E.J. Rayfield.

1.9 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. Face-to-face engagement activities were prevented during 2020 by the coronavirus pandemic. The Lyme Regis Fossil Festival took place as an online event. 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 2020), supporting recurring festival activities and Engagement Grants.

1.10 Engagement Grants: The scheme received a total of six applications in 2020, of which three were recommended for funding, totalling £16,000. These were awarded to Ms S. Chakravorti, 'Museum on Wheels: when you cannot come to the museum, the museum comes to you'; Mx F. Keely, 'EvoArcade'; and Dr C. Martínez-Pérez, 'The hospital's fossils: an educational resource for paediatric patients'.

1.11 Diversity Group: The Diversity Group (DG) continues to implement the recommendations of the Diversity Study completed by Parigen Ltd in 2018, led by the Diversity Officer. In 2020, along with the remaining members of Council, the DG revisited the Undergraduate Research Bursaries, aiming to increase the diversity of applicants. Supervisors and students applying for the first time are now eligible for one-year free Association membership. Priority is given to students from under-represented groups based on self-declared protected characteristics, and the requirement for transcripts or grades is removed. The Progressive Palaeontology meeting and the Annual Meeting were both held virtually in 2020. Progressive Palaeontology talks were pre-recorded and all presentations were available for the full duration of the conference via the Association website, increasing accessibility. Reduced registration fees, fee waivers and the removal of the need for travel and accommodation likely drove the increase in accessibility of the Annual Meeting (50.7% were not UK-based and several attendees were from countries that would not usually be represented). LGBTQ+ meet-ups were facilitated at both conferences and a symposium 'New Ideas on Old Fossils: A Symposium of Early Career Palaeontologists from Around the World' was held at the Annual Meeting, increasing visibility of researchers from regions not usually represented at Association conferences. The DG has continued to try and "internationalize" the *Palaeontology Newsletter* away from its UK-centric past. The regular columns 'Legends of Rock', 'Behind the Scenes at the Museum' and 'A Palaeontologist Abroad' covered more than 15 countries in 2020. The 'Spotlight on Diversity' section covered the lived experiences of palaeontologists who are trans, diabetic, from under-



represented regions and those who speak minority languages. Following the appointment of Dr S.C.R. Maidment in 2019, Dr E. Kustatscher has now joined the Editorial Board of the Association's journals, shifting the gender balance of the Board to 50:50. The DG requested that the handling editors seek input from at least one woman reviewer for each article sent to review. In 2017 the Association mentoring scheme was introduced to assist palaeontologists at the start of their academic careers and focused on those transitioning from postdoctoral positions to permanent jobs. In 2020 the scheme has been expanded to accommodate those transitioning from late-stage PhD to postdoctoral positions. In 2020 members of the DG led work to produce the Association's statement in support of Black colleagues, available on the Association website and published in *Newsletter* 105, and were grateful for input from external sources. The statement acknowledges the additional barriers and challenges faced by Black palaeontologists at work and in their daily lives, resulting from systemic racism.

1.12 Palaeontological Association Exceptional Lecturer scheme: Dr A.J. Hetherington was selected in a competitive process to become the Palaeontological Association Exceptional Lecturer for 2020/2021; however, due to travel restrictions, only two of the six scheduled lectures of the Innovations in Palaeontology Lecture Series were delivered within the usual timeframe (at the Geological Society of London and the University of Plymouth, UK). Both of these were delivered virtually and a recording of the latter is available on the Palaeontological Association's YouTube channel. The other four lectures by Dr Hetherington are planned during the remainder of 2021. Dr E.G. Mitchell from the University of Cambridge, UK was selected in a competitive process to be the Palaeontological Association Exceptional Lecturer for the academic year 2021–2022. To date, five institutions have registered their interest to host Dr Mitchell.

1.13 Online activities: The Association continues to be the sole host for the online-only journal *Palaeontologia Electronica*, 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]). New hosting arrangements have either been signed (Carnets Geol), or planned for 2021 (Journal of Palaeontological Techniques). The listserv 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 have been switched to GSuite through its non-profit provision. At the end of 2020 members of the Association Facebook group numbered 2,241 and the newer Facebook page had 614 followers. The Association Twitter account had 7,389 followers.

1.14 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 Dr Andrew B. Smith (Natural History Museum, 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 Professor Xu Xing (Institute of Vertebrate Paleontology and Paleoanthropology, China). 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 Dr Erin E. Saupe (University of Oxford, UK). The Mary Anning



Award, for an outstanding contribution by an amateur palaeontologist, was made to Mrs Maggie Wood (South Queensferry, UK). The Gertrude Elles Award for high-quality, amateur or institutional, public engagement projects that promote palaeontology was awarded to Dr J. Murray for The History of Life project (NUI Galway, Ireland). The 2020 Best Paper Awards in *Palaeontology* and *Papers in Palaeontology* were given respectively to Prof. R.D.K. Thomas and colleagues for their paper entitled 'Pelagiella exigua, an early Cambrian stem gastropod with chaetae: lophotrochozoan heritage and conchiferan novelty', **63(4)**, 601–627; and Dr J.R. Thompson and colleagues for their paper 'Phylogenetic analysis of the Archaeocidaridae and Palaeozoic Miocidaridae (Echinodermata, Echinoidea) and the origin of crown group echinoids', **6(2)**, 217–249. Council also awards Undergraduate Prizes to outstanding students in university departments worldwide where Palaeontology is taught beyond Level 1; a total of 14 were awarded throughout the year.

1.15 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 2021 Progressive Palaeontology meeting will again take place online due to the continuing coronavirus pandemic, but the 65th Annual Meeting, to be hosted by The University of Manchester, UK in December 2021, is planned as an in-person meeting with some virtual access. In 2021 *Palaeontology* and *Papers in Palaeontology* will move to an online-only publication model. In 2021 the Association's Public Engagement Group will develop a five-year plan, to incorporate its wider public engagement work, as well as the focus on working with schools and young people. 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. Upcoming surveys of the membership will aid with monitoring progress.

1.16 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 2020, the Association agreed to support a total of five palaeontological meetings, symposia or workshops worldwide (three held online hosted by UK institutions in 2020 and two in-person events in Spain and France postponed). Due to major meetings being held virtually in 2020, no applications for the Postgraduate Travel Fund were received in 2020. The Association's support enabled the worldwide dissemination of research to the benefit of the global palaeontological community.

2.2 Publications: During 2020, 292 papers were submitted to either *Palaeontology* or *Papers in Palaeontology*. Of these, 136 (47%) were considered to be within scope by the Editorial Board and 86 (29%) were subsequently accepted following peer review; a further 25 papers were still awaiting submission of a revised manuscript before a final decision could be made. A total of 96 papers were published online. The number of downloads of articles via Wiley Online Library was 41% higher in 2020 relative to 2019 for *Palaeontology* and 40% for *Papers in Palaeontology*. This represents a significant increase for both journals. The Association continues to support data archiving by sponsoring Dryad data records although we now also strongly encourage authors to use an appropriate subject-specific repository where appropriate (e.g. MorphoSource for image data and



MorphoBank for phylogenetic data); 74% of all published papers had an associated data archive in 2020, with the remainder including all relevant data and observations within the paper. The Association published one book in 2020, *Fossils of the Kimmeridge Clay Formation*, in two volumes, both edited by D.M. Martill and S. Etches.

2.3 Support for research: In 2020 the Association agreed to fund the research activities of 16 early-career researchers based in six countries (Ireland, Italy, Norway, Portugal, the UK and USA). 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. Overall, the number of grants funded in 2020 was the same as 2019. Compared to 2019, applications for Research Grants increased from 13 to 22, and thus the success rate decreased from 23% to 13%. The applications to the Small Grants Scheme decreased (from 22 to 15), and the success rate consequently increased from 32% to 47% (including one award that was declined). Applications to the Undergraduate Research Bursary Scheme decreased strongly in 2020 compared to 2019 (from 18 to 8) and the success rate increased to 75%.

2.4 Mentoring scheme for early career palaeontologists: In 2017 the Association established a mentoring scheme. Priority areas were identified and in the first instance the focus was on the transition from postdoctoral positions to permanent jobs. In 2020 the decision was taken to expand the scheme to late-stage PhD students and this change to the scheme was advertised in *Palaeontology Newsletter* 105. A total of 23 palaeontologists in permanent positions have offered to act as mentors and, so far, 12 early-career palaeontologists have taken part in the scheme. The Association mentoring scheme is via direct mentoring, via e-mail, video call or other forms of communication.

2.5 Outreach, education and public engagement: During 2020, the Association provided £3,000 to support the Lyme Regis Fossil Festival, an online event 24–25 October 2020. The event received 3,210 unique visitors, making 14,775 visits over the weekend and 18,709 separate page views. The average visit length was 31 minutes and six seconds (a remarkably long time in online engagement terms). The Education Officer delivered a talk and took part in a Q&A session. The online offering also showcased the 'The Palaeontological Association presents...' playlist of short, professionally-produced, YouTube videos featuring members of Council. In 2020, PEG awarded three Engagement Grants (see 1.9). 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 2020 Annual Meeting and Progressive Palaeontology meeting.

3. FINANCIAL REVIEW

3.1 Reserves: As of 31st December 2020, the Association holds reserves of £858,207 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 £125,353 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 2021 totalled £983,560.

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 2020, was £315,657. Governance costs were £13,131. Total resources expended were £361,233. 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 Thursday 15th December 2016.

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 2020 totalled 1,206 (1,177 at end 2019). Of these, 593 were Ordinary Members, 194 Retired Members, 19 Honorary Members, 375 Student Members and 25 Institutional Members. There were 35 institutional subscribers to *Papers in Palaeontology*. Wiley also separately manages further institutional subscribers and arranges online access to publications for them on behalf of the Association.

4.4 Risk: The Trustees consider that the Association is in a sound financial position. Membership numbers and revenues from publications remain strong.

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 2019 to serve as Trustees in 2020:

Prof. C. H. Wellman	President
Prof. T. R. A. Vandenbroucke	Vice President
Dr F. L. Gill	Vice President
Dr C.T.S. Little	Secretary
Dr P. Winrow	Treasurer
Dr B.H. Lomax	Chair of the Editorial Board
Prof. M. A. Purnell	Editor Trustee
Prof. N. J. Butterfield	Editor Trustee
Dr R. Garwood	Internet Officer
Dr G.T. Lloyd	Newsletter Editor
Dr T.J. Challands	Book Review Editor
Dr Z. E. Hughes	Outreach Officer
Dr M.E. McNamara	Education Officer
Dr S.J. Lydon	Publicity Officer
Dr R.C.M. Warnock	Diversity Officer
Dr U. Balthasar	Meetings Coordinator
Dr T. Clements	Ordinary Member
Dr S. Giles	Ordinary Member
Dr T.H.P. Harvey	Ordinary Member
Dr E.A. Hide	Ordinary Member

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 23rd June 2021.



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 2020 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: 23rd June 2021



THE PALAEOLOGICAL ASSOCIATION

**Statement of Financial Activities
for the Year Ended 31 December 2020**

	Notes	Unrestricted funds £	Designated funds £	31.12.20 Total funds £	31.12.19 Total funds £
INCOME AND ENDOWMENTS FROM					
Donations and legacies		55,214	1,866	57,080	61,571
Charitable activities					
Public Meetings		10,730	—	10,730	53,301
Publications		325,339	—	325,339	320,107
Investment income	2	<u>10,640</u>	<u>1,574</u>	<u>12,214</u>	<u>14,743</u>
Total		401,923	3,440	405,363	449,722
EXPENDITURE ON					
Raising funds	3	32,445	—	32,445	36,459
Charitable activities					
Public Meetings		17,597	—	17,597	73,364
Grants & Awards		22,100	8,516	30,616	65,494
Administration		48,052	—	48,052	51,479
Publications		219,392	—	219,392	239,820
Governance Costs		<u>13,131</u>	<u>—</u>	<u>13,131</u>	<u>25,063</u>
Total		352,717	8,516	361,233	491,679
Net gains on investments		<u>25,466</u>	<u>—</u>	<u>25,466</u>	<u>94,878</u>
NET INCOME/(EXPENDITURE)		74,672	(5,076)	69,596	52,921
Transfers between funds		<u>183</u>	<u>(183)</u>	<u>—</u>	<u>—</u>
Net movement in funds		74,855	(5,259)	69,596	52,921
RECONCILIATION OF FUNDS					
Total funds brought forward		<u>783,352</u>	<u>130,612</u>	<u>913,964</u>	<u>861,043</u>
TOTAL FUNDS CARRIED FORWARD		<u>858,207</u>	<u>125,353</u>	<u>983,560</u>	<u>913,964</u>

The notes form part of these financial statements.



THE PALAEOLOGICAL ASSOCIATION

Balance Sheet
At 31 December 2020

	Notes	Unrestricted funds £	Designated funds £	31.12.20 Total funds £	31.12.19 Total funds £
FIXED ASSETS					
Investments	6	583,371	125,353	708,724	688,995
CURRENT ASSETS					
Debtors	7	190,350	—	190,350	175,564
Cash at bank		<u>101,384</u>	<u>—</u>	<u>101,384</u>	<u>90,743</u>
		291,734	—	291,734	266,307
CREDITORS					
Amounts falling due within one year	8	<u>(16,898)</u>	<u>—</u>	<u>(16,898)</u>	<u>(41,338)</u>
NET CURRENT ASSETS		<u>274,836</u>	<u>—</u>	<u>274,836</u>	<u>224,969</u>
TOTAL ASSETS LESS CURRENT LIABILITIES		<u>858,207</u>	<u>125,353</u>	<u>983,560</u>	<u>913,964</u>
NET ASSETS		<u>858,207</u>	<u>125,353</u>	<u>983,560</u>	<u>913,964</u>
FUNDS					
Unrestricted funds	9			<u>983,560</u>	<u>913,964</u>
TOTAL FUNDS				<u>983,560</u>	<u>913,964</u>

The notes form part of these financial statements.

The financial statements were approved by the Board of Trustees and authorised for issue on 23rd June 2021.



THE PALAEOLOGICAL ASSOCIATION

Notes to the Financial Statements for the Year Ended 31 December 2020

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 PALAEOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued* for the Year Ended 31 December 2020

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

	31.12.20	31.12.19
	£	£
Deposit account interest	123	274
Investment Income	<u>12,091</u>	<u>14,469</u>
	<u>12,214</u>	<u>14,743</u>

3. RAISING FUNDS

	31.12.20	31.12.19
	£	£
Voluntary Income Costs: Administration	30,578	32,759
Investment Management Costs: Stockbroker Fees	<u>1,867</u>	<u>3,700</u>
	<u>32,445</u>	<u>36,459</u>

4. TRUSTEES' REMUNERATION AND BENEFITS

There were no Trustees' remuneration or other benefits for the year ended 31 December 2020 nor for the year ended 31 December 2019.

Trustees' expenses

The total travelling expenses reimbursed to 20 Members of Council (2019:19) was £3,799 (2019: £12,308).



THE PALAEOLOGICAL ASSOCIATION

**Notes to the Financial Statements – *continued*
for the Year Ended 31 December 2020****5. STAFF COSTS****Analysis of Staff Costs and Remuneration**

	£ 2020	£ 2019
Salaries	89,956	85,753
Social Security Costs	5,998	6,467
Pension Costs	<u>8,996</u>	<u>8,575</u>
Total	<u>104,950</u>	<u>100,795</u>

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

	2020	2019
Publications	1	1
Administration	<u>1</u>	<u>1</u>
	<u>2</u>	<u>2</u>

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

	31.12.20	31.12.19
	£	£
Sundry Debtors	<u>190,350</u>	<u>175,564</u>

8. CREDITORS: AMOUNTS FALLING DUE WITHIN ONE YEAR

	31.12.20	31.12.19
	£	£
Trade creditors	5,475	19,734
Subscriptions in advance	<u>11,423</u>	<u>21,604</u>
	<u>16,898</u>	<u>41,338</u>



THE PALAEOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued*
for the Year Ended 31 December 2020

9. MOVEMENT IN FUNDS

	At 1.1.20 £	Net movement in funds £	Transfers between funds £	At 31.12.20
Unrestricted funds				
General fund	783,352	74,672	183	858,207
Sylvester-Bradley	17,608	(3,022)	—	14,586
Jones-Fenleigh	28,376	27	—	28,403
Hodson	295	—	(183)	112
Callomon	2,433	(1,111)	—	1,322
Whittington	15,823	159	—	15,982
Stan Wood	<u>66,077</u>	<u>(1,129)</u>	<u>—</u>	<u>64,948</u>
TOTAL FUNDS	<u>913,964</u>	<u>69,596</u>	<u>—</u>	<u>983,560</u>

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	401,923	(352,717)	25,466	74,672
Sylvester-Bradley	600	(3,622)	—	(3,022)
Jones-Fenleigh	27	—	—	27
Callomon	344	(1,455)	—	(1,111)
Whittington	598	(439)	—	159
Stan Wood	<u>1,871</u>	<u>(3,000)</u>	<u>—</u>	<u>(1,129)</u>
TOTAL FUNDS	<u>405,363</u>	<u>(361,233)</u>	<u>25,466</u>	<u>69,596</u>



THE PALAEOLOGICAL ASSOCIATION

**Notes to the Financial Statements – *continued*
for the Year Ended 31 December 2020****9. MOVEMENT IN FUNDS — *continued*...****Comparatives for movement in funds:**

	At 1.1.19 £	Net movement in funds £	At 31.12.19 £
Unrestricted Funds			
General fund	728,871	54,481	783,352
Sylvester-Bradley	21,073	(3,465)	17,608
Jones-Fenleigh	27,503	873	28,376
Hodson	294	1	295
Callomon	3,368	(935)	2,433
Whittington	12,974	2,849	15,823
Stan Wood	<u>66,960</u>	<u>(883)</u>	<u>66,077</u>
TOTAL FUNDS	<u>861,043</u>	<u>52,921</u>	<u>913,964</u>

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	441,144	(481,541)	94,878	54,481
Sylvester-Bradley	836	(4,301)	—	(3,465)
Jones-Fenleigh	873	—	—	873
Hodson	1	—	—	1
Callomon	365	(1,300)	—	(935)
Whittington	4,349	(1,500)	—	2,849
Stan Wood	<u>2,154</u>	<u>(3,037)</u>	<u>—</u>	<u>(883)</u>
TOTAL FUNDS	<u>449,722</u>	<u>(491,679)</u>	<u>94,878</u>	<u>52,921</u>



THE PALAEOLOGICAL ASSOCIATION

Notes to the Financial Statements – *continued*
for the Year Ended 31 December 2020

9. MOVEMENT IN FUNDS — *continued*...

	At 1.1.19 £	Net movement in funds £	Transfers between funds £	At 31.12.20
Unrestricted funds				
General fund	728,871	129,153	183	858,207
Sylvester-Bradley	21,073	(6,487)	—	14,586
Jones-Fenleigh	27,503	900	—	28,403
Hodson	294	1	(183)	112
Callomon	3,368	(2,046)	—	1,322
Whittington	12,974	3,008	—	15,982
Stan Wood	<u>66,960</u>	<u>(2,012)</u>	<u>—</u>	<u>64,948</u>
TOTAL FUNDS	<u><u>861,043</u></u>	<u><u>122,517</u></u>	<u><u>—</u></u>	<u><u>983,560</u></u>

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	843,067	(834,258)	120,344	129,153
Sylvester-Bradley	1,436	(7,923)	—	(6,487)
Jones-Fenleigh	900	—	—	900
Hodson	1	—	—	1
Callomon	709	(2,755)	—	(2,046)
Whittington	4,947	(1,939)	—	3,008
Stan Wood	<u>4,025</u>	<u>(6,037)</u>	<u>—</u>	<u>(2,012)</u>
TOTAL FUNDS	<u><u>855,085</u></u>	<u><u>(852,912)</u></u>	<u><u>120,344</u></u>	<u><u>122,517</u></u>

Transfers between funds

The transfer of £183 from the designated Hodson fund to General funds is to re-allocate a cost originally attributed to the unrestricted general fund in 2019.



THE PALAEOLOGICAL ASSOCIATION

**Notes to the Financial Statements – *continued*
for the Year Ended 31 December 2020****10. RELATED PARTY DISCLOSURES**

There were no related party transactions for the year ended 31 December 2020.

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 2020	31st December 2019
	£	£
Realized Gain/(Loss)	(26,637)	2,803
Unrealized Gain/(Loss)	<u>52,103</u>	<u>92,075</u>
Total per Statement of Financial Activities	<u>25,466</u>	<u>94,878</u>

12. INVESTMENT PORTFOLIO 2020

See pages 24–25.



Detailed Statement of Financial Activities for the Year Ended 31 December 2020

	31.12.20 Unrestricted funds £	31.12.19 Total funds £
INCOME AND ENDOWMENTS		
Donations and legacies		
Donations	4,636	8,140
Subscriptions	52,444	53,431
	<u>57,080</u>	<u>61,571</u>
Investment income		
Deposit account interest	123	274
Investment Income	12,091	14,469
	<u>12,214</u>	<u>14,743</u>
Charitable activities		
Scientific Journals	319,314	309,605
Special Papers	298	573
Newsletter	—	80
Field Guides	5,346	9,129
Distribution	381	720
Scientific Meetings	10,730	53,301
	<u>336,069</u>	<u>373,408</u>
Total incoming resources	405,363	449,722
EXPENDITURE		
Raising donations and legacies		
Administration	30,578	32,759
Investment management costs		
Stockbroker Fees	1,867	3,700
Charitable activities		
Scientific Journals	61,721	67,050
Field Guides	11,390	25,622
Newsletters	19,540	18,990
Marketing	600	297
Publication Costs	85,769	82,544
Editorial Costs	40,372	45,317
Public Meetings & Costs	17,597	73,364
Grants & Awards	21,309	37,534
Research Grants	9,307	27,960
Administration	48,052	51,479
Consultancy	—	2,800
	<u>315,657</u>	<u>432,957</u>
Support costs		
Governance costs		
Trustees' expenses	3,799	12,308
Accountancy and legal fees	595	595
Administration	8,737	9,360
	<u>13,131</u>	<u>22,263</u>
Total resources expended	361,233	491,679
Net income before gains and losses	44,130	(41,957)
Realized recognized gains and losses		
Realized gains/(losses) on fixed asset investments	25,466	94,878
Net income	69,596	52,921

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



Palaeontological Association year ended 31st December 2020.

Nominal	Holding	Cost (bought pre 2020) £	Value end 2019 £
£18,000	UK 4.75% Stock 07/03/20 GBP 100	18,145.87	18,403.00
49,685.81	COIF Charities Fixed Interest Fund	65,807.52	68,342.83
9,275	Allianz Global Investors Gmbh Index Linked Gilt E Inc GBP Dic		
9,000	Allianz Global Investors GMBH Gilt Yield I (Inc) GBP Dis		
7,200	AXA Investment Managers UK Ltd US Sht Duration High Yld		
9,730.085	M&G Securities Limited Optimal Income J GBP Dis	10,060.08	10,130.00
5,500	Royal London Unit Trust Mngrs Sterling Credit Z GBP NAV		
7,500	Royal London Unit Trust Mngrs Sterling Credit Z GBP NAV	10,474.20	10,680.00
700	Pimco Global Advisors Irl Ltd Global Inv Grade Cred	9,620.07	9,828.00
1,425	BP Ord 25c shares	5,047.35	6,720.00
600	Royal Dutch Shell B shares	4,422.42	13,473.00
600	BHP Billiton \$0.5 shares	4,341.48	10,661.00
180	CRH ord EUR 0.32	4,426.82	5,476.00
1,400	Smith(DS) ord GBP 0.10	4,569.69	5,379.00
370	Halma ord GBP 0.10	3,871.71	7,829.00
350	Experian Ord 10C	2,870.79	8,932.00
200	Diageo Ord GBP 0.28	3,884.00	6,401.00
200	Persimmon Ord 10p	2,258.00	5,390.00
60	Reckitt Benckiser Group ord GBP 0.10		
70	Reckitt Benckiser Group ord GBP 0.10	5,325.75	4,290.00
30	Unilever PLC Ord GBP 0.031111		
150	Unilever PLC Ord GBP 0.031111	2,163.11	6,526.00
120	Astrazeneca Ord 25c	5,749.41	9,128.00
450	Glaxo Smithkline Ordinary 25p shares	7,083.98	8,006.00
2,500	Tesco ord GBP0.05	5,953.09	6,380.00
300	Relx Olc GBP 0.1444	4,438.20	5,717.00
300	Compass Group Plc ord GBP0.1105	5,399.53	5,670.00
641	National Grid Ord GBP 0.12431289	3,648.26	6,053.00
2,250	Barclays 25p Ord shares	4,867.00	4,042.00
1,465	HSBC Holdings Ordinary 0.5 US Dollar shares	4,534.00	8,671.00
6,000	Mercantile Investment Tst Plc(The) ord GBP0.025	10,171.60	15,720.00
300	Findlay Park Partners US Smaller Companies	4,347.16	31,034.00
2,525	Ishares S&P 500 GBP	18,161.79	61,414.00
4250	Fidelity EUR Value Ordinary 25P shares	4,059.07	11,050.00
30	Roche Hldgs Ag Genusschein Nvp	3,335.33	7,345.00
6,600	Thesis Unit Trust Mngmt Ltd TM Crux European GBP Dis	7,140.00	14,993.00
9,000	Baillie Gifford & Co Japanese Income Growth W4 Dis	11,977.02	12,519.00
1,007	Eastspring Investments SICAV Japan Dynamic FGDY GBP	7,837.74	10,056.00
26	Veritas Funds Plc Veritas Asian D GBP Inc	8,182.27	18,585.00
900	JPMorgan Am UK Ltd Emerging Markets I Instl	5,043.10	9,351.00
650	RIT Capital Partners Ordinary £1 shares	4,903.90	13,748.00
800	BH Global Ltd ord GBP	10,226.25	12,140.00
4,400	Invesco Fund Managers Targeted Y Acc	9,770.33	9,860.00
37	Marshall Wace UCITS Funds Plc MW Tops UCITS G GBP	4,849.70	5,223.00
9,000	Charities Property Fund Income	11,043.28	11,592.00
1,021.54	COIF Charities Investment Fund Acc Units	59,678.69	192,239.12
396,865	Quilter Investors Ltd QC Global Income & Growth Fund GBP Dis		
	Total	379,689.56	688,996.95



Schedule of Investments (Note 12 to the Accounts).

Proceeds (sold in 2020) £	Cost (bought in 2020) £	Gain realised during 2020 £	Value end 2020 £	Gain unrealised during 2020 £
18,000.00		-403.00		
			70,643.28	2,300.45
11,273.19	11,227.89	45.30		
19,107.43	19,394.58	-287.15		
6,257.12	6,393.82	-136.70		
9,110.55		-1,019.45		
7,672.81	7,683.54	-10.73		
10,462.92		-217.08		
9,502.58		-325.42		
4,382.23		-2,337.77		
7,366.19		-6,106.81		
9,854.00		-807.00		
4,887.15		-588.85		
4,481.18		-897.82		
8,354.62		525.62		
9,806.13		874.13		
5,269.19		-1,131.81		
4,241.56		-1,148.44		
4,396.65	3,831.70	564.95		
5,129.43		839.43		
1,283.81	1,250.22	33.59		
6,419.03		-106.97		
9,962.52		834.52		
7,247.88		-758.12		
5,575.04		-804.96		
5,543.30		-173.70		
3,312.43		-2,357.57		
6,194.51		141.51		
1,983.59		-2,058.41		
5,709.62		-2,961.38		
11,264.95		-4,455.05		
32,157.68		1,123.68		
61,421.98		7.98		
10,958.60		-91.40		
7,672.35		327.35		
13,557.40		-1,435.60		
11,755.22		-763.78		
7,934.66		-2,121.34		
20,705.17		2,120.17		
9,389.95		38.95		
11,583.97		-2,164.03		
14,634.58		2,494.58		
9,616.01	176.48	-420.47		
5,347.37		124.37		
10,949.41		-642.59		
			211,053.23	18,814.11
	396,038.05		427,027.00	30,988.95
451,735.95	445,996.28	-26,637.28	708,723.51	52,103.51



Nominations for Council

At the AGM in December 2021, the following vacancies will occur on Council:

- Vice President
- Secretary
- Publicity Officer

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.

All potential Council Members are asked to consider the following:

'Each Council Member needs to be aware that, since the Palaeontological Association is a Registered Charity, in the eyes of the law he/she becomes a Trustee of that Charity. Under the terms of the Charities Act 1992, legal responsibility for the proper management of the Palaeontological Association lies with each Member of Council'.

Further information on the responsibilities of Trustees can be obtained by e-mailing <secretary@palass.org>.

The closing date for nominations is **1st September 2021**. They should be sent as a PDF document to the Secretary: <secretary@palass.org>.

Council vacancies: 'job descriptions':

Vice-President (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.

Secretary (five-year term)

The Secretary is one of the senior members of Council and has a wide range of duties and responsibilities – never a dull moment! In addition to dealing with inquiries and other communications from members and non-members, preparing agendas and keeping the minutes of all the Association's meetings, the Secretary also has a major role in keeping written records up to date, such as the rubric for the various grants and awards, and drafting the annual Trustees Report. As senior Council member, the Secretary usually sits on most of the grant-awarding committees – a demanding but ultimately very satisfying aspect of the position – and also acts as the Executive Officer's line manager. Whenever Council agrees to forge ahead with a major new initiative, the Secretary has a responsibility for drafting any new documentation that may be required, such as job descriptions and adverts. These duties require the Secretary to work closely with the President and the Executive Officer in particular, but also with the Internet Officer and Newsletter Editor. The



responsibility and breadth of the role requires that the applicant has had previous experience of being on Council (or a similar role in another related organization).

Publicity Officer (three-year term)

Together the Publicity Officer, Outreach Officer and Education Officer comprise the Public Engagement Group (PEG). These posts have responsibility for the Palaeontological Association outreach activities. Currently they include organizing the Association's presence at Lyme Regis Fossil Festival and the Yorkshire Fossil Festival, co-ordinating the Engagement Grants, answering relevant inquiries, 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; responsibilities particularly associated with the Publicity Officer post include leading the Association's publicity and promotion via social media and other outlets.

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/Medals selection procedures

The Palaeontological Association Council discusses Awards and Medals at the May Council meeting and votes to select awardees. 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 that: (i) includes a diversity statement to remind Council of their responsibility in terms of fairness and diversity issues (including impact of non-



standard careers *etc.*); (ii) outlines the remit and selection criteria for each award; (iii) considers the impact of awardees in terms of increasing the diversity of recipients. Each award is considered in turn with every application considered except those that clearly fall outside of the remit. Each Council Member will vote by listing their three preferred candidates in rank order. The candidate with the most votes as preferred candidate will be awarded the award/medal. If there are only two candidates and they are tied the President shall have the casting vote. If there are three or more candidates and there is a tie the vote will be recounted including the second ranked candidate for all of the votes. If the vote remains a draw after second and third ranked candidates are considered the President will cast the deciding vote. Please note that, in recognition of the disruption caused by the coronavirus pandemic, Council has decided that 2020 should be discounted when calculating the years of full-time experience for relevant medals and awards.

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. 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 to the Association website by the deadline.

The award will be considered by Council at its May meeting and awardees will be invited to a ceremony at the Annual Meeting in December. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to decide 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 to his/her earlier career, coupled with an expectation that they will continue to contribute significantly to the subject in their further work.



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. 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. We are looking for evidence of significance of research with clearly identified achievements and breakthroughs. 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 to the Association website by the deadline.

The award will be considered by Council at its May meeting and awardees will be invited to a ceremony at the Annual Meeting in December. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to decide 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.

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. 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 to the Association website by the deadline.

Nominations will be considered by Council at its May meeting and awardees will be invited to a ceremony at the Annual Meeting in December. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to decide 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). 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 to the Association website by the deadline.

Nominations will be considered by Council at its May meeting. Awardees will be invited to a ceremony at the Annual Meeting in December, 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 decide 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 contacts 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 to the Association website by the deadline.

The award will be considered by Council at its May meeting and winners will be invited to the award ceremony at the Annual Meeting in December. Awards will also be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to decide 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 contact details required). The nomination must consist of a one-page statement (font-size 12) outlining the nature of support for the Palaeontological Association. This should be uploaded to the Association website by the deadline.

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 and Flash Talk Prizes

These prizes are awarded for the best talks (long and short format) and 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 these awards. 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.

Best Paper Awards

The aim of this award 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 final part are allocated) and circulated around the science editors. The science editors are asked to nominate any papers that stand out, providing 2–3 sentences explaining why each is deserving. The Editor-in-chief will draw up a shortlist 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.



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 format 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 September: 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 May: Deadline for applications from host institutions.

September – May: delivery of lectures.



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 (<www.palass.org>). Those with deadlines in the next six months 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. Application must be made in good time (at least nine months before the start of the event) by the scientific organizer(s) of the meeting using the online application form. Such requests will be considered by Council at its May and October meetings each year. If the application is successful, we will require that the support of the Association is acknowledged, preferably with reproduction of the Association's logo, in the meeting/workshop/short course literature and other media. Inquiries may be made to the Secretary (e-mail <secretary@palass.org>).

Applications should be made through online submission via the appropriate page on the Association's website, for which you will need the following information:

- Title of meeting / workshop / short course
- Date and Place proposed
- 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 (also whether the request is for a loan or a grant)
- Other sources of funding applied for
- Specific use to which requested funds will be put

Note: If funds are requested to support one or more keynote speakers, then full details of their names, affiliations and titles of presentations should be included. The application will be strengthened if the keynote speaker agrees to submit their paper as a review article for possible publication in *Palaeontology*.

The deadlines are **1st March** and **1st September** each year.



Engagement Grants

Awards are made to encourage educational outreach, public engagement and related initiatives in palaeontological themes. Normally, the budget for an individual grant would be less than £5,000 GBP. 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 they can be 'proof of concept' case studies that have their own outcomes but that form the groundwork for a larger bid elsewhere. 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 below for the categories of expenditure for which the Palaeontological Association does not provide support.).

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.
- The principal applicant must be a member of the Association.
- Preference will normally be given to candidates who have not previously won an award.
- 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 through the PalAss website (<<https://www.palass.org/awards-grants/grants/engagement-grants>>, which includes details of the Required Supporting Information).

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.

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, Ms Zoe Hughes (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 application form and Council will decide on the allocation of the awards based upon the nature of the project described in the application.

Applications should be made through online submission via the appropriate page on the Association's website, and will comprise:

- An account of project aims and objectives and expected outcomes
- A breakdown and justification of the proposed expenditure
- A curriculum vitae
- Two references: one reviewing the project, and one personal reference for the applicant
- A summary suitable for the non-specialist, which will be published in the *Newsletter* when an award is made

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

Further details 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. Inquiries may be made to the Secretary (e-mail <secretary@palass.org>).

The deadline is **1st November** each year. The awards will be announced at the AGM, and funds will normally be available from 1st January.



Undergraduate Research Bursaries

The Palaeontological Association Undergraduate Research Bursaries are aimed at giving undergraduate students the opportunity to acquire research skills and experience that will significantly transform their academic career. The bursaries will support projects co-designed by students and their supervisor(s) that give students registered for an undergraduate degree their first experience of undertaking a palaeontological research project; students and supervisors from all countries are encouraged to apply. The bursaries provide a stipend for the student for up to eight weeks. The scheme is not intended to fund students to undertake routine work for the supervisor(s) and the Association expects the supervisor(s) to provide significant personal mentoring of successful student applicants. Students from under-represented groups will be given priority.

Applications should be made by the principal supervisor through online submission via the appropriate page on the Association's website.

After completion of the work, successful **students** are required to produce a short report of the findings suitable for publication in the *Newsletter*. This report should be submitted by e-mail to <palass@palass.org> within eight weeks of the stated end date of the project. Successful candidates are requested to prioritize the Association's meetings and publications as media for conveying the research results.

Further details, including eligibility criteria for supervisors and students, and a full list of terms and conditions for the Undergraduate Research Bursaries scheme can be found on the appropriate page of the Association's website. Inquiries may be made to the Secretary (<secretary@palass.org>).

The deadline is **1st February** each year. Successful applicants will be notified by the end of March and funds will normally be available from 1st June. A full list of awards will be announced at the AGM.



ASSOCIATION MEETINGS



65th Annual Meeting of the Palaeontological Association
University of Manchester, UK 18 – 20 December 2021

The 65th annual meeting of the Palaeontological Association will take place at the University of Manchester, UK from 18th to 20th December 2021. We are currently aiming to welcome delegates to an in-person meeting at the University of Manchester, with enhanced online access to allow remote participation where possible. The current global situation is highly changeable but we aim to keep members up to date via the PalAss website (<www.palass.org>) as soon as we are able to share more details. The organizing committee is chaired by Dr Robert Sansom, with help from Dr Russell Garwood and other members of Manchester's Interdisciplinary Centre for Ancient Life (ICAL) and the Department of Earth and Environmental Sciences.

Outline conference programme

The hosting committee are keen to welcome delegates to a safe in-person meeting with its concomitant benefits, whilst maintaining and enhancing the internationalism and diversity of the Annual Meeting during pandemic times. We aim to hold in-person scientific sessions at the Oxford Road campus of the University of Manchester, and stream/share oral and poster presentations for virtual delegates who are unable to attend in person. As normal, we will be inviting abstract submissions for oral and poster presentations from participants irrespective of geographic location. Those participants who know, or expect, they will be unable to attend in person because of travel, health or mobility restrictions will be able to submit abstracts. If accepted, they will be invited to submit pre-recorded talks in advance of the meeting and asked to attend a live virtual session for Q&A after their talks. Oral sessions during the meeting will therefore be a mix of predominantly live, in-person presentations and some pre-recorded presentations, presented to both the in-person and virtual audiences.

Workshops and symposium

The meeting will begin with several workshops during the morning of Saturday 18th December. Current proposals include decolonizing palaeontology, public engagement, and potentially training in tomography and visualization. The meeting will continue in the afternoon with a special thematic symposium '*The Problem of Problematica: pushing the limits of the fossil record*'. There will be talks from six international invited speakers addressing a broad range of topics, including geological, biological, ecological and taphonomic approaches to resolving the affinity and evolution of problematic fossil taxa, with important case studies from geological history.

Registration and booking

Registration, booking and abstract submission will commence in early August 2021. Abstract submission will close in September (date to be confirmed) and abstracts submitted after the closing date will not be considered. Registration after that date will incur an additional administration charge, with the final deadline for registration in November 2021. Registration and bookings for in-person events will be taken on a first-come, first-served basis. Virtual delegates will also be required to register to access the remote content.



The city of Manchester

Manchester is a large city with a historic industrial past, currently undergoing an energetic period of growth and regeneration. There is a long history of engineering and science innovation at the University, including Ernest Rutherford's work in physics, Alan Turing's pioneering approaches in computing, and Kathleen Drew-Baker's work on botany and marine aquaculture. Evidence of Manchester's industrial, political, cultural and sporting heritage can be found all over the city centre and its museums, alongside modern architecture and vibrant nightlife. Close to the University campus is Manchester's famous gay village, historic music venues, the 'curry mile', and a wide range of pubs and restaurants.

During December, Manchester city centre is usually taken over by the massive Christmas markets with 300 stalls centered on Albert Square. Your local hosts can frequently be found there in December, and we encourage in-person attendees of the Annual Meeting to make a visit (if possible) and enjoy some mulled wine with colleagues.



Virtual

LYME REGIS FOSSIL and Earth Science FESTIVAL

SATURDAY 10th & SUNDAY 11th JULY 2021



**Join us for a weekend of science, discovery
and fun at the world-famous Jurassic Coast
from the comfort of your own home!**

**Enjoy virtual field trips, live and pre-recorded talks
and lectures and lots of fun activities!**



LYME REGIS
FOSSIL FESTIVAL
Sponsors and Supporters



www.fossilfestival.co.uk



news



Palaeontology in the news

At the end of March 2021, a heart-warming, fossil-related news story received huge amounts of media coverage in the UK and beyond. The BBC News headline proclaimed that a “Walsall boy, 6, finds ‘488-million-year-old’ fossil in garden”, and many other national news sources put out similar versions of the tale. Young Sid (Siddak Singh Jhamat) was digging for worms in his garden in Walsall (a town in the Black Country area of the English Midlands, not far from Birmingham) when he found something that “could be a tooth or a claw or a horn” and turned out to be a solitary rugose coral fossil.

Through the Facebook Group ‘Fossil Finds UK’ Sid’s dad, Vish Singh, was soon in touch with people who knew what they were looking at, including our very own Council member, Dr Sam Giles (Lapworth Museum, University of Birmingham), who contacted him via the Facebook group with an invitation to the Museum once it was open again. The *Guardian* even ended up doing a follow-up piece in May in their ‘Life and style’ section, in which Sid told his story in the first person. So: the story has a happy ending, with a child’s unexpected fossil find correctly identified and contact made with a local museum. And for once, the fossil was a Palaeozoic invertebrate – not a dinosaur or other Mesozoic reptile in sight. These are all undoubtedly Good Things and absolutely no criticism of any of the folks involved is implied. However – there was much about the media coverage that revealed the poor state of geological literacy (for want of a better phrase) in the UK and a similar lack of understanding of our discipline in the media.

One of the most striking things about the coverage was the oft-repeated phrase “The family said that they do not live in an area known for its fossils, like the Jurassic Coast in the south of England”. This comment would have made me bang my head against a flat surface if I had been part of the team who successfully gained UNESCO Global Geopark status for the Black Country Geopark, less than nine months earlier, in July 2020. The Geopark – which covers the Borough of Walsall – includes the world-famous Wren’s Nest National Nature Reserve, a Site of Special Scientific Interest at Dudley. One of the most productive fossil localities in the UK, this historically important Silurian reef is the locality for the charismatic trilobite *Calymene blumenbachii*, nicknamed the Dudley Bug by local quarrymen. Yet UNESCO recognition of a well-established, historically-important regional Geopark gained a fraction of the coverage that Sid’s find gained. The area most definitely *is* known for its fossils in palaeontological circles – but somehow that knowledge has not made it to the people who live there, with the rocks underneath their feet.

The recurring misconceptions in the coverage were: that the age of the fossil was mind-blowing (if you don’t have any frame of reference for geological timescales); that it was extraordinary that the find was made nowhere near the coast (because you need to be at the seaside to find fossils, possibly even only on the Jurassic Coast); and, that “you can find fossils anywhere if you look carefully enough ...” (because people don’t connect fossils with rock type). And a final indignity for invertebrate researchers: “The next day he found a crinoid – which is the tentacle of a squid – in his garden” (a sub-heading in the *Daily Mail* article).



One of the ways that we can make palaeontology, and geology more generally, relevant to people of whatever age when we are doing outreach work is to talk about the rocks where they are, and (depending on where they are!) the fossils they might be able to find nearby. It seems to be that in the popular consciousness of the UK at least, fossil-hunting is purely the preserve of those who holiday in Lyme Regis.

The *Guardian* lifestyle piece ended with Sid's future aspirations: "When I grow up I want to be a paleo-archaeologist, so I can study rocks and find out where they came from". It often feels like a pedantic point to make when we call people out for mixing up two similar professions – but it could make a world of difference to the advice that Sid and other kids like him receive when they are old enough to start looking for advice about career choices. If done well, better co-ordination between regional museums, universities and local (and virtual) amateur groups could do a whole lot of awareness-raising, breaking down misconceptions, and embedding people's understanding in the rocks under their own feet.

Susannah Lydon

Publicity Officer



NEWS THAT A SIX YEAR OLD FOUND A PALAEOZOIC FOSSIL IN THEIR GARDEN HAS LEFT PARENTS FAR LESS ENTHUSED THAN THEIR CHILDREN



Featured Article #1

Unemployment among palaeontologists

Every year scores of students graduate as palaeontologists all over the world, but very few secure a permanent academic position. As the numbers of students obtaining PhD degrees keeps increasing, jobs have become more competitive. Along the path to success, many talented people drop out and we are losing expertise in this field.

To qualify for a permanent academic job, the minimum requirement is a doctorate. This means at least seven to ten years of studying to obtain a PhD. Usually, a PhD is followed by a postdoctoral position, which can then be followed by other postdoctoral positions until the candidate lands a permanent job. Very few people are lucky enough to continue their career in the same institution for successive jobs. For others, a new position means moving to a new city or even a new country. This has a huge impact on the personal lives of researchers. To achieve academic success, they are forced to make many compromises in their personal lives. Even then, there is no guarantee that they will get a job. To understand this situation and what can be done about it, I interviewed unemployed palaeontologists from various backgrounds and asked them about the obstacles they faced and their recommendations on what could be improved. Here are their stories.

Dr Antoine Bercovici

At the age of 18, Antoine travelled to the USA to participate in palaeontological excavations. At the excavation site, the team was digging out a *Triceratops* fossil. He quickly realized that this was not meant for him. Luckily, he was offered another opportunity to explore a nearby site. It turned out that the site contained extremely well-preserved fossil leaves, which he found much more interesting than dinosaurs. This is how he started developing a keen interest in palynology. He now works on fossil pollen and is very interested in the Cretaceous–Palaeogene boundary. He did his PhD at Université de Rennes in France. The topic of his PhD was “Sedimentology and palynology of the Late



Photo courtesy of Antoine Bercovici.

Permian–Triassic boundary environment”. After his PhD he completed three postdocs: in China, Sweden, and the USA. After his third postdoc, he was unemployed for almost three years, as he could not write a proposal for his next position and do his postdoc work simultaneously. During these years, he continued to work in the USA with his colleagues at his own expense. In 2019, he started his fourth postdoc at the University of Nottingham, UK. Right now, he is stuck at home in France and waiting to travel back to finish his postdoc. He says he has been able to move around so much for his postdocs only because he is single. That is one of the many sacrifices he is making to keep working as a researcher in palaeontology. It has been 12 years since he received his PhD.



Many funding agencies have a cut-off criterion of five to seven years after receiving a PhD degree. This means he is no longer eligible for many postdoc positions. Despite all this, he is hopeful that some opportunity will come up soon. Otherwise, the paleontological world will lose his expert skills and knowledge.

Dr Richard Hoffmann

Dr Hoffmann got his PhD from the University of Zurich in 2013, where he worked on the end-Permian mass extinction. Following this he did his first postdoc, also at the University of Zurich. For his next postdoc, at the Natural History Museum in Berlin, he moved there with his family. His research was focused on palaeobiodiversity analysis of benthic invertebrates. He worked extensively on mass extinctions and diversification processes. Ever since he was a small boy, he was always fascinated by rocks that he saw along road cuts and quarries and was eager to know the stories behind them. That is how he ended up studying geology and then palaeontology. Currently he lives in Berlin with his wife and two children. Given that his wife has a permanent job in Berlin, he wants to work in or near the same city. Since his last postdoc, he is looking for a permanent position as a researcher. He has been unemployed since May 2020 and is now teaching natural sciences at a school.



Photo courtesy of Richard Hoffmann.

Dr Anna Sanson Barrera



Photo courtesy of Anna Sanson Barrera.

Anna is originally from Spain and currently lives in Sweden. She did her PhD at the University of Zurich, working on environmental analysis and the interaction between rapidly changing climate and land floras during the Early Triassic. Towards the end of her PhD, she was unsure whether she wanted to continue in academia. After speaking to many postdocs, she realized how stressful their jobs were. There are many problems such as lack of funding, heavy workload, no guarantee of a permanent job and one has to change countries frequently. With this in mind, she started looking for a job outside academia, but the opportunities to work as a palaeontologist were very limited. Around this time, her partner got a postdoc position in the USA, so she decided to move there with him for two years. There she worked as a customer service agent at a local printing store. Following this, her husband was offered a job opportunity in Sweden and they decided to move there together. In order to find a job, she had to learn Swedish. She worked temporarily in a kindergarten and is now pursuing a course in GIS and topography at the Gothenburg town hall.



Dr James Witts

Photo courtesy of James Witts



James works on fossils from the Cretaceous–Palaeogene boundary and is especially passionate about science communication. He completed a PhD part-time while holding a teaching fellowship at the University of Leeds. His PhD project was a collaboration between the University of Leeds and the British Antarctic Survey, where he studied the Cretaceous–Palaeogene extinction in Antarctica. During his PhD, he attended many international conferences and established an extensive network. Through this network he discovered an opportunity for a two-year postdoc position at the American Museum of Natural History, where he worked on the Cretaceous–Palaeogene extinction and ammonite ecology. Following this, he moved to

the University of New Mexico. He was offered another postdoc there and continued working on the Cretaceous–Palaeogene boundary. He was in a long-distance relationship for the entire time that he lived in the USA. He moved back to the UK at the end of last year, as his partner found a job there. Since then, he has been unemployed. He has already applied to several postdoc fellowships, but the results were disappointing. He is still looking forward to any opportunities that come his way.

Dr Alex Xafis

Alex is a palaeontologist from Greece. His PhD topic was 'Out of Africa: dietary transitions of migrating megaherbivores during the Miocene'. He specializes in microwear and mesowear analysis. He is also an expert in taxonomy, particularly of the Giraffidae. In addition to this, he works on the palaeoecology of other large mammals, including elephants, rhinos, pigs, antelopes and bovids. He lives with his family in Vienna, where he also pursued his PhD. After finishing his PhD last year, he worked as a collections manager at the palaeontological collection in the University of Vienna for two months. During his PhD, he published extensively and started a job hunt early, because he wanted to avoid being unemployed. He also travelled and did a lot of field work, which can affect one's personal life. He says this can be very stressful and exhausting. By now, he has applied for many positions. What really upsets him is that despite being highly qualified, he has not even been shortlisted once. He is now looking for employment in other directions, *e.g.* as a consultant. He also loves growing plants and is considering developing his online horticulture business. If an opportunity comes up where he does not have to make too many compromises in his personal life, like moving far away from his family, he will definitely take it.



Photo courtesy of Alex Xafis.



The interviewees mentioned a recurring pattern of problems encountered by early-career palaeontologists, either from their own experiences or from the experiences of their peers.

1. Early-career researchers are expected to write proposals for their next appointment while in their current job. This is extremely stressful and can lead to burnout. If they fail to do this, they often face months to years of unemployment until their projects are accepted and they receive funding. The waiting period is quite long for this cycle and not everyone has the financial wherewithal to take this risk. Usually, people from a more diverse background are the ones to drop out first (e.g. Gándara 2006; Huntoon & Lane 2007; Holley & Gardner 2012; Booksh & Madsen 2018).
2. Academic jobs require researchers, especially postdocs, to move every few years; they are expected to be very flexible and this is also glorified in some way. For those who are in a relationship or have a family, this is one of the most important factors in deciding whether they will continue as palaeontologists or not.
3. There is no guarantee that one will find a job even when they are highly qualified for a position. A recurrent comment is that, for many advertised positions, applicants believe the decision about who is going to be offered the job has already been made. A common perception is that if one does not have good connections, one is unlikely to find employment.
4. The interviewees reported that, in practice, the workload required or expected is often much higher than officially stated and the salaries are low.
5. It seems that people can get into an academic bubble when they start studying palaeontology. They lack information on what they could do outside of academia or in museums.
6. Many specialized branches, such as palynology, are dying out slowly, as there are very few people studying this discipline. If these researchers do not find positions as palaeontologists, their skills will ultimately be lost.

The interviewees offered the following suggestions to people who want to follow a career path in palaeontology:

- Build a strong network of colleagues and collaborators, as most future opportunities are likely to come from there. Collaborate as much as possible. Do not be afraid to reach out to people and ask for opportunities.
- Be careful about becoming too specialized within a field. The more you specialize, the fewer job opportunities will be available to you.
- Acquire transferable skills while doing your PhD or Master's degree, e.g., coding.
- Find mentors to whom you can talk freely about your career and who will give you good advice¹.
- Palaeontology is a very uncertain career path so always have a Plan B.
- Make friends outside academia and have a hobby.

¹ Editor's note: the Association offers a Mentor Scheme, to which early career palaeontologists can sign up via this webpage: <<https://www.palass.org/careers>>.



What can universities and funding institutes do to prevent palaeontologists from becoming unemployed?

- Offer longer postdoc positions. Two years is a very short time to move to a new place, settle there, do research, and meanwhile also prepare for the next appointment.
- The duration of PhD positions could be extended up to five years and the format changed in such a way that the candidates receive their degree in the penultimate year and have one year to prepare their next application.
- Universities and PIs should organize more events to connect people from different areas related to palaeontology, such as science communication, journalism, geology companies, statistical and analytical job markets².
- Encourage students to do internships and explore paths other than academia.
- Invest more time and monies in science outreach. The public needs to know what research is being done in their region or country. This is a good way to convince the government to invest more money in research.
- Maybe it is time for the scientists to reduce the number of PhD students they take on or at least give them a reality check about the realities of the job market.
- There is the potential to create positions in mitigation palaeontology.

Despite all its difficulties, palaeontology can be a very rewarding profession. It offers a chance to unravel the Earth's mysterious history and improve our understanding of this world. We must make an effort to reduce the uncertainties and offer more security to those who choose to pursue this career path.

Namra Sikilkar

Friedrich-Alexander-Universität Erlangen-Nürnberg

REFERENCES

- BOOKSH, K. S. and MADSEN, L. D., 2018. Academic pipeline for scientists with disabilities. *MRS Bulletin*, 43(8), 625–632.
- GÁNDARA, P., 2006. Strengthening the academic pipeline leading to careers in math, science, and technology for Latino students. *Journal of Hispanic Higher Education*, 5(3), 222–237.
- HOLLEY, K. A. and GARDNER, S., 2012. Navigating the pipeline: How socio-cultural influences impact first-generation doctoral students. *Journal of Diversity in Higher Education*, 5(2), 112.
- HUNTOON, J. E. and LANE, M. J., 2007. Diversity in the geosciences and successful strategies for increasing diversity. *Journal of Geoscience Education*, 55(6), 447–457.

Note from the editor: This article has been solicited by Newsletter readers and written by a Masters student, illustrating the perspective of a person about to enter the job market. The text has been slightly edited by the Association's President and myself with the author's knowledge and agreement. We would like to pursue this topic in further issues by soliciting contributions on how to support palaeontologists in the job market. Please contact us if you would like to comment on the article or write a contribution on this topic.

² Please see our column 'Careers Q&A', where we interview palaeontologists in diverse jobs.



Featured Article #2

The PalAss Mentor Scheme

One of the ways in which the Palaeontological Association seeks to support early-career researchers is by offering a mentoring scheme. The Palaeontological Association Mentor Scheme is currently open to PhD students and post-doctoral researchers, and we aim to expand the remit of the scheme in the future. If you are a PhD student or postdoctoral member of the Association and are interested in having a mentor, or if you are a palaeontologist in a permanent position who would be willing to act as mentor, please e-mail Dr Fiona Gill (<vicepresident1@palass.org>) for more information.

Here two of our first mentees summarize their experiences.



I first learnt about the PalAss Mentor Scheme through the experience of another of the mentees, featured in *Newsletter 104*. I had been dealing with difficulties throughout my PhD, to the point of considering abandoning it. I found myself trapped in a situation with little to no control over my future career, especially towards the end of the PhD when guidance and feedback from an experienced academic is crucial to complete the work and to advance in your career. I was delighted when I learned about the PalAss Mentor Scheme and I was hoping to find the guidance I needed.

A couple of days after my first inquiry about joining the scheme, I received a list of academics who had agreed to volunteer their time; a generous number of people with a wide range of expertise, academic positions and professional backgrounds who are eager to assist early-career researchers. Immediately, two names caught my attention as the perfect mentors in my situation and after reaching out, Russell Garwood (University of Manchester) agreed to be my mentor through the scheme. Russell and I had met a few years back, while I was an MSc student at the University of Bristol, and from then we shared a conversation practically every year at the PalAss Annual Meeting. His research interests cover a broad variety of topics, which makes talking to him not only enjoyable and insightful but sometimes surprising. We had a preliminary meeting where we agreed that monthly meetings would suffice; however, he made sure to let me know that I could contact him at any time if I had any questions or needed extra advice. That first conversation was an eye-opener for me and prompted the submission of my PhD thesis less than a month later. Since then, I have approached Russell seeking advice ahead of the preparation for my viva, a job position and funding applications. I find his advice to be very practical, thorough, impartial and all-around positive. His mentorship has led me to regaining my confidence after a draining experience and was that little push I needed to continue pursuing a career in academia.

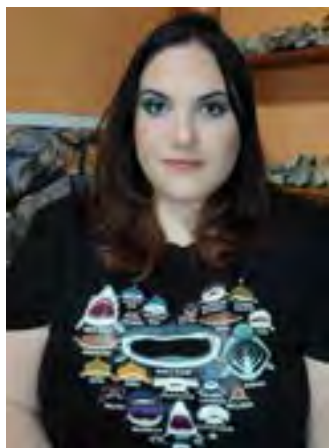


Photo courtesy of Nidia Álvarez Armada.



I would highly encourage any early-career palaeontologists to seek guidance through the PalAss Mentor Scheme. When you are unable to seek support from your immediate academic superiors it can leave you with an overwhelming feeling of abandonment and, unfortunately, academic institutions do not commonly offer specialized advice in these situations. This scheme offers the opportunity of balancing particular needs from the guidance-seeker with a suitable, experienced mentor who has probably worked through similar issues at some point during their career. Without this scheme, I would not have been able to receive personalized advice and support when I needed it the most.

Nidia Álvarez Armada



I am currently part-way through my first postdoctoral position after finishing my PhD a few years before. My long-term goal is to become a lecturer in palaeobiology and although I was already aware of some aspects that are needed to achieve this, such as developing a good publication record, I was much less sure on other aspects, such as how to secure independent fellowships that can act as gateways into permanent positions. I therefore asked to join the Mentor scheme and soon after I was assigned a mentor who had such knowledge and experience.

I started with the mentoring scheme in May 2020 not long after I had moved to a new city to begin my postdoc. I had yet to meet any of my new colleagues in person due to the first UK lockdown and would not do so for several more months. I often struggle with anxiety and during the first lockdown the worst place to be sometimes is to be trapped inside my own head. I would routinely worry over unanswerable questions, such as “how am I supposed to be competitive for fellowships if I can not physically do research or publish anything?”. I also felt that I had less of a right to be struggling compared to many other people because I had no vulnerable elderly relatives to look after, nor any children to home-school. This obviously played on my self-worth. I explained this during my first meeting with my mentor who was very sympathetic and understanding. The best advice they gave me was that “everyone has to deal with their own reality, which has become a whole lot harder in lockdown”, which really helped. Sometimes it is OK to not be OK and I thank my mentor for helping me come to terms with this.

We continued to meet thereafter every three months where we discussed more about my long-term goals and how I can take steps in the short to medium term to help achieve this. For example, my mentor looked through my CV as if pretending to be a fellowship reviewer and gave me very useful feedback on my strengths and on areas that could still be improved. It was refreshing and insightful to talk to someone informally other than a PI or colleague about the trials and tribulations of working in a pandemic and on the broader insecurities associated with pursuing a career in academia. My mentor also gave me very useful broader advice, such as how best to deal with disagreements between co-authors when writing and finalizing manuscripts for submission, as long delays in getting material published can have adverse effects on the employability of early-career researchers.

I would fully recommend PhD students and postdoctoral researchers to join the Mentor scheme. I would like to thank the PalAss for creating this scheme and hope that it continues to develop and grow in the future.

Anonymous mentee



Download our **Palaeontology App!**

Stay up to date with the latest research from ***Palaeontology*** and ***Papers in Palaeontology*** with the **Palaeontology app**



FEATURES

Read articles on the go

- Access to *Palaeontology* and *Papers in Palaeontology* in a single app
- Save your favourite articles to read later
- Set up content alerts and stay up to date with the latest research



Android

Scan the code and download the app for free



iOS

Scan the code and download the app for free

See the PalAss website for details regarding free access for members



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 Konstantina Agiadi, Patrycja Dworczak and Shamindri Tennakoon.

Konstantina Agiadi is a Greek in Austria, employed as a Senior Postdoc at the University of Vienna on an FWF Lise Meitner Fellowship.

Q1: How did you end up in Austria?

I first visited the Department of Palaeontology of the University of Vienna in 2017 with a small grant from the COST Action MarCons (<<https://www.marcons-cost.eu/>>) to work on fish otolith death assemblages from the Mediterranean coast of Israel, as part of a bigger project on the Historical Ecology of the Lessepsian Invasion (<<https://lessepsianmigrationblog.wordpress.com/>>). I soon realized that the research group was a perfect fit for me, so I discussed with the professor leading the group and we decided to pursue a postdoctoral fellowship to join them. After a couple of tries, I managed to get my proposal funded.



Photo: George Iliopoulos

Q2: How is your position funded?

My position is funded by the Austrian Science Fund (FWF) through a Lise Meitner Fellowship (<<https://www.fwf.ac.at/en/research-funding/fwf-programmes/meitner-programme/>>). This is an excellent scheme for incoming researchers, which covers my salary based on a collective agreement and project-specific costs up to €12 000/year.

Q3: What is your project about?

In the PALEOWEB project (<<https://sites.google.com/view/kagiadi/projects/paleoweb>>), I produce palaeontologic and palaeoclimatic data from the Pleistocene of the eastern Mediterranean, which I then use to model the marine food web during specific glacial and interglacial periods. Present-day marine ecosystems, especially the eastern Mediterranean marine ecosystem, are affected by multiple stressors, such as climate change, biological invasions, and anthropogenic impacts. In contrast, Pleistocene ecosystems were only affected by severe climatic oscillations, including warming periods that can be used as analogues of current and forecasted climate warming. Therefore, modelling the Pleistocene food webs could allow us to isolate the effect of climate warming on marine ecosystems.

Q4: What surprised you most about living in Austria?

I cannot say I was surprised by anything really, because I was very well prepared for the transition.



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

Although I enjoy the outdoors in Austria very much, I suppose I do miss the easy access to the sea and the Mediterranean food.

Q6: How has the pandemic affected your situation as a palaeontologist abroad?

Several meetings I planned to attend were cancelled or postponed. Although I tried to keep in contact with my network through online meetings, it is hardly the same. I hope next year will be better. I would like to present the results of my project in person, and I have missed my friends/colleagues.

Konstantina tweets at @kagiadi

Patrycja Dworcak is a Pole in Germany, doing a PhD at GeoZentrum Nordbayern in Erlangen, funded by the Polish National Agency for Academic Exchange (NAWA).

Q1: How did you end up in Erlangen?

The first time I visited the Institute of Palaeontology in Erlangen was in 2019 during the International Course on Carbonate Microfacies ("Flügel Course"). Then I decided to apply for an internship in Erlangen, because I met many inspiring researchers there and I really liked the vibe of the institute.

Q2: How is your position funded?

My six-month internship was funded by the Polish National Agency for Academic Exchange (NAWA) that supports international mobility of young researchers by enabling them to acquire scientific experience in foreign research institutions.

Q3: What is your project about?

The project I conducted in Erlangen was a part of my PhD thesis and it focused on environmental and ecological reconstruction of the development of the Late Devonian platform in south-eastern Morocco. Based on a detailed investigation of facies and fossils (stable isotopes, trace element and REE analyses) I wanted to determine the conditions which controlled deposition of carbonates, the development of diverse marine ecosystems and the environmental changes during the Late Devonian. The research was combined with biostratigraphic analysis.

Q4: What surprised you most about living in Germany?

I was surprised to see how many breweries there are in Bavaria. People are very friendly and the mountains are so beautiful. I enjoyed taking short trips outside town and trying local cuisine. Bavarian food is really tasty and there is a wide selection of local products in most supermarkets. However, it is good to remember that all shops are closed on Sundays in Germany. Another tip is to carry some cash with you as you cannot always pay by card in Bavaria.

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

It is hard to say because Germany and Poland have many similarities, such as cuisine. Additionally, both countries during my stay were in deep lockdown so in general what I missed the most was freedom.



Photo: Małgorzata Krzyżaniak

**Q6: How has the pandemic affected your situation as a palaeontologist abroad?**

While working on biostratigraphy, I was working in the laboratory. There were restrictions on lab activities, which limited the access – but, in spite of them, everything worked smoothly.

Patrycja Dworzak is on ResearchGate <<https://www.researchgate.net/profile/Patrycja-Dworczak>> and Facebook <<https://www.facebook.com/patrycja.dworczak.1>>.

Shamindri Tennakoon is a Sri Lankan in the USA, studying as a graduate student (PhD candidate) at the Department of Biology and the Florida Museum of Natural History, University of Florida on a graduate assistantship.

Q1: How did you end up in the USA?

I completed my bachelor's degree at the University of Peradeniya in Sri Lanka, where I majored in Zoology. For my undergraduate thesis, I studied cerithiform gastropods in the North-western Miocene deposits of Sri Lanka. I was interested in pursuing research in palaeobiology and was looking for graduate programmes in the US for some time. I was interested in working at the Invertebrate Paleontology Division/Kowalewski lab at the Florida Museum of Natural History and wrote to my current advisor to see if there were any openings. As instructed by him, I applied to the Zoology PhD programme in the Department of Biology. I got admitted to the programme and got the opportunity to join Dr Michał Kowalewski's lab as a graduate student.



Photo: Carmi Thompson.

Q2: How is your position funded?

I am on a graduate assistantship at the University of Florida. During the fall and spring semesters, I am employed as a teaching assistant in the Department of Biology. My assistantship comes with a tuition waiver for the credits I register for, and it also provides me with a stipend to cover my living expenses and health insurance. In summer, I work as a research assistant at the Florida Museum of Natural History.

Q3: What is your project about?

I am interested in morphological patterns and palaeoecology of molluscs (primarily gastropods) and clypeasteroid echinoids (sand dollars). For one of my dissertation research projects, I study the morphological variability of Cenozoic cassids (a group of marine predatory gastropods which prey on echinoids), with a focus on moldic fossil cassids from the Eocene of Florida. I am also interested in the morphology of predatory traces, and I look into non-lethal marginal traces in recent and fossil clypeasteroid echinoids. Non-lethal marginal traces are an under-utilized predatory trace in the fossil record. In this project I characterized non-lethal marginal traces on live-collected sand dollars and compared them with traces observed in post-Miocene fossil specimens, to develop a protocol to identify non-lethal marginal traces on fossil sand dollars and help us better understand the evolutionary history of biotic interactions, specifically non-lethal attacks in the echinoid fossil record. Earlier on in my programme, I carried out a conservation palaeobiology project, where I compared living and dead mollusc assemblages in an artificial reef system to determine responses of local faunal communities to decadal scale changes due to reef establishment.



Q4: What surprised you most about living in the USA?

I was surprised by how the climate during most months in Florida is similar to the climate in my home country. The vastness of the country surprised me and how spread-out towns and cities are (my country is about a third the size of Florida). I love being able to try different cuisines and there is a wide variety of food available here. I appreciate all those who were welcoming and helped me get adjusted to life here.

Q5: Apart from friends and family what do you miss most about Sri Lanka?

I miss Sri Lankan food, especially some fruits, vegetables and snacks which are not readily available here. I miss the holidays and festivals in Sri Lanka and I still try to celebrate in whichever way I can. I also miss visiting national parks and natural areas in the island and the native fauna and flora.

Q6: How has the pandemic affected your situation as a palaeontologist abroad?

The pandemic has been a stressful and difficult time in many ways. I am unable to travel to my country and I worry about the well-being of my family and friends back home. In 2020, we were not allowed on campus for several months and access was restricted to most research facilities. Fieldwork was not an option until restrictions were lifted recently. I missed in-person conferences where I get to meet colleagues and friends. The pandemic has delayed or altered the graduation timelines for many of us. I feel fortunate to be able to continue my programme and have funding to continue research.

Shamindri Tennakoon tweets at @ShamindriT

Legends of Rock

Jon Cutbill: pioneer of museum documentation and gay rights

As we in the PalAss consider how we can make our organization and our science more inclusive and welcoming to people of all genders and sexual orientations, it feels timely to be telling the story of a 1960s gay rights pioneer who also had a lasting impact on palaeontologists' use of museum collections.

As computing resources developed in the late 60s and early 70s, researchers and museum workers saw the potential for enabling them to search their collection data in different and more effective ways. Much of this early work was centred around a small group of geologists and palaeontologists at the Sedgwick Museum of Earth Sciences (University of Cambridge, UK) who developed one of the world's first computerized museum catalogues. Up to this point, museums with large research collections were reliant on card indexes, meticulously hand-drafted cross-referencing lists and good old curatorial memory to locate fossils. These geologists saw how this new technology had the potential to transform the way in which people could access research material. Even in a museum such as the Sedgwick, where the scope and scale of the collections means that full digitization of the collection is a daunting task, it is still difficult to imagine not being able to look up a fossil on the database.



One of the driving forces in this ground-breaking work was Jonathan Cutbill, known as Jon in the Sedgwick, whose PhD focused on the Carboniferous and Permian microfossil palaeontology and biostratigraphy of Svalbard. He carried out several field seasons on Svalbard in the early 1960s as part of a long tradition of Cambridge geologists led by Brian Harland, who visited the Norwegian archipelago from the 1930s onwards and whose extensive field records are preserved in the Sedgwick Museum archives. Towards the late '60s, along with colleagues Jon Odell and Martin Porter, Cutbill's interest shifted towards exploring how to use computers – at this time, room-sized machines – to sort and index information about the Sedgwick Museum's fossil collections. Using the Sedgwick's collections, he demonstrated how fossil information could be retrieved by geological age or locality using computer-generated indexes. A major conference in 1969, convened by Cutbill, drew together international museum representatives to share ideas about how this new technology could be harnessed. This led to the establishment of global documentation standards for museums, and the setting up of the Museums Documentation Association (now the Collections Trust) in 1977.



Jonathan Cutbill (yellow jumper) in the 1970 The Sedgwick Club photograph. The Sedgwick Club is the Cambridge student geology society, which first met in 1880 and is still thriving today. Source: Sedgwick Museum Archive.



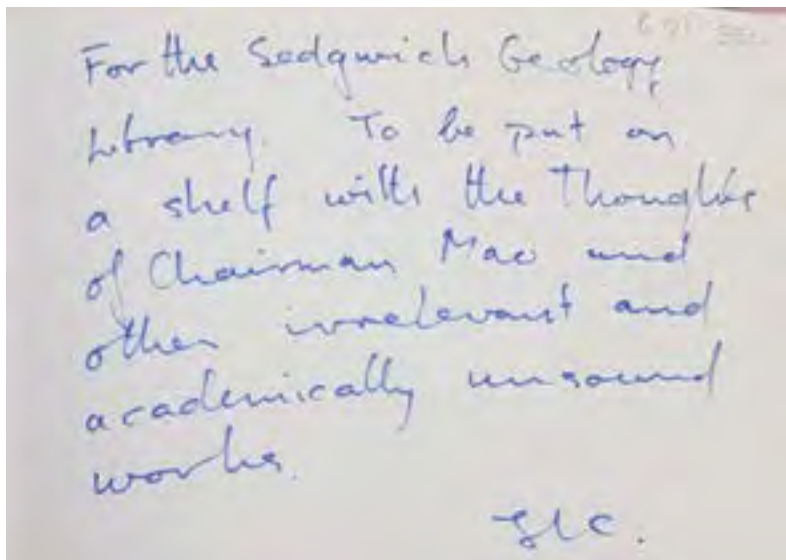
Jonathan was an out gay man and colleagues from the Department of Earth Sciences remember him as good company, up for fun and, in the words of Nigel Woodcock, 'ahead of his time in gay rights'. He was an active campaigner, passionate about justice. A friend, Geoff Hardy, describes his first encounter with him in the 1970s: "two youngish guys hand-in-hand with hennaed hair swishing their way through [the military parade] and kissing". After the Sedgwick, he went on to work on documentation systems at the National Maritime Museum and also began to build up what was to become the largest and most comprehensive collection of LGBTQ+ books in the UK, including titles dating back to the 1760s. In 1979, he was one of the three founders of Gay's The Word bookshop in Bloomsbury, London, the UK's oldest LGBT bookshop. It featured in the 2014 film *Pride* and continues to be an important focus for the gay community.

In the 1980s, Cutbill's study of the work of First World War poet Wilfred Owen demonstrated that the poet was gay, information that had been suppressed by previous biographers in some sort of misplaced 'protection' of British military honour. As well as having a deep interest in gay literature and publications, Jonathan used his data management skills to set up the shop's stock control system. In 1984, he was one of eight staff arrested and threatened with imprisonment when HM Customs and Excise raided the bookshop on the assumption that they were selling illegal pornography. After a campaign they were released and the confiscated titles – including books by Oscar Wilde and Tennessee Williams – were returned.

On Cutbill's death in 2019 his collection of more than 30,000 books, pamphlets and periodicals passed to the University of London's Senate House library where it forms an important research resource.

Liz Hide

Sedgwick Museum of Earth Sciences, UK



Jonathan's sense of humour and irreverence are reflected in this inscription in the front of the 1969 conference volume he presented to the Department of Earth Sciences Library. Source: Liz Hide.



Behind the Scenes at the Museum

Palaeontology Collection at the Iziko South African Museum

The Iziko South African Museum is located in Cape Town's "The Company Garden" established by Jan Van Riebeeck in 1653. It opened its doors in 1825 and emerged between 1825 and 1827 as a small natural history and ethnographical collection. As the oldest public museum in South Africa, it celebrates 200 years of existence in 2025. One of its most illustrious visitors was Charles Darwin in 1836. It possesses the first mammal fossil collected in South Africa, *Pelorovis bainii* (= *Bubalus bainii*), collected in 1839. The South African Museum had sent Karoo fossil specimens overseas since 1876 with work beginning on Karoo fossils in South Africa in 1902. The South African Museum's Invertebrate Palaeontology Collection dates to more than 100 years ago. Cenozoic Palaeontology, formally known as Cainozoic Palaeontology, began to grow in size and importance from 1962.



Façade of the Iziko South African Museum, Cape Town, South Africa. © Iziko Museums of South Africa, photographer: C. Beyer.

Curators and research associates at the Museum have driven the accumulation of the thousands of specimens in the Invertebrate Palaeontology collection. It contains nearly 50,000 specimens that date from 700 Ma to the most recent Quaternary period. The collections include Precambrian invertebrate fossils, microfossils, eurypterid, coral, sponge, trilobite, crinoid, brachiopod, starfish, ophiuroid, ammonoid, nautiloid, bivalve and gastropod fossils. The fossils come from all over the world, but the most important sites in the collections are the Devonian-aged Bokkeveld mountainous region and the Cretaceous-aged eastern margin of South Africa. The Devonian fossils come from the mountainous area of the southwestern region of South Africa and include abundant trilobites, brachiopods and echinoderm fossils. The Cretaceous-aged fossils include mainly ammonites from southern Africa. The microfossil collection includes a few thousand ostracod and foraminifera specimens from the Cretaceous and Quaternary periods.



Devonian trilobite from the Bokkeveld Group, South Africa. © Iziko Museums of South Africa, Invertebrate Collections, photographer: S. Abraham.

These important collections represent a glimpse into how the landscape and environments of southern Africa have changed over geologic time. Invertebrates represent the oldest forms of life on Earth and are the oldest fossils from South Africa. The Bokkeveld fossil fauna represent a time when the mountainous area of southwestern South Africa was covered by the ocean. What followed were periods of continental collision and mountain-building, resulting in these fossils being found at an elevation of more than 1,000 m above sea level. The Cretaceous invertebrate faunas represent a period when the rifting eastern margin of South Africa drifted further away from the other southern continents. The microfossils in the collection are useful indicators of environments from the time when they were alive. These data can be used as a comparative baseline to today's environments.

The Cenozoic collection is made up of at least 700,000 specimens from mostly onshore Neogene and Quaternary deposits from southern Africa's west coast, with some trawled specimens representing marine and terrestrial communities. The Neogene collections are mainly from the Miocene and Pliocene while the Quaternary collections date from the Pleistocene to the Holocene. The most notable Neogene sites associated with sea level changes are Arrisdrift, Langebaanweg, Duinefontein (Koeberg) and Hondeklip Bay, Ysterplaat, Milnerton, Saldanha Steel, Prospect Hill and Baard's Quarry. The Quaternary collections include Swartklip 1, Swartklip 2, Ysterfontein-carnivore, Ysterfontein-L, Katz Street, Spreeuwalle, Sea Harvest, Hoedjiespunt, Duinefontein 2, Duinefontein-calcrete, Duinefontein, Elandsfontein-Main, Elandsfontein-Bone Circle, Elandsfontein-HD, Donkergat, Hout Bay, Geelbek, Velddrif, Skurwerger – Saldanha. Adjunct to this collection is a comparative extant taphonomy collection.

The world-renowned Langebaanweg has produced a prolific collection of late Neogene fossil taxa. Numerous bird and terrestrial fauna described from this site were identified for the first time in Africa and include the short-faced bear, giant otter and giant wolverine. The Neogene marine mammal fauna has established links to the Atlantic of Europe and North America, and eastern North and South Pacific. The Quaternary collection has revealed information about the fauna that shared the coast with the resident hominins. Elandsfontein has 49 species with 15 having no living descendants, giving insight into an extended interglacial period closer to 600 ka (mid-Pleistocene). Swartklip is a hyaena den from a glacial



Cretaceous ammonite. © Iziko Museums of South Africa, Invertebrate Collections, photographer: S. Abraham.



maximum about 110,000 years ago when the sea level was about 100 m below the current sea level, while Sea Harvest shows how humans exploited coastal resources about 40 ka.



Agriotherium africanum (short-faced bear) from Langebaanweg. © R. Govender.

The sedimentary rocks of the Karoo Supergroup are an almost continuous 120-million-year record of climate change in western Gondwana from approximately 300 to 180 Ma. The Karoo offer a unique opportunity to investigate how terrestrial ecosystems respond to climate changes over millions of years. Fossils include plants (both macrofossils, pollen and spores), rare insects and fish, common and diverse tetrapods (mostly therapsids, temnospondyl amphibians, parareptiles, archosauromorphs and dinosaurs), and many types of trace fossils such as coprolites, burrows and trackways.



Giant Buffalo [Syncerus (Pelorovis) antiquus] skull with horns. © R. Govender.



Assistant Collections Manager Ms Zaituna Skosan holds a well-preserved therapsid (*Gorgonops*) fossil in the Iziko Karoo Palaeontology laboratory. © C. Browning.

The Early-Permian to Early Jurassic is considered the most important in tetrapod evolution as life on land radiated throughout the supercontinent of Pangaea. The Late Cretaceous and Early Eocene lake deposits produced over 250 complete skeletons of an extinct aquatic frog (*Vulcanobatrachus mandelae*), an extinct gar-fish (*Stompooria rogersmithi*), many small pond-living invertebrates (ostracods, bivalves (mussels) and gastropods (water snails), as well as fragments of large ornithopod dinosaurs. The Karoo Palaeontology collection houses over 400 type specimens and includes complete skeletons of large herbivorous tetrapods such as *Paraeisaurus*, *Rhaciocephalus*, *Endothiodon*, *Lystrosaurus*, *Odontocyclops*, large carnivores such as *Gorgonops* and *Pristerognathus*, and exquisite skeletons of smaller herbivorous *Diictodon* and



insectivorous *Thrinaxodon*, *Youngina*, *Prolacerta* and *Euparkeria*. It also contains the most complete skeletons of *Endothiodon bathystoma* and *Galesaurus planiceps* and numerous Karoo-aged temnospondyl amphibian skeletons including several type specimens.

Oudenodon lived in the Southern African Karoo basin during the late Permian.
© C. Browning



These diverse palaeontology collections hold treasures yet to be discovered. These will tell us about the geological past of southern Africa and the southern hemisphere and will build on what is currently known about past climates and environments.

Romala Govender

Curator Cenozoic Palaeontology

Eugene Bergh

Curator Geology and Invertebrate Palaeontology

Claire Browning

Curator Karoo Palaeontology

Iziko Museums of South Africa, Research and Exhibition Department, Palaeontology Collections

For further information:

Website: <www.iziko.org.za>

Facebook: <[www.facebook.com/Iziko Museums of South Africa](https://www.facebook.com/IzikoMuseums)>

Twitter: @Iziko_Museums

The fossil man

It is a terrible thing when a person becomes an ism. Take a subtle, complex human being, whose thoughts, over a tumultuous lifetime, could stretch to encompass a whole planet, to reach the cosmos along a myriad filigree pathways ... and then reduce that life to a banner headline: worse – one of those banner headlines that elicits the worst kind of knee-jerk response. There are isms and isms, though. Darwinism is a small thought-bomb that – in our own amiable company, of course – might be generally acceptable shorthand for one of the basic truths of our world¹, and likely of others too. But let us spare a thought for Jean-Baptiste-Pierre-Antoine de Monet, chevalier de Lamarck. The ism that he acquired is one that we all grew up with – normally to a chorus of boos and hisses from the gallery, penalty for being found on the wrong side of the tracks of scientific progress, used as ‘mud slung ... by neo-Darwinians at other schools of thought’². But there was a good deal more to Lamarck than Lamarckism. And, he himself mostly had different isms in mind, that put a slightly different complexion on things.

Like so many, I grew up with the Darwin–Lamarck binary system, which had something of the feeling of the combination of the omniscient Sherlock Holmes and poor perplexed Inspector Lestrade, forever to flounder helplessly in his wake. There has always got to be a fall guy, and in this story our chevalier drew the short straw. My own absorption, at a tender age, of this narrative remains vivid, and indeed specific: a handsome hardback book, *Man, Time and Fossils*, by Ruth Moore, a Christmas present from my sister in 1968³. I still have it and, leafing through

¹ So long as it is kept well away from the qualifier ‘social’, of course.

² Quoted by Olby (1966, p. 5).

³ Little did she know what she was starting.



its pages, it is clear that it is a book of the old school in the best sense, artfully telling the story of evolution through the colourful⁴ lives of the main protagonists. Darwin, Mendel, Cope, Haldane, Fisher and others – and Lamarck. A page-turner with style, all the better to win hearts and minds: a doddle, that, when a fossil-happy teenager stumbles into its range.

Lamarck's chapter is sympathetically written, mind, and the background colour does not need to be forced in the slightest. The many-barrelled name might suggest a comfortable aristocrat, like so many eighteenth-century savants but, the youngest of 11 children of a noble but impoverished rural family, from the beginning he had to fend for himself. Packed off to a seminary as the most reluctant of trainee priests, he took off on a 'wretched' horse to seek glory in the army, and found it on his first day. As a teenage recruit caught in an enemy offensive, all of the officers killed around him, he took impromptu charge and held the position until help arrived: genuine heroics which led to instant promotion. The glow didn't last: the boredom of inaction followed, and an injury (from horseplay, not battle) invalidated him out of a military career and into a Parisian garret, his dull life as a bank clerk enlivened by a growing interest in plants. The friendship of fellow herborist Jean-Jacques Rousseau, then the support of the influential Comte de Buffon to a position at the *Jardin du Roi* – an institution that Lamarck later saved by the quick-minded stratagem of renaming it the *Jardin des Plantes*, as the French Revolution put the *ancien régime* and all its creatures to the sword. A new position there, away from plants to become responsible for the Jardin's invertebrate collections, and growing ideas of how the life on Earth might be connected, his final reward a pauper's grave.

It is breezily written stuff, setting the scene for Lamarck's growing ideas, and – the wider narrative firmly in mind – leading into the story of Lamarck's now-notorious mechanism of evolution, of how characters acquired during life might be passed on to the offspring, with the classic examples Lamarck imagined being rolled out, including that giraffe stretching for those leaves ever higher up the tree. A set-up, of course, to allow this ingenious idea to be subsequently debunked and left in the wastebasket of history, with much of Lamarck's reputation wrapped around it.

Lamarck's influence, though, went beyond the evolutionary biology circles and could turn up in the most unlikely places. He was cited as an influence by that visionary Russian scientist Vladimir Vernadsky, founder of biogeochemistry and someone who sensed the heart of the Gaia concept, half a century before James Lovelock did⁵. The key work here is *Hydrogéologie*, a book which Lamarck published in 1802, at his own expense, and in little more than a thousand copies. The title is now not terribly attractive, suggesting a technical treatise for engineers dealing with municipal water supplies. Then, because of its home-made publishing style, it almost sank without trace. Nevertheless, it is a most intriguing introduction to Lamarck speaking in his own voice, and readily available online these days⁶. To see behind the ism, what better way than settle down, cup of tea to hand, and walk on the Earth that Lamarck saw.

It was quite a journey. The book has nothing to do with practical water supply, but instead aims at a 'good theory of the Earth', in the operation of which Lamarck saw not only water as crucial, but also life and chemistry. Lamarck was at home in the science of life (he was among the first to

⁴ Or they all seemed to have colourful lives. Artfully written, for sure.

⁵ See 'Birth of the Biosphere', *Newsletter* 84.

⁶ There's a translation into English, too, by Albert Carozzi, together with a nice essay in *Isis*.



use the term 'biology'), though his chemical musings now seem surreal, as for him the elements were earth, air, fire and water – and he had no truck with the newfangled chemistry that brought in such concepts as 'oxygen'.

The stall is set out at the beginning. Lamarck wished to propose and seek to resolve four questions:

- what are the consequences of the movement of water at the Earth's surface?
- why are oceans separated from the land?
- have the oceans always been in the same place?
- what is the influence, and what are the products, of life on the Earth's crust?

Large questions! And Lamarck underlined the point by emphasizing the difference between 'little facts', assembled by minute description of details of the natural world – that offered, he said, enthusiasts of this kind of study an inexhaustible field – and the 'big facts' that one needs to tackle to truly understand nature. Lamarck's tone about the 'little facts' and those who pursued them is couched in what seems to be faint deprecation – or maybe it is simply sly irony. His own assembly of solid detail of the natural world was, well, inexhaustible, and extraordinarily widespread across both animal and plant kingdoms, reflecting his re-fashioning from botanist to zoologist in mid-career.

Wikipedia has a page of 'Taxa named by Jean-Baptiste Lamarck', neatly alphabetically arranged, with 215 entries – employing the Linnean classification that his mentor Buffon so disapproved of – ranging from *Acer spilatum*, the dwarf maple of North America, to *Ziziphus mauritiana*, the Indian jujube. Along the way, quite a few old friends hove into view: the water fern *Azolla*, with its prodigious growth both today and in the Eocene⁷; the 'walking stick' heteromorph ammonite *Baculites*; the 'cake urchin' *Clypeaster*; the bivalve *Modiolus*; that outsized, pyramid-building foraminifer *Nummulites*; the coral *Porites astreoides*; the hydrozoan *Velella*, and more. Wikipedia's tally is not complete, mind. It lacks the bizarre rudist bivalves that Lamarck's sharp eye took in, with the genera *Sphaerulites* and *Radiolites* – which with the agonizing proper to biological classification he first distinguished, and then 15 years later combined into one, thinking on mature reflection that they were so similar they represented the same taxon (more than a century and a half later Pons *et al.* (2012) separated them once more, in yet another turn of the taxonomic merry-go-round). Among these little facts, Lamarck had a good sprinkling of medium-sized ones. The rudists are an invention of his (he may have puzzled as to what kind of organism they were, but that does not stop a good taxonomist). The Cariditidae, Trigoniidae and Cardiodea – now families and a superfamily of bivalves, respectively – are his, and yet others too. At yet higher levels, he famously recognized annelids as separate from other worms, and arachnids from insects, and struggled mightily to understand their connections⁸.

So, Lamarck's credentials at the coalface of biology, both living and fossil, are impeccable. When he gets to the really big facts, he might then be forgiven for letting his hair down a little. In this case, his hair reaches out to the horizon, if not beyond (and is dyed in luminous colours) as he

⁷ See 'She married a dinosaur', *Newsletter* 100.

⁸ As eloquently described by Stephen Jay Gould's (2000) essay 'A tree grows in Paris: Lamarck's division of worms and revision of nature'.



muses on the grand patterns of his planet. The scope of *Hydrogéologie* is a little reminiscent of Buffon's *Les Époques de la Nature*, as are some of the rhetorical flourishes, though it does not quite have Buffon's celebrated style, or the ferociously organized logical structure of that work⁹. Nevertheless, in Lamarck's exercise in thinking high, wide and handsome, there are some fascinating insights into how one can reach towards real planetary insights by putting together the most fragmentary of evidence, and build on – or refashion – the work of one's predecessors.

Lamarck stretched geological time well beyond Buffon's published (and still controversial, in its day) timescale of 75 000 years. How far? Well, to Nature, he opined, time is nothing and never a difficulty. For him, it was 'a means without end, with which it could make the greatest things, as well as the smallest'. This is more than a little reminiscent of James Hutton's 'without the vestiges of a beginning, or prospect of an end' vision (though he was almost certainly unaware of Hutton's work then). More, he took time as an endless resource, and the Earth as a planet subject to interminable but humdrum processes – wind, rain, currents, tides, the lives and deaths of innumerable generations of organisms, and so on. Indeed, in a book generally devoid of rancour, he gently chided the notion of catastrophes, current among some of his colleagues (perhaps with the doyen of that concept, Baron Cuvier, in mind¹⁰). Of course, the Earth was subject to powerful events such as storms and landslides, but the idea that these would have worldwide reach, he said, was unfounded and unnecessary. He was thus emphatically a uniformitarian, a generation before Charles Lyell became the leading spokesman for that particular ism, which was to carry all before it for a century or more. What can Nature do with time and normal process, then, in modifying the grand architecture of the Earth?

Indeed, why did the Earth have a grand architecture at all, with such endless time to hand? Lamarck duly noted the action of the rain and rivers in wearing away the landscape and carrying its detritus down to the sea. So, given his near-infinite timescale, why has not the land simply been washed away into the sea? A standard question, perhaps – but only once that kind of timescale is taken on board. He didn't go here for the motor that Hutton reached for, the inner heat of the Earth, but instead invoked another source of energy, that of the tides. This may have been partly Buffon's influence again, who had used tidal heating to explain the incandescence of the sun¹¹, and it certainly fitted his own predilection for a slow and steady Earth process. Lamarck, though, took the force that drives strong currents along the coast, and extended it right through to the deep ocean, being unaware (the deep ocean being thoroughly mysterious in those days) that the tides are effectively a shallow-water phenomenon. Lamarck's imagined whole-ocean tides steadily eroded sediment from one side of a continent and piled it up on the other: he saw the continents thus continually inching their way across the globe, rather like the banks of a gigantic meandering river, to utterly change their positions over his abysses of time. There were no truly primitive rocks left on Earth, he said: everything has been reworked as the Earth's crust has gradually reshaped itself time and again.

It is an ingenious idea for a form of continental drift by other means, though not without its difficulties – as he clearly saw. How does one account for the vertical motion that must have

⁹ See 'Encore des Buffonades, mon cher comte?', *Newsletter* 79. Or even (it's bewildering what a PAN column can sometimes lead to): Buffon, Comte De. (2018).

¹⁰ Cuvier, notoriously, took his revenge in the most poisonous of eulogies following Lamarck's death, as related in Gould (2000)

¹¹ Not as daft as it might initially sound: it is tidal forces, after all, that power the continually erupting volcanoes of Jupiter's moon Io.



occurred too? Such motion must have happened too, given the fossil evidence which he attested. First, though: some more terminological housekeeping. He made clear here that 'fossils' should be applied only to the preserved remains of long-dead animals and plants, rather than to any old objects dug up out of the ground, and therefore seems to have been the first person to make that fundamental, and enduring, distinction, of perhaps the key word of our profession¹². He made the distinction, too, between 'pelagic' fossils of the deep sea – ammonites, belemnites and such – and littoral ones such as corals. These were usually found separated in different strata, he said, and so were of very different times – though where they sometimes occurred together they may have been mixed by the action of a submarine landslide carrying shallow-water shells into the depths, a nice (and still effective) deduction.

The presence of marine, and especially his 'pelagic', fossils high up on dry land spoke to these vertical movements, that he said were continual, and that he struggled to explain, invoking first the building up of land by the accumulation of organic matter, and later in the book latching on to the idea that, as the continents slowly shifted with respect to the Earth's centre of gravity, they would be slowly carried vertically up and down.

Water, to Lamarck, did more than build landscape. It permeated it too, to turn loose masses of shells and coral skeletons into solid rock, in which fossils could at first be recognized, then, with further alteration, could be completely obliterated. With an understanding of chemistry that was more alchemical than chemical, this was difficult terrain for him (and for us, now, on reading his words), but his sense of underground changes attuned him to the way that rocks lost porosity in undergoing such changes – or sometimes developed it, when hollow fossil shells were discovered underground, in an intuition of processes that we would later call diagenesis.

It is with life, though, that Lamarck reached out the farthest, into a realm somewhere between acute insight and the perils of fragmentary knowledge. The continuous presence of life over almost infinite time, he averred, must – in living, dying, decaying, regenerating – have shaped the structure of the Earth's crust. Indeed, he posited that *all* rocks and minerals of the Earth's crust have been shaped by life, and here his examples ranged from mountain-sized fossil coral reefs and other limestones, through to mudrocks (from the decay of vegetable matter, he said) right through to granites (the end product of such transformation, he said, that formed on the deep ocean floor). From our modern vantage point it's a vast over-reach, with Lamarck subscribing to another discredited ism, this time a form of neptunism, albeit one largely independent of the neptunist–plutonist wars then in full cry. But, to Vernadsky it was a genuine glimpse of the wider truth, that life does shape the Earth's surface, packing a much harder punch than its minute mass relative to the planet might suggest.

This kind of vision of the Earth lies behind the ideas for which Lamarck is best known, or most notorious, in his discussions of biological evolution. But even here the main point, and Lamarck's main concern, is often missed: this was his insistence that species had changed from one to another over the vastness of time that he envisaged – of normal time and process, without need for global catastrophes – and left evidence in the form of the fossils with which he became so familiar and which provided key evidence (Burkhardt 1972). This is the kind of realization that Darwin himself struggled with, and called 'like confessing to a murder' – and which Cuvier and

¹² Servais *et al.* (2011) seem to confirm this.



others (Lyell too) flatly denied. Lamarck himself called it 'transformism' – which seems a more apt way to summarize his central insight.

There is a very large literature on Lamarck, which includes a substantial biography written by one Alpheus Spring Packard. It details his life, his ideas (with a long section on *Hydrogéologie*), a long list of tributes from eminent geologists of the day, and the general sentiment that Lamarck's star was on the rise and Darwin's was on the wane. Packard's book appeared in 1901, and hit the presses just too late to incorporate news of the rediscovery, in 1900, of Gregor Mendel's laws of genetics, forgotten since 1866. The rediscovery, of course, was to provide the raw material on which Darwin's natural selection could act, close the door on the inheritance of acquired characteristics – and make Lamarck's name, thereafter, a synonym for backing the wrong horse.

That is all true, of course. Nevertheless ... it is nice to keep in mind the scrawny horse on which the poor chevalier set out into his adventurous life, and how far it took him. The man who invented fossils, and breathed life into a planetary machine, deserves a kinder memory.

Jan Zalasiewicz

University of Leicester, UK

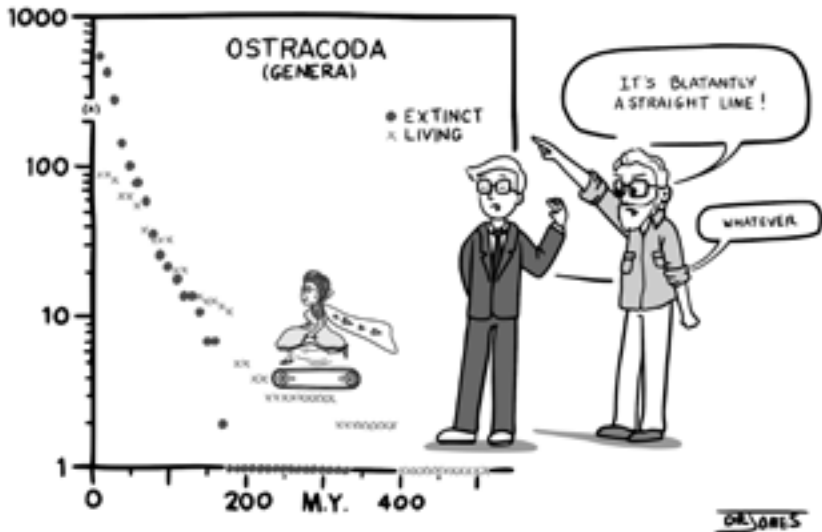
REFERENCES

- BUFFON, COMTE DE. 2018. *The Epochs of Nature*. (translated and compiled by ZALASIEWICZ, J., MILON, A-S. and ZALASIEWICZ, M., with an Introduction by ZALASIEWICZ, J., SÖRLIN, S., ROBIN, L. and GRINEVALD, J.). Chicago University Press, 244 pp.
- BURKHARDT, R. W. 1972. The inspiration of Lamarck's belief in evolution. *Journal of the History of Biology* 5, 413–438.
- CAROZZI, A. V. 1964. Lamarck's Theory of the Earth: *Hydrogéologie*. *Isis* 55, 393–307.
- GOULD, S. J. 2000. *The Lying Stones of Marrakech*. Jonathan Cape, 384 pp.
- OLBY, R. C. (Ed.) 1966. *Late Eighteenth Century European Scientists. Vol. 2*. Elsevier, 208 pp.
- PACKARD, A. S. 1901. *Lamarck the founder of evolution: his life and work*. Longmans, 451 pp.
- PONS, J. M., VIVENS, E., CHIKI-AOUIEUR, F. and ABDALLAH, H. 2012. Taxonomical and biostratigraphical significance of the North American radiolitic rudist bivalve *Praeradiolites biskraensis* (Coquand, 1880). *Palaeontology* 55, 677–695.
- SERVAIS, T., ANTOINE, P-O., DANELIAN, T., LEFEBVRE, B. and MEYER-BERTHAUD, B. 2012. Palaeontology in France: 200 years in the footsteps of Cuvier and Lamarck. *Palaeontologica Electronica*, 5 (1), pp.2E.



Palaeontology's greatest ever graphs

The mathematical background of Van Valen's first evolutionary law



To me, the most iconic graphs in palaeontology are the survivorship curves from Leigh Van Valen's 1973 article "A new Evolutionary Law" (Van Valen 1973). This publication is iconic in that it introduced the Red Queen Hypothesis. The hypothesis has become so successful in both science and pop culture as a conceptualization of hypercompetition, that it can be called palaeontology's most successful meme (Derfus *et al.* 2008; Wonho and Youngsun 2013).

Survivorship curves played a key role in establishing the Red Queen Hypothesis, as they serve as the basis for the "Evolutionary Law" (EL), the key empirical result for the first of many versions of the Red Queen Hypothesis.

Personally, I find the EL a lot more interesting than the Red Queen Hypothesis, as it provides some excellent food for thought about the interdependence between the mathematical properties and assumptions used in modelling and the evolutionary modes observable in data.

Many aspects of the EL have been discussed extensively in the literature, such as the mode of origination and extinction, taxonomic effects, and the way taxa are grouped for the analysis. Here, I will use a different approach and focus on the purely mathematical aspects of the EL by (1) discussing why it has such strong implications, (2) looking at some systematic biases that interfere with its corroboration or rejection, and (3) briefly touching upon the possibility that it results from noise.



Survivorship curves, the Evolutionary Law, and its implications

The graphs used by Van Valen are survivorship curves, which plot the taxon age on the abscissa against the number of taxa older than this age on the ordinate. It should be noted that this plot pools taxa from different time periods and only examines their life span. This type of plot is frequently used in medical statistics and engineering, however, every discipline uses different conventions on y-axis direction, axis labels, and names, making the translation of methods between the fields difficult.

The mathematical foundation for all further considerations is that the negative slope of the survivorship curve at a given taxon age is the extinction risk of taxa of that age cohort within the examined taxonomic group: the steeper the slope, the higher the extinction risk. Mathematically, the value of the survivorship curve is an estimate of the accumulated extinction risk, which is easier to estimate than the scale-dependent extinction risk.

The EL states that the extinction risks of taxonomic groups are independent of age and thus constant, implying that their survivorship curve forms a straight line. There is only one probability distribution with constant extinction risk and that is the exponential distribution. Together with its discrete equivalent, the geometric distribution, it is the only distribution with a property called “memorylessness”. Memorylessness states that the future survival of a taxon is independent of the fact that the taxon reached a certain age. So knowing a taxon’s age does not add any information to the assessment of its future extinction risk. To me, not the constant extinction risk, but the memorylessness is the curious part of the EL: it implies that two arbitrary extant taxa from the same taxonomic group have identical probabilities to go extinct within the next million years – and the probability is completely independent of the ages of either of them.

How to identify the First Evolutionary Law

Deciding whether a taxonomic group has constant extinction risk is a mathematically challenging task. One difficulty arises from the fact that the number of samples is unevenly distributed on the time axis: there are only a few long-lived taxa that provide information on the extinction risk of the oldest taxa, whereas many taxa become extinct early on and thus provide information on the extinction risk of the younger taxa. As a result, only a few very old taxa control the shape of the bottom right part of the survivorship curve and the ages of these few long-lived taxa have a strong influence on the overall shape of the curve. Because these old taxa are rare, the lower part of the survivorship curve is strongly influenced by chance and tends to display “wiggly tails”. This effect can, for example, explain the curves from dinoflagellate cysts in Van Valen’s publication. Even when extinction risk is constant, this can lead to the impression that extinction risk increases or decreases for the oldest taxa. Interestingly, this effect will not vanish as sample size increases. The wiggly tail will only migrate to the bottom right of the graph, as any larger sample will again have oldest taxa that are prone to the same effect.

Additionally, there is an inherent asymmetry to the estimate, as the survivorship curve is biased downwards. This is based on the theory of large deviations, which shows that, while the curve will converge towards the exact value of accumulated extinction risk at any given taxon age as sample size increases, it will do so asymmetrically, implying that deviations downwards are larger than deviations upwards (Hohmann 2019).



The survivorship curve becomes a less precise and accurate estimate for the accumulated extinction risk for the oldest taxa (independent of their absolute age), which makes both false positives and false negatives for the first evolutionary law more likely.

Can the First Evolutionary Law be a result of noise?

Mathematical statements can provide null hypotheses on patterns observable in empirical data. A prime example of this is the central limit theorem, which states that a variable that is the result of many small and independent contributions tends to be normally distributed. The theorem underlies the extensive use of the normal distribution in statistics. An extension of the theorem to processes through time is Donskers theorem, stating that the interaction of many random walks will result in a Wiener process, the mathematical description of a Brownian motion.

It is not straightforward to decide whether Van Valen's EL can arise from a limit theorem in a similar fashion and whether it should thus serve as a null hypothesis for the distribution of the life spans of taxa. There are limit theorems where the timing of events converges to a Poisson point process with a constant event rate, implying that the waiting time between events is exponentially distributed, just as the waiting time between origination and extinction (Kallenberg 2017, chapters 4 and 12.1). One of the statements that lead to these limits is, for example, observing the distance between infinitely many randomly moving particles (Klenke 2013, example 24.25), which has no intuitive equivalent in an evolutionary context.

The issue here seems to be that a variable, e.g. taxon abundance, can be changed in small increments by different independent processes, which justifies the application of a limit theorem. However, it is unclear how the binary outcome of survival and extinction can be expressed as the result of the independent small contributions of other processes without implicitly assuming an underlying model of evolutionary success. This makes it difficult to argue for the EL as a mathematically supported null hypothesis against which deviations can be examined.

Niklas Hohmann

Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

REFERENCES

- DERFUS, P. J., MAGGITI, P. G., GRIMM, C. M. and SMITH, K. G. 2008. The Red Queen effect: Competitive actions and firm performance. *Academy of Management Journal*, **51**, 61–80.
- HOHMANN, N. 2008. Large Deviations of the Estimated Cumulative Hazard Rate. *arXiv preprint. arXiv:1907.02033*.
- KALLENBERG, O. 2017. *Random measures, theory and applications*. Springer, 694 pp.
- KLENKE, A. 2013. *Probability theory: A comprehensive course*. Springer, 650 pp.
- VAN VALEN, L. 1973. A new evolutionary law. *Evolutionary Theory*, **1**, 1–30.
- WONHO, J. and YOUNGSUN, K. 2013. Envisaging the Sociocultural Dynamics of K-pop: Time/Space Hybridity, Red Queen. *Korea Journal*, **53**, 83–106.



An Introduction to Bayesian Phylogenetics: Fancy matrices

[NB: This tutorial, data and other useful files are available at
<https://github.com/wrightapril/PA_newsletter>.]

Oftentimes, systematicists who are starting to try Bayesian methods wonder if they can maintain their character ordering and custom step matrices. The answer to that question is yes! In this issue, we will briefly introduce a couple of common modifications to the evolutionary model that palaeontologists are often eager to use.

In this tutorial, we continue using the dataset of Cinctan morphological characters from the previous tutorials in this series. The data come from Zamora *et al.* 2013. To get started, we will read in the data. In RevBayes, reading in data is not done by the type of data (molecular, morphological), but by whether the data are discrete or not. Because of this, we will use the function `readDiscreteCharacterData`. If we had continuous data (such as measurements in length or weight, or landmarks), we would use the function `readContinuousCharacterData`. If you have any difficulty in this step, please refer back to the initial RevBayes instructions in the first tutorial (“Getting Started with RevBayes”).

```
morpho <- readDiscreteCharacterData("data/Cinctans.nex")
```

Ordering

One of the most common special cases palaeontologists want to include is ordered characters. When we order characters, we are specifying that a character must go through one state to get to another. For example, if your data set contains a character or spines along an organism’s back, and the states are “spines are bumps”, “spines”, and “elongate spines”, it might be reasonable to think we need to have “spines” before “elongate spines”.

Specifying an ordered matrix is both easy and flexible in RevBayes. First, we create two parameters. `lambda` is often used to represent gains, and `mu` for losses.

```
lambda ~ dnExponential( 1 )  
mu ~ dnExponential( 1 )  
lambda.setValue( 2 )  
mu.setValue( 1 )
```

In the above block we have specified that we will draw the rates of gains and losses from an exponential distribution, and that to start these values will be 2 and 1 respectively. If we do not place moves on these parameters, this will be the traditional way most people think of ordering – the researcher tells the software what the ordering is, and the software does it. In this case, we can then go on to turn this into a Q-matrix like so:

```
Q_ordered <- fnOrderedRateMatrix(5, lambda, mu)
```



In this case, 5 is the maximum number of character states in our character. The Q-Matrix will look like so:

```
[ [ -2.0000, 2.0000, 0.0000, 0.0000, 0.0000 ] ,
  [ 1.0000, -3.0000, 2.0000, 0.0000, 0.0000 ] ,
  [ 0.0000, 1.0000, -3.0000, 2.0000, 0.0000 ] ,
  [ 0.0000, 0.0000, 1.0000, -3.0000, 2.0000 ] ,
  [ 0.0000, 0.0000, 0.0000, 1.0000, -1.0000 ] ]
```

Now, what did you say about moves, there?

In the above example, we fix lambda and mu. We do not have to do that – we can put a move on those parameters and let the data tell us how many more gains than losses we have. First, we can set up our helper values. For a refresher on this, see the tutorial “Models”:

```
taxa <- morpho.names()
num_taxa <- morpho.size()
num_branches <- 2 * num_taxa - 2
moves = VectorMoves()
monitors = VectorMonitors()
```

Once we have done this, we can include a move on our lambda and mu values. This will mean that rather than being fixed, the analysis will sample values for these parameters.

```
moves.append(mvScale(lambda, weight=2))
moves.append(mvScale(mu, weight=2))
```

In the next section, we will see how to use these custom Q-matrices in an analysis.

Not all my characters are ordered!

This is a common issue for researchers. Some characters may be ordered, while others are not. This means multiple models of evolution in your characters. We can handle this. The way we do this is, we divide up the characters in our matrix, and apply our custom Q-matrices to each. For simplicity, we will assume we have one set of characters evolving using the ordered rate matrix generated in section “Ordering”, and one under the regular Mk model.

First, we will create some helper values. These are values that we use in most analyses, like how many taxa there are, how many branches and moves.

```
taxa <- morpho.names()
num_taxa <- morpho.size()
num_branches <- 2 * num_taxa - 2
moves = VectorMoves()
monitors = VectorMonitors()
```

Next, we will generate our gamma-distributed rate heterogeneity, which is used for both models. We will also make our tree distribution and specify moves on the topology (see tutorial “Models” for a refresher):



```

alpha_morpho ~ dnUniform( 0, 1E6 )
rates_morpho := fnDiscretizeGamma( alpha_morpho, alpha_
morpho, 4 )
#Moves on the parameters of the Gamma distribution.
moves.append(mvScale(alpha_morpho, lambda=1, weight=2.0))
br_len_lambda ~ dnExp(0.2)
moves.append(mvScale(br_len_lambda, weight=2))
phylogeny ~ dnUniformTopologyBranchLength(taxa, branchLeng
thDistribution=dnExponential(br_len_lambda))
moves.append(mvNNI(phylogeny, weight=num_branches/2.0))
moves.append(mvSPR(phylogeny, weight=num_branches/10.0))
moves.append(mvBranchLengthScale(phylogeny, weight=num_
branches))
tree_length := phylogeny.treeLength()

```

The trickiest part of this whole process is creating two data matrices (one ordered, one not) from our single matrix and specifying the model. We will create a vector of datasets that we can then work with.

First, we make a copy of the raw dataset:

```
morpho_ordered[1] <- morpho
```

This is so that we don't overwrite the data in RevBayes' memory. From this dataset, we will exclude all the characters that are not ordered.

```

morpho_ordered[1].excludeCharacter(v(2, 5, 6, 8, 9, 10,
11, 17, 19, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 37,
46, 47, 49, 51, 55, 58, 59))
morpho_ordered[1]
Standard character matrix with 27 taxa and 60 characters
=====
== Origination: Cinctans.nex Number of taxa: 27 Number
of included taxa: 27 Number of characters: 60 Number of
included characters: 33 Datatype: Standard

```

This indicates that our exclusion of non-ordered characters worked: we only have 33 characters in this matrix. Now, we will establish a matrix of unordered characters:

```

morpho_ordered[2] <- morpho
morpho_ordered[2].excludeCharacter(v(1, 3, 4, 7, 12, 13,
14, 15, 16, 18, 20, 21, 22, 23, 25, 35, 36, 38, 39, 40,
41, 42, 43, 44, 45, 48, 50, 52, 53, 54, 56, 57, 60))
morpho_ordered[2]

```

We can once again verify that this worked:

Standard character matrix with 27 taxa and 60 characters

```

Origination: Cinctans.nex Number of taxa: 27 Number of
included taxa: 27 Number of characters: 60 Number of
included characters: 27 Datatype: Standard

```

This partition has 27 characters. 27 + 33 = 60, which is the total number of characters in the matrix. We did it, folks.



Now, we clamp the data and model together for each partition for use in estimation.

```
m_morph[1] ~ dnPhyloCTMC(tree=phylogeny, siteRates=rates_
morpho, Q_ordered, type="Standard")
m_morph[1].clamp(morpho_ordered[1])
Q = fnJC(5)
m_morph[2] ~ dnPhyloCTMC(tree=phylogeny, siteRates=rates_
morpho, Q, type="Standard")
m_morph[2].clamp(morpho_ordered[2])
```

You can see we specified a vector of models. Unlike most other analyses, we do not have one model, we have two: one for the ordered and one for the unordered characters. We have now completed the model set up, and can run the analysis as specified under section “Completing the MCMC” in the “Models” tutorial.

Help Wanted

Do you have a burning phylogeny question? We would love to feature it in the next Newsletter. Whether it is about phylogeny in general, Bayesian methods, data, how to get started programming for phylogenetics, whatever! Send it to <newsletter@palass.org> by 30th September and we will get a panel of experts to answer it for the Newsletter.

April Wright

Southeastern Louisiana University, USA



Spotlight on Diversity

Juggling palaeontology and caring responsibilities...

Brendan Anderson studies marine gastropod evolution, integrating information from phylogenetics, stable isotope sclerochronology and palaeoecology. He is from New York and is currently a postdoctoral researcher at Baylor University in Waco, Texas. [Brendan apologises to the reader for the rambling style of the responses.]

1. What role does care play in how you conduct your work as a palaeontologist, e.g. in the ability to attend conferences, join work calls across time zones, plan your schedule?

I am a parent to a 4th grader (nine years old), who was born when I began my MS programme. My spouse has tended to have more work-related fixed-schedule commitments than I (mine are principally courses I have taught or been taking) so I have always planned lab work or writing around the need to drop off or pick up our child on most days. I tend to be a bit nocturnal as a result, and conducted much of my PhD lab work at night after my spouse was home. Childcare was always an expense that was mandatory. I could and did bring my daughter to classes I taught and on some field-trips but this was not always feasible or appropriate. The other time I reserve aside from pickup and drop-off has been bedtime. The 2-3 hours around when they go to bed is important family time and takes priority most of the time.

Childcare responsibilities have not impinged on my fieldwork or conference attendance as we know about those dates far in advance and we have traditionally been able to rely on grandparents/my spouse's planned time off for extra support in these 1-2 week stretches. The expense associated with conferences has been more of a determining factor, limiting my attendance to one each year, mostly paid for through department or society travel grants.

I have tended to do much of my writing at home rather than in an office setting, which allows me to be present for my kid but a lot of the time when I really need to push through writing I would go in to an office, and I tend to operate with some family time reserved on weekends and then long stretches of work time on the weekend, frequently out of the house. My previous postdoc was out of state from where my daughter and wife were living due to her job's location (but near to grandparents), and this pattern was reversed, with frequent long weekends and eight-hour drives each way and some weeks spent with them as solid non-work time alternating with more work-focused work-weeks. The exceptions were the summers when our child stayed with me but attended summer camp (which was insanely cheaper where I did my postdoc). Excepting meetings with students, I have generally not needed to close doors to my child when having work



Photo courtesy of Brendan Anderson.



meetings and as far as I can tell my collaborators have been accepting of my child's occasional mid-meeting requests.

2. How has the Coronavirus pandemic affected your ability to work?

When the pandemic started my child was in NY, and her school closed and went all online. Everyone in the NY household was then working from home and it made more sense for our daughter to stay with me. Soon after we were told to switch our teaching to all online, which was a large hurdle for what was already a new prep. Helping my kid navigate her variety of online work was not easy as the platforms were different for each course and she was in 3rd grade. (Apparently what we did for her language programme was not what we were supposed to be doing but we did not know that until we got the report card). Converting a new prep to all online while being a full-time sole caregiver was difficult and I tried to accommodate the students' various circumstances as best I could, but the majority did not continue watching the lectures I was making. Although the university stated that professors continuing could opt out of having their teaching evaluations considered, I continue to be afraid that since I do not have evaluations I would share from the first course I taught out of PhD this will reflect negatively on job applications. Truthfully there is so much research on how biased student evaluations of teaching are and how little they correspond to learning that I do not think they should be asked for in-job applications at all.

Our child has continued to be schooled from home and as I moved to a new postdoc my family was reunited, but with their school continuing to be at home. The system was more rational here (all one platform) but still requires a lot of parental attention. It has been very hard to find a continuous block of time to work.

I am very afraid of how the pandemic will impact my work output (even the papers I have managed to submit are taking enormous amounts of time in the review process, which I understand in the time of COVID), and whether this will matter to search committees when competing for the few jobs that are posted in field. Everything is taking longer and a day of home school supervision does not leave me with the energy to work late into the evening. It feels like a full day of school assistance does not even qualify as "quality time" with my child either, and there is added pressure to increase the time spent on fun activities because I and my spouse have been essentially her only in-person human contact in a year. I really do not know what to do about this and it often feels like there is nothing that I can do. It is difficult to disentangle COVID-specific issues with employment from the general anxiety of the academic job market but it definitely has not helped. As more data are coming out showing that COVID is having disproportionate impacts on researchers, I have not seen a clear plan for how universities are going to address this in considering job applicants, and I do not know how to properly accommodate the impact of increased care responsibilities with the fear of disclosure of such responsibilities. I know I am privileged in this regard as a cis-man and those who do not know me well may assume I do not have significant care responsibilities even if they are aware I have a child.

As a bright spot, it has been easier to attend conferences, since many are all virtual and cheap or free, and I have been able to present at or attend several conferences I would not have otherwise been able to this past year.



3. What recommendations do you have for colleagues and institutions to make your work more family-friendly, e.g. what can PIs, HoDs, conference organizers do to make it possible for palaeontologists with care responsibilities to have equal opportunities at work?

Having mandatory attendance or strongly encouraged events (graduate colloquia in particular) at school pickup times is not a family-friendly policy. Limits on work graduate students can do outside of the department is also not family friendly – childcare is expensive. Let committees and individual students decide what the right balance of paid work and research work is or alternatively pay wages that students can survive on. Allow TAs to have family or emergency leave. When my seven-week-old infant had surgery to remove part of her skull I flew back and forth six hours to teach classes. Surely there could be some system in place for someone to find a substitute for an intro class. I understand professors are busy, but this seemed and still seems insane, and I could not risk anything impacting my child's insurance.

Having non-restroom lactation rooms reasonably distributed on a campus or conference grounds would also be a great policy. My wife returned to work and was working at a campus facility, but ended up having to pump in our car because there were not comfortable locations she could go without getting on a bus and losing substantial work time; she ultimately discontinued first pumping and then the job.

Allowing pre-recorded talks to continue, perhaps with virtual Q & A as an option even as conferences return to being in person would be excellent. Permitting platform access to recordings of talks by live speakers who opt in to being recorded would also be great.

My advisors have thankfully always been very accommodating about schedule, bringing my child to classes and necessary family-related travel, and been respectful of family time (and frequently my own choice to work odd/weekend hours – I promise I do not expect prompt replies to these emails). My PhD advisor deserves special mention for helping arrange my child's summer camp attendance as part of my summer support which allowed me to continue lab work during the summers. My first postdoc was not strongly based on lab work and my advisor was very explicit in the hiring process and after I began work that he was anticipating that I would be spending time out of state with my family and that this was entirely at my discretion. My current postdoc advisor has also been very flexible with respect to my ability to pursue research independently, but now my family is thankfully all in one place. When incoming graduate students have toured programmes I have participated in I have always chosen to share the positive and negative aspects of the school with respect to accommodating parenting so that they do not feel the need to disclose their own care responsibilities or plans, as several schools do have programmes/networks of support but these are not often well advertised.

4. Do you have any tips to share with fellow or beginner palaeontologists in similar situations or palaeontologists who are worrying whether they will be able to reconcile work and care responsibilities?

Everyone's family situation is different and you should trust yourself in determining what is right for you and your family. If you are considering joining a particular lab or taking a position and the situation seems toxic, know that there are likely better options. I do not expect the solutions that worked for me will work for everyone, but I expect there is a solution for you. If you are teaching or watching a lecture, there is generally no reason why a kid can't be in a lecture hall or non-lab classroom and asking the instructor (if it is not you) will usually result in a positive response. Many schools have networks, programmes or grants that are available to parents (even



if just a listserv) and it is worth both searching for and asking about these programmes. Some grants permit care expenses as valid budget items (e.g. the AWG Chrysalis scholarship), and if it is not specified consider enquiring with the contact person for the grant.

To the questioning palaeontologist I would say: modern palaeontology has so many diverse modalities of research that I am certain that your perspective is valuable and that there is a way for you to do great scientific work and fulfil your care responsibilities as well. Most of my work is behind a computer (frequently next to my kid on their iPad), lab work is frequently something that can be scheduled to accommodate care responsibilities, and no one suddenly and unexpectedly ends up in necessary field work. It seems like the field is paying more attention to these issues (as evidenced by the existence of this reporting), so hopefully things will only get better.

Verónica Díez Díez is a vertebrate palaeontologist who comes from Spain. She did a PhD on sauropod dinosaurs, and is currently hired by the Humboldt Universität zu Berlin (Germany) and working at the Museum für Naturkunde Berlin, developing 3D musculoskeletal reconstructions and biomechanical analyses of sauropods, as well as assessing different surface digitization techniques and workflows, looking for efficient digitization protocols for natural history collections.



Photo courtesy of Verónica Díez Díez.

1. What role does care play in how you conduct your work as a palaeontologist, e.g. in the ability to attend conferences, join work calls across time zones, plan your schedule?

I try to plan all the work-related activities for the time-span in which my kids attend the kindergarten and school. Working with my kids is almost an impossible activity. For conferences and trips, I usually schedule them in school holidays, this way I can leave them with their family in Spain.

2. How has the Coronavirus pandemic affected your ability to work?

Living alone with a 2 yo and a 9 yo has made working during the pandemic a stressful activity and has indeed reduced my work-pace. I should help my older son with homeschooling (in a language which is not my mother tongue and I am still learning in my “free time”!), while I play with the younger one. And as we only have one computer, we have needed to prioritize my son’s work, calls and activities before mine. I try to be positive, but most days I end up thinking that I have not done anything productive. I do not know how this situation would affect my future professional options.

3. What recommendations do you have for colleagues and institutions to make your work more family-friendly, e.g. what can PIs, HoDs, conference organizers do to make it possible for palaeontologists with care responsibilities to have equal opportunities at work?

For me, flexibility and a home office have been essential, especially as I am a foreigner and the father of my kids still lives in Spain. As this pandemic has shown, home office could imply an improvement at the work-pace and efficiency (when your kids are at school!!), and help by



creating a family-friendly environment. Besides, childcare options and facilities at institutions and meetings, with real people taking care of the kids (some places only offer a room with toys, meaning that you need to stay there with your kid and bring your computer), are an important recommendation that must be implemented.

4. Do you have any tips to share with fellow or beginner palaeontologists in a similar situation or palaeontologists who are worrying whether they will be able to reconcile work and care responsibilities?

It is a difficult situation, but try to focus, plan your activities well in advance, and do not worry if you cannot achieve what you have planned. Try to work continuously in small tasks (day by day), rather than focus on large projects.

And very important: ask for help whenever you need it, and enjoy the time you spend with your kids (even if you should be working, do not feel bad about it!).

Struan Henderson works on Palaeozoic osteichthyans, currently focusing on actinopterygians. He is from Australia and grew up in Scotland. Currently, he is a PhD student at the University of Birmingham, UK.

1. What role does care play in how you conduct your work as a palaeontologist, e.g. in the ability to attend conferences, join work calls across time zones, plan your schedule?

My work schedule is largely dictated by when I am looking after my son. I am thankful for the flexibility that academia provides, giving me the opportunity to shuffle the structure of my working week. Thankfully, care is flexible enough that I can arrange to attend conferences.

2. How has the Coronavirus pandemic affected your ability to work?

Closure of nurseries has massively impacted by ability to work. Caring for a young child during the daytime has meant shifting work to the evenings and weekends, a definite negative impact on work-life balance. I am grateful that I am in the middle stage of my PhD, so am not yet thinking about postdoc, job or grant applications, however I worry about the appearance of my academic record. The impact on my work has held up all of my research projects, making me worry about having a large gap in my publication record and about the potential impact that could have on my long-term career.

3. What recommendations do you have for colleagues and institutions to make your work more family-friendly, e.g. what can PIs, HoDs, conference organizers do to make it possible for palaeontologists with care responsibilities to have equal opportunities at work?

My supervisor has been incredibly supportive throughout the whole pandemic, making it clear that caring responsibilities and my own mental and physical health are the priorities, and sorting out an extension to relieve some of the time pressure.



Photo courtesy of Struan Henderson.



4. Do you have any tips to share with fellow or beginner palaeontologists in a similar situation or palaeontologists who are worrying whether they will be able to reconcile work and care responsibilities?

While the coronavirus pandemic has upended everything, I would like to assure any palaeontologist that my experience of balancing academia with care responsibilities has only ever been positive. I am lucky to be surrounded by caring, understanding people who have enabled me to work while maintaining care commitments!

Magdalena Łukowiak studies fossil sponge spicules and ascidians. She is an Assistant Professor at the Institute of Paleobiology, Polish Academy of Sciences, Warsaw, Poland.

1. What role does care play in how you conduct your work as a palaeontologist, e.g. in the ability to attend conferences, join work calls across time zones, plan your schedule?

The care affects only my ability to travel and attend conferences.

2. How has the Coronavirus pandemic affected your ability to work?

I work almost normally (two hours less if I need to take care of the baby – which happens when he stays home – I need to plan shifts with the baby's father, because we both work from home). I have some delays with laboratory work and SEM photography due to restrictions caused by the pandemic.

3. What recommendations do you have for colleagues and institutions to make your work more family-friendly, e.g. what can PIs, HoDs, conference organizers do to make it possible for palaeontologists with care responsibilities to have equal opportunities at work?

I attended the Coral Reef Symposium some time ago and they organized daycare and a kindergarten for scientists who attended the conference with their children. I am not sure if you were allowed to leave the baby without your supervision there (I did not care much about such things then), but it would be a great form of support even to have a place to have your baby close to you, with another member of your family, when you are attending lectures or giving a talk.

In the pandemic, being flexible with the days of the week you want to work is also very important. Due to restrictions, all children-friendly facilities are full of people at weekends (zoos, parks, swimming pools *etc.*), so I swap my working days with weekend days to use these facilities during the week and avoid the crowds.

4. Do you have any tips to share with fellow or beginner palaeontologists in a similar situation, or palaeontologists who are worrying whether they will be able to reconcile work and care responsibilities?

Be flexible (see point 3). If you work from home, take some time to rest. Exercise. Share your care duties with your partner. Talk to your boss.



Photo courtesy of Magdalena Łukowiak.



>>**Future** Meetings of Other Bodies



18th Conference of the European Association of Vertebrate Palaeontologists (EAVP2021)

Virtual meeting co-organized by several institutions 6 – 9 July 2021

The in-person conference in Benevento was postponed from July 2020 due to the coronavirus pandemic. However, the EAVP board and the organizers have decided to hold the 18th EAVP meeting online. Several European institutions (Università di Firenze, Università del Sannio, Museum für Naturkunde Berlin, Humboldt-Universität zu Berlin) are co-organizing this event with the support of many other institutions and companies. The number of participants will be restricted to 200 to avoid having parallel sessions for oral presentations. The organizers aim to make the online experience as close as possible to an in-person one and therefore the talks and related discussion time will be held live. Instead of poster sessions, the organizers aim to showcase all poster presenters with a 1–2-minute flash talk for each poster.

For more information please visit the website: <<https://eavp.org/>>.



36th International Geological Congress

India Expo Centre, Delhi, India 16 – 21 August 2021

The IGC was postponed from March 2020 due to COVID-19. The IGC is a non-profit scientific and educational organization whose meetings are held in collaboration with, and under sponsorship of, the International Union of Geological Sciences (IUGS). IUGS holds its General Assemblies in conjunction with Sessions of the IGC. The main purpose of the Congress is to encourage the advancement of fundamental and applied research in the Earth sciences worldwide.

For further information please visit the website: <<https://www.36igc.org/>>.



Fossil chironomid workshop

Virtual meeting organized by the University of Basel 30th August 2021

This fossil chironomid research event has been rescheduled from August/September 2020 due to the ongoing pandemic. The workshop aims to provide the fossil chironomid research community with an opportunity to exchange results and ideas online. Online talks and discussions will run from c. 13.00–17.00 CET. To register contact Ilona Hofmann (e-mail <Ilona.hofmann@unibas.ch>). If there are a large number of registrations time-slots for presenting will be preferentially assigned to early-stage researchers. Presentations will be kept relatively short as an in-person meeting is anticipated in 2022.

Please contact Prof. Oliver Heiri (e-mail <oliver.heiri@unibas.ch>) for more information.



9th International Meeting on Taphonomy and Fossilization (TAPHOS) and 6th ICAZ Taphonomy Working Group Meeting (ICAZ-TWG)
Museo Arqueológico Regional de Madrid, Spain 30 August – 6 September 2021

This meeting has been postponed from September 2020. The 9th edition of TAPHOS and the International Council for Archaeozoology will bring together palaeontologists and archaeologists and also calls on other researchers to participate, such as forensic scholars, molecular biologists, histologists anthropologists. A special tribute will be paid to Sixto Fernández-López, founder of the TAPHOS meetings, and to Peter Andrews for his innovative work on small mammal taphonomic methodology and palaeoenvironmental interpretations.

For more information please visit the website: <<http://taphostwg2020.es/>>.



2nd Crossing the Palaeontological–Ecological Gap (CPEG)
Museum für Naturkunde Berlin, Germany 6 – 9 September 2021

NEW DATES

Postponed from September 2020, this three-and-a-half-day meeting is planned with oral and poster presentations and a workshop. Besides giving a platform to scientists and work that crosses the gap between modern and ancient worlds, the aim is to cover all major organism groups, ecological levels and process focuses. Keynote speakers, round table discussion and goals will remain the same. The Museum für Naturkunde – Leibniz Institute for Evolution and Biodiversity Science, Berlin, is one of the most important research institutions worldwide in the areas of biological and geological evolution and biodiversity, with a collection of over 30 million items covering zoology, palaeontology, geology and mineralogy. The deadline for abstract submission has been extended to 1st July 2021.

See the website for further details: <<https://cpegberlin.weebly.com/>>.



XII Congress of the Asociación Paleontológica Argentina (CAPA 2020)
Virtual conference 23 – 26 November 2021

This meeting is postponed from September 2020. The 12th congress of the Argentine Paleontological Association (APA) will commemorate the 65th anniversary of the Association, featuring recent advances in the field of palaeontology in Argentina. This meeting aims to promote a favourable environment to exchange knowledge and coordinate joint actions between palaeontologists, museum workers, biologists, related Earth scientists, teachers, students and institutions linked to the areas of education, protection and tourism, strengthening links between palaeontologists and the broader community. Advances in the field and outreach communication are fundamental for the conservation of Argentinean palaeontological heritage.

For more information please visit the website: <<https://www.congresoapa.org.ar/>>.

**VIII International Conference on Mammoths and their Relatives (ICMR)**

Indian Institute of Science, Bangalore, India 2021

NEW DATES TBC

The Conference is postponed from October 2020 and revised dates and deadlines are yet to be announced. However, participants are encouraged to submit abstracts without waiting for further announcements. The themes of the Conference will include evolution and biogeography, genetics, ecology, extinction, conservation, archaeozoology and others, with both oral and poster sessions. Field-trips include a visit to Asian elephants in Bandipur National Park and a chance to explore the famous Neogene–Quaternary vertebrate fossil site of the Siwaliks.

Please visit the website: <<https://mammothindia2020.org/>>.

**5th International Congress on Ichnology (ICHNIA 2022)**

Florianópolis Island, Brazil 4 – 8 April 2022

Every four years ichnologists from around the world join to discuss the progress of the science and share experiences and ideas. Previous congresses have been held in Argentina, Poland, Canada and Portugal, and Brazil is the next hub of ichnology to share some of the vast heritage of ancient and modern biogenic structures. The 5th edition of ICHNIA was planned for 2020 but, due to the pandemic, was postponed to April 2022. Several keynote speakers are already confirmed, including Karen Chin (University of Colorado Boulder), Koji Seike (Geological Survey of Japan) and Anthony J. Martin (Emory University). See the website for further information and updates.

Please visit the website: <<https://www.ichnia2020.com/>>.

**Marine Reptiles Conference 2020**

The Etches Collection, Kimmeridge, UK May 2022

NEW DATES TBC

This conference has been rescheduled from May 2020 due to the coronavirus pandemic. Originally postponed to October 2020, this has now been postponed further as delegates were polled and found to prefer an in-person meeting. All professionals, amateurs and enthusiasts of marine reptiles are invited to attend. The primary focus will be on the fossil record, covering not only the marine reptiles but also the other organisms that formed part of their ecosystems. A session will also take place on modern reptiles, and we welcome abstracts from researchers studying all aspects of this field.

For more information please visit the website: <<http://www.marinereptiles.org/>>.

**International Conference on Modern and Fossil Dinoflagellates (DINO 12)**

Palacio Congressos De Canarias, Gran Canaria, Spain 4 – 8 July 2022

This conference has been postponed from July 2020. The aim is to hold the event in a safe environment, attracting the participation of scientists from all over the world, so is postponed until July 2022. The International Conference on Modern and Fossil Dinoflagellates (DINO) has been held on a continuous basis in different parts of the world since 1978. For this edition, DINO12 will be



framed within the common topic of global warming, but preserving the essence of the meeting, in which the dinoflagellates and their cysts are the major protagonists. As is usual, the conference will gather biologists working with modern dinoflagellates and geologists working with fossil dinoflagellates. For more information please see <<https://dino12conference.com/>>.

**Palaeo Down Under 3 (PDU3)**

Perth, Western Australia and online 11 – 15 July 2022

Australasian Palaeontologists (AAP) cordially invites all palaeontologists from Australia, New Zealand and around the world to participate in Palaeo Down Under 3 (PDU3) in Perth, Australia. A full conference programme is proposed, covering all aspects of palaeontology and associated disciplines. PDU3 will include guest keynote lectures, general and thematic sessions, symposia and posters. Due to the global pandemic, AAP looks forward to broadcasting its first virtual conference, providing an opportunity for members to participate from all over the world.

For more information please see the website <<https://www.australasianpalaeontologists.org/pdu3>>.

**World Congress of Malacology 2022 (WCM 2022)**

LMU Biocenter, Munich Germany 1 – 5 August 2022

The World Congress of Malacology (WCM) will be hosted by the Staatliche Naturwissenschaftliche Sammlungen Bayerns (SNSB) and the Biological and Medical Faculty of the Ludwig-Maximilians-Universität (LMU) Munich during the first week of August 2022. The theme of WCM 2022 will be all aspects of diversity, function, ecology, evolution and conservation of extant and fossil Mollusca. Special topics of the Congress will include evolutionary and developmental aspects, taxonomy, phylogeny, palaeontology, genomics and functional morphology, as well as all methodological innovations concerning malacological aspects. The organizers wish to explicitly welcome the next generation of malacologists from across the globe, including those at bachelor level to those in the postdoctoral phase of their career. The organizers will encourage their contact and the exchange of ideas and experiences with the – no less welcome – already established scientists from the various fields of malacology from all countries and continents. Registration will open in November 2021.

For more information see <<https://www.wcm2022.bio.lmu.de>>.

**18th International Nannoplankton Association Meeting (INA 18)**

Avignon, France August – September 2022

NEW DATES TBC

The INA brings together the world's approximately 200 nannofossil and nannoplankton (coccolithophore) scientists, and this biennial meeting is their main venue for the exchange of information. The meeting rotates amongst different continents and is back in Europe for the first time since Athens in 2017. Early bird registration will open in early 2022.

For more details please see the website: <<https://ina18.sciencesconf.org/>>.



11th International Symposium on Cephalopods Present and Past

London, UK *September 2022*

DATES TBC

Anyone interested in joining the 11th International Symposium on Cephalopods Present and Past should sign up for the mailing list by registering using the online form at <https://forms.office.com/r/jSQDae7tWM>.

For more information please e-mail ISCPP11@nhm.ac.uk.



6th International Palaeontological Congress (IPC6)

Khon Kaen, Thailand *7 – 11 November 2022*

The 6th International Palaeontological Congress will be held in Thailand from 7th to 11th November 2022, plus various field-trips will be available lasting several days. The organizers aim to assemble an exciting and highly informative programme, including all aspects of our science and its connections to biology and Earth and planetary sciences, from the Archean to the Holocene, and covering work from all continents. Workshops will be organized on palaeontological techniques, probably as one-day mid-conference events. Details of scientific sessions/symposia are already available online.

For more information see the website: <https://ipc6.msu.ac.th/>.



XV International Palynological Congress and XI International Organization of Palaeobotany Congress (XV IPC-XI IOP)

Clarion Congress Hotel Prague, Czech Republic *25 – 31 May 2024*

The Congress celebrating 200 years of modern palaeobotany, postponed from September 2020, was due to take place in May 2021. Reviewing the various levels of coronavirus infections and the processes implemented by various countries, the organizers do not believe that travel and a physical meeting can take place while safeguarding all attendees. They have therefore made the decision to move the event to 2024. This date has also been chosen to reflect the decisions of the parent organizations (IFPS and IOP), and the fact that the online European Palaeobotany and Palynology Conference in Stockholm will take place in 2022. These conferences are held biannually and usually alternate between European and world events.

For more details please see the website: <https://www.prague2020.cz/>.

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

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



Meeting REPORT



Picture a Scientist: screening and discussion panel

Virtual meeting hosted by

The Palaeontological Association 8 March 2021

To celebrate International Women's Day 2021, the Palaeontological Association arranged a screening of the film 'Picture A Scientist' and an accompanying panel discussion. The panel discussion was held on International Women's Day, 8th March 2021, and the film was available for Association members to view on demand for a period of 72 hours prior to the panel discussion. Over one hundred Association members registered for the free screening of the film, which featured three women scientists and their experiences in various STEM fields, plus new perspectives on how to make science itself more diverse, equitable and open to all. You can find out more about the film and view the trailer at <www.pictureascientist.com>. (NB it recently became available to view on Netflix).

The discussion panel was chaired by Palaeontological Association President Dr Patrick Orr and included the following speakers: Ms Nussaibah Raja, Friedrich Alexander Universität Erlangen-Nürnberg; Ms Aviwe Matiwane, Rhodes University and Albany Museum; Dr Leanne Melbourne, University of Bristol; Dr Elsa Panciroli, Oxford University Museum of Natural History and National Museums Scotland; Dr Liam Herringshaw, palaeontologist at Hidden Horizons and Yorkshire Fossil Festival Director; and Dr Caroline Buttler, Amgueddfa Cymru – National Museum Wales. There were 49 participants in the panel discussion event, which was held online and was open to non-members as well as members the Association.

The Palaeontological Association is very grateful to the panellists, who volunteered their time to share their responses to the film and to discuss the wider issues that the film raised. Audience members also made an important contribution to the discussion, with a number of thoughtful and thought-provoking questions.

It was great to get the opportunity to see the film 'Picture a Scientist' which was both shocking and inspiring. I found the range of voices in the panel discussion really interesting to listen to. Dispiriting at times to hear of things that happened to me at the beginning of my career are still occurring today to younger panel members, but encouraging to have the open conversation – I learnt a lot.

Caroline Buttler

Amgueddfa Cymru – National Museum Wales, UK





I was very glad the Association screened 'Picture A Scientist', as I hadn't seen the film, and found it powerful and disturbing. This, and taking part in the panel discussion afterwards, made me reflect on the privilege I have had in my career. I look back two decades to when I started my PhD and I recognize now how common sexism was, passive as well as active. I'm not sure things have improved enormously, but I think the screening and panel discussion are exactly the sort of events the Association should be organizing. If we are to make our discipline as diverse and supportive as it should be, it is vital that the sorts of issues and experiences documented in 'Picture A Scientist' are highlighted, discussed, and acted upon.



Liam Herringshaw

Director of the Yorkshire Fossil Festival and Palaeontologist at Hidden Horizons, UK

Being part of the panel was a real eye-opener for me. I have always considered myself pretty lucky not to have suffered too badly from sexism as a scientist. But watching the film and reflecting on all the issues it raised made me realize that, like many women, I am just so used to sexism being a part of life that I often ignore it. It made me remember some pretty difficult experiences, and it was both consoling and disheartening hearing similar (and much worse) experiences being shared by others. It is a serious wake-up call for all of us to examine our workplaces, behaviour and attitudes.



By far, two of the most important parts of the discussion for me were about the role of allies, and the experiences of women of colour. The film 'Picture a Scientist' showed both good and bad examples of people who considered themselves allies, and challenged my stereotypes of who can provide the role of an ally, and how they might provide it. The other panel members spoke eloquently about the additional challenges women of colour face, as scientists and in everyday life – as a white woman from the global North, it was really eye-opening. I left with a renewed determination to more effectively support fellow women in science (and other genders), and the many links shared during the panel and advice for how to proceed really helped with that.

The only thing I regret about the panel was that it could not have gone on longer – there is just so much to discuss! I would really like to see more ethical issues like this being debated openly in our discipline and beyond. It is way overdue that we tackle sexism in science, but I hope we will get there eventually.

Elsa Panciroli

Oxford University Museum of Natural History and National Museums Scotland, UK

* All photos courtesy of the authors.



I never dreamed of being a scientist. Growing up, I never even gave a thought of what scientists did or what they looked like. Actually, until a few years ago, if you had told me to picture a scientist, the first thing that would have come to mind would be one of the evil scientists in animated films who always wanted to take over the world. It was only when I watched the film ‘Picture a Scientist’ that I realized that until my masters degree, I did not really know what scientists did or how academia worked – I am still learning about the latter. But there was something else that I realized as well: that this systemic and societal discrimination of women was something that had been present in my life even before I joined the ranks of academics.



I grew up in, theoretically-speaking, quite a liberal environment, but there were still some unwritten societal rules that one had to abide by. As a girl I was supposed to learn how to do household chores, because one day I would get married and I would be expected to cook and clean for my husband. I was also told that one of the greatest accomplishments that I could ever have were children. As an only child, however, I was also given the freedom to just do what I wanted – something that I would most likely not have been allowed to do if I had a brother, even with my somewhat liberal parents. But even without a brother, I learned early on that if I could be better than all the boys and men in my family, then I would not be expected to take on these more traditional roles that I was expected to fill. So I became this high-functioning person who would go on to do as much as she could to get the best grades, to be admitted to a “world-class” university – a prime candidate for academia. I do not think I had a free weekend since I was around eight (because of how competitive the Mauritian education system used to be and also because of all the extra work I was doing) until about my mid-twenties. So when I did join academic circles and started doing research (first as a masters student and a research assistant), I have to admit, it felt natural. I was the prime candidate for reinforcing survivorship bias in academia.

But it all changed when I experienced two bombings and an attempted coup in Turkey and when I was still expected to work through all of that to finish my degree so I could eventually go home (and hopefully not miss my own wedding). That was probably the last straw. In the months that followed I made radical changes to myself and my own life. I declined a PhD position I was offered because that meant I would have to be away from my partner for a long period of time and I moved to Germany to be with him. This also meant, at least at the time, giving up on academia and anything I had planned until then. Academia is ruthless in the way that it makes you choose between your career and your family, especially for women – and my priorities were clear.

Ironically, I accidentally fell back into academia a bit more than a year later (but that is a story for another time) and I was determined to be different this time. And I think that is when I realized how uncompromising the system is for people who do not align with the systemic culture of

** All photos courtesy of the authors.*



that system, especially for marginalized groups, or how people may perceive someone as being unproductive or lacking passion for their job if they do not work 24/7. It still excludes those who lack mobility or want to be close to their loved ones. The system was designed with a particular group in mind – white men – and they still dominate, especially in powerful positions. But as long as the system works for them, there will be no incentive to change. And that was what was most inspiring but at the same time heart-breaking about the 'Picture a Scientist' film: how much effort it took for these women to make themselves heard and what they achieved when they were, but also how long a way we have to go to make science more equitable for everyone.

As for me, I do not think I will ever stop being this high-functioning person, but I have learned and am still learning how to still take time for myself and my loved ones. I am determined to make it work, but if it does not, leaving is also an option.

Nussaibah Raja Schoob

Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Picture a Scientist – PalAss panel discussion report

Directed by Ian Cheney and Sharon Shattuck, the 93-minute-long movie is centred around three women in STEM: biologist Prof. Nancy Hopkins, chemist Prof. Raychelle Burks and geologist Prof. Jane Willenbring, as they tell the viewer about the awful harassment and situations they have had to endure in their careers.

The film brought up a horde of memories and emotions for every scientist who watched it. Whether you are a tenured professor or a bachelor student starting out – anger, disappointment, and maybe a few tears resurfaced when watching these women tell their stories. Recalling some of my own memories from the gloomy depths in the back of my mind I felt a small sense of relief, but also exasperated melancholy. After listening to the panel discussion, I think a lot of us realized that these pains and issues are international, with no age limit and, horrifyingly, more common than we want to believe. This film was the perfect catalyst to start a conversation to make us change the environment in which women in STEM have to constantly scramble against.

The panel discussion felt like a safe and accepting space to share thoughts with scientists from all walks of life with hopes of starting a fruitful discussion. The members of the panel were introduced and then asked to share their first impression of the film, which parts resonated and how they felt after watching it. Most of the responses were that they felt emotional, infuriated, discouraged, defeated even, but also inspired and hopeful. A couple of members also admitted that they realized they have, unintentionally, been a part of the problem. The conversations quickly moved on to situations seen in the film and comparisons with other real-life situations. The first realization: initially thinking that you have not had these kinds of interactions, but after hearing other traumatic experiences, you start to realize that you have too many in common and ended up just brushing these situations off and forgetting about them. Sadly, it has become the norm, and you just get used to it. A second example was not saying anything because either you would be jeopardizing your own career, or you are not sure how the person on the receiving end is dealing with it. Either way, it perpetuates this idea that nothing is wrong, everything is fine, and it does not or has not happened to anyone else. The result is that you are then stuck in a catch-22. You are damned



if you tell someone – you are over-reacting, do not worry; and you are damned if you don't – it is your fault for not telling us about the struggle. Another point made in the discussion was the common attitude “I have never experienced it, therefore it does not happen”. I'm pretty sure most palaeontologists have not seen a live *Ankylosaurus*, or experienced first-hand any of the mass extinctions, but we are pretty sure they happened.

The topics of funding issues, gender power dynamics, and gatekeeping were also mentioned, but that is entirely another matter. A plethora of related issues regarding biases including language, ethnicity, affiliations, mental health, childcare and families, and more, also popped up. The depressing realization is that if we were to get people to write down their experiences, we would end up with a manuscript that would rival the length of the software code for Apollo 11 that Margaret Heafield Hamilton's team wrote. It is obvious that these situations are not specific to academia, but happen across all industries and organizations. The unsettling thing is that the very institutions that pride themselves in fostering knowledge and research are rife with ignorance. You can call it blissful ignorance, or a benevolent lack of situational awareness, but it is not an excuse to continue with the way things are. I think a lot of people have become trapped in thinking that “this is the way it has always been” means “if it has been this way for so long it must be the best way”, which is not true. Just because in 1600 we thought that throwing buckets of excrement out the window into our water supply was fine, it does not mean that it was the best solution. Things do, and should, change. The panel discussion did show that many of us are aware of what goes on, but are somewhat stumped on how to change the situation. A lack of communication is something that seems to be a common factor: are we being heard? Are we listening? Are we being taken seriously?

A definitive plan was not outlined in the panel discussion, but the result was as good as one could get. There are many questions that need answering: how will we deal with these situations from now on? How will these situations be followed up and investigated? Who would be in charge of dealing with cases? The lasting thought was that these allegations have to be taken more seriously, people need to feel safer to come forward, and the guilty parties need to be reprimanded for their behaviour. Obviously it is not going to be solved with one panel session, but the fact that these topics are being spoken about, be that on Twitter or in panel discussions such as this one, and support is provided, is a step in the right direction.

Let us not be naïve – a lifetime of systematic and systemic issues will not change in one evening or with one panel discussion, but it is the best place to start highlighting these situations that many people either ignore or have been afraid to speak out about. We have to learn from mistakes and situations from the past in order to avoid history repeating itself, and we have to look at the evidence if we have not been there. Otherwise, most sciences would surely be rendered pointless? I think a lot of us have a good understanding of the issues in the community, but many questions remain unanswered as to how to move forward from here.

Aija Zāns

Vilnius University, Lithuania



A follow-up survey was sent to everyone who registered for the film or the panel discussion. Feedback on the event was very positive, with 100% of respondents stating that the online screening met their expectations and that they would attend similar events in the future. Suggestions from respondents for issues to be considered at such events included: challenges faced by early-career researchers; the impact of both COVID-19 and Brexit on the palaeontological community; career structure, including moving between academic and non-academic positions; diversity and ethics. The Palaeontological Association would welcome any other suggestions for topics to be covered by similar events. If you would like to make a suggestion, please e-mail Dr Fiona Gill at <vicepresident1@palass.org>.

Fiona Gill

Vice President



— OBITUARIES —

Desmond T. Donovan 1921 – 2019

Desmond Thomas Donovan was born in Surrey in the UK, the son of Irish and German parents. He attended Epsom College until 1938, during which time he assembled a varied collection of natural history artefacts, among which rocks, minerals and fossils (including his first, a very battered *Echinocorys* sea urchin from his parents' garden in Cheam) came to predominate. His interest was stimulated by regular forays to the Natural History Museum in London and school biology lessons. At the same time, a fascination for caving started on visiting the Beatushöhlen, on the Thunersee in Switzerland, run by family friends. University beckoned in 1938, and for a year, Desmond joined about one hundred other students at what is now Imperial College London, intending to specialize in the Earth sciences at its School of Mines from his second year. However, after the declaration of World War II, a second year at Imperial was impossible and, with his father's help, Desmond found a place via W.F. Whittard, professor of geology, at the University of Bristol, along with a handful of other students specializing in geology. For his Honours year, Desmond studied alone, often just being given some lecture notes and told to "get on with it". It was during this final year that a field week in Torquay sparked Desmond's interest in systematic palaeontology but, after graduating in 1942, he was obliged, along with most other science graduates, to enlist in the army as a radio (*i.e.* radar) officer. Towards the end of the war he was sent to Palestine to run a transport depot.

Desmond returned to the University of Bristol with the intention of working on Middle Jurassic rocks, but was soon diverted into studying 'The Ammonites of the Blue Lias of the Bristol District' for a PhD, awarded in 1951 while working as a lecturer in the department and serving on Senate, the academic part of the governing body. In the 1950s, Desmond devoted much of his energy to fieldwork, mapping Bathonian Fullers Earth of the Cotswold Hills with W.J. Arkell, providing consultancy services on water supply of the area and contributing to publications such as *Geology of the Bristol District* (Donovan and Kellaway 1956) and *Pevsner's Buildings of England*. But what he often talked of was the several excursions to that geological paradise (were it not for the mosquitos) which is East Greenland, on expeditions led by the Danish geologist Dr Lauge Koch. The



Photo courtesy of Bob Chandler.



team mapped, logged sections and collected ammonite faunas in many localities; work which was published in *Meddelelser om Grønland* in 1957. He contributed to the first edition of the *Kansas Treatise on Invertebrate Paleontology* ("L" Ammonites) again collaborating with W.J. Arkell, as well as other eminent workers of the time such as Dick Reymont, Rudolf Trumphy and J.E. Hemingway. During his time at Bristol, he met Lou Saward, also a geologist who later became his wife.

In 1962, Desmond was appointed Professor of Geology at the University of Hull, during which time his involvement in offshore geology expanded into mapping the UK continental shelf using geophysical techniques prevalent at the time. However, his tenure was cut short by a successful application for the Yates Goldsmith chair at University College London (UCL), which Desmond filled from 1966 until retirement in 1982. During his time at UCL, his research interests in offshore geology and Jurassic stratigraphy continued apace, with some Pleistocene and Palaeolithic flint tool studies on the side. Although he was never most comfortable as an administrator, he oversaw the successful running of the UCL department and the supervision of several PhD studentships in areas of seafloor geology and Jurassic palaeontology and stratigraphy (including R. Dingle, R. Dingwall, A. Doré, T. Getty, M. Oates, F. Alkaya and L.I. Silva). He retired from UCL in 1982 and spent three years as honorary curator at the Wells and Mendip Museum in Somerset, albeit still retaining his base in London.

As a scholar first and foremost, Desmond saw retirement as an opportunity to go back to his beloved research, helped by having access to UCL facilities, and later also those in Bristol. He was active in geology and palaeontology up until the end, and published on many topics, particularly coleoids, ultrastructure in cephalopods, taphonomic studies and the molecular phylogeny of recent cephalopods. For a number of years he was the editor of the Coleoid part of the *Treatise on Invertebrate Paleontology*. He was also a stalwart and longstanding member of the University of



Desmond in the field at Hadspen in Somerset in 2011. Photo courtesy of Bob Chandler.



Bristol Speleological Society and many natural history societies, including the Mendip Society, Bristol Naturalists Society, Bath Natural History Society, the Churches Conservation Trust and the Somerset Churches Trust as well as being founding member of several.

Desmond was an old-style polymath, a quiet and gentle man interested in and knowledgeable about many things, who never lost his curiosity. His students appreciated the minimal interference in their research, but constant support when it was needed, including his taking pleasure in visiting their field areas. Recent visitors to his house in Wells will recall small trays of specimens awaiting measurement for statistical analysis, and excellent coffee. His great intellectual ability was disguised with a very modest and unassuming manner, and a gentle sense of humour. Still driving himself and active as ever at 97, a hospital visit for a minor ailment in April 2019 resulted in a bout of sepsis, from which he never fully recovered. His children, Tom, Tessa and Dan, took turns in staying with him and reported that he read the *Guardian* daily and was making lists of things to do right until his death, in his sleep, on 23rd December 2019. He will be greatly missed.

Michael Oates

Brian G. Gardiner FLS. **1932 – 2021**

Professor Brian George Gardiner, an esteemed former lecturer and researcher of biology and palaeontology at King's College London, UK, passed away on 21st January 2021. Born in Cashes Green in Gloucestershire on 30th October 1932, he went to Marling Grammar School and won a National Scholarship to read Entomology at Imperial College London in 1951. He had a long and distinguished scientific career. He did his PhD at University College London from 1954 and then in 1958 moved to Queen Elizabeth College to take up a junior lecturer position. He did a sabbatical at the University of Alberta in Edmonton, Canada in 1963–64. He was awarded his DSc in August 1975 and a Readership at Queen Elizabeth College in 1978, and was subsequently made Professor in 1985, the year that Queen Elizabeth College merged with King's College London. He was the President of the Linnean Society of London from 1994 to 1997.



Prof. Gardiner in 2010. Photo © Nicholas Gardiner.

Brian was also among the first scholars to apply cladistics as a method to assess the phylogenetic inter-relationships of fish and tetrapods. He was a member of the so-called 'Gang of Four' (the others being Colin Patterson, Donn Rosen and Peter Forey), most famous for a revolutionary study suggesting that lungfishes were the sister-group of tetrapods. Their paper published in 1981



provoked a strong reaction from the 'Swedish School' at the time. Fish palaeontologist Erik Jarvik (1907–1998) had long advocated the origin of tetrapods from the extinct Rhipidistia group such as *Eusthenopteron foordi*. However, the heated debate among vertebrate palaeontologists that ensued contributed to refining cladistics and firmly established it as the most acceptable method available to investigate anatomical features that have special significance for biological evolution of vertebrates. Brian was a close friend of Bobb Schaeffer from the American Museum of Natural History in New York, with whom he wrote seminal papers on the evolution of ray-finned fishes. They were pioneers in applying the cladistic method to study their phylogenetic inter-relationships.

Over the years Brian supervised many PhD students, among them Alan Bartram, Peter Forey, Gavin Young and myself. Gavin, who occupied the room next door to Brian in the Old Coach House at Queen Elizabeth College between 1974- and 1976, recalls that "Brian was one of the most sincere, straightforward and honest people I've ever met. He was always exuberant, humorous and fun-loving, and enthusiastic in discussing any idea, even if it came from a knowledge-challenged PhD student. He was an inspirational PhD supervisor". I (KCL alumnus 1991) have very fond memories of Brian, who I first met in 1987 when I came to London on a scholarship from the Brazilian Research Council (CNPq). I arrived from South America with 200 kg of Late Carboniferous fossil fishes I had collected in southern Brazil. An influential fish palaeontologist and expert on Palaeozoic ray-finned fish, Brian was the ideal scholar to advise on my project. Brian was also much liked and respected by the undergraduates he taught at King's College, a favourite vertebrate biology practical class



From left to right: Colin Patterson, Stanley Westoll, Peter Forey, Roger Miles, Brian Gardiner and Gordon Reid outside the 'Old Coach House', London in 1976. Photograph courtesy of Gavin Young.



including a guided tour to the Natural History Museum's roof to see the amazing views from the top and take a close look at the elaborate gargoyles. Brian acted as an Adviser for the Museum.

Kind and warm, often laughing loudly, that was Brian's typical way. He would greet everyone he passed in the corridor with a big smile. Oliver Crimmen, an ichthyologist at the Museum, similarly mourns the loss of "a lovely man, who brightened us during some dark times, always giving good cheer and wisdom". Mike Coates from the Field Museum (Chicago, USA) also remembers Brian's "deep love of the tricorn hat – the one that came with being president of the Linnean Society" and has fond memories of "good-humoured arguments about actinopts, morphology and trees".

Brian was Angela Milner's external examiner and she says of him "he was well practised at putting nervous candidates at ease and began the viva with friendly chit-chat before getting down to business". He was also a pivotal figure in Prof. Moya Meredith Smith's career. Currently a Scientific Associate of the Museum, she remembers the day when Brian introduced her to Dr Roger Miles, a Museum scientist and an expert on Australian fossil fishes, over 50 years ago. Brian and Roger were studying exceptionally well-preserved Devonian fishes from the Gogo Station in Australia and Moya was invited to help them with studying the fish dentitions. Meeman Chang and Zhu Min, from the Institute of Vertebrate Paleontology and Paleoanthropology in China, remember him fondly and Min says that "his works on placoderms and Devonian actinopterygians are the classic ones we make frequent reference to in our own projects. He will remain in our memory".

Brian's sense of humour and outgoing, friendly character made a big impression on everyone who knew him. Philippe Janvier, a researcher at the Muséum national d'Histoire naturelle, Paris, said he long thought Brian would be immortal, and in fact, he is, through all his scientific publications and the many funny anecdotes he shared with us! A victim of the coronavirus pandemic, Brian leaves his widow Elizabeth and three children, twin daughters Catherine and Clare and son Nicholas. He will be much missed.

Martha Richter

Natural History Museum, London, UK



Small Grant REPORT

Investigating the role of oxygen and silica in deep-water first appearances of the Ediacara Biota

Thomas H. Boag

Department of Geological Sciences, Stanford University

(current address: Department of Earth and Planetary Sciences, Yale University)

Introduction

The first macroscopic, complex eukaryotes appear during the late Ediacaran (~571–541 Ma), characterized by marine assemblages of organisms with frondose, sponge and cnidarian affinities, and simplistic burrows produced by mobile bilaterians. These assemblages occur as early as 571 Ma in the deep ocean but are not found in shelfal environments until ~560–555 Ma, occurring stratigraphically above the globally recognized Shuram negative carbon isotope excursion (CIE) (Boag *et al.* 2016). The Ediacaran fossil record therefore displays a puzzling ~15 myr period when large, complex life apparently arose and flourished in deep-water settings but did not inhabit shallow-water environments.

This study evaluates the taphonomic and palaeoenvironmental conditions that may be affecting fossil first-appearances along a newly characterized shelf-to-slope transect in sedimentary strata of the Rackla Group, Yukon, Canada (Figure 1). Within this basin, it is now possible to test the

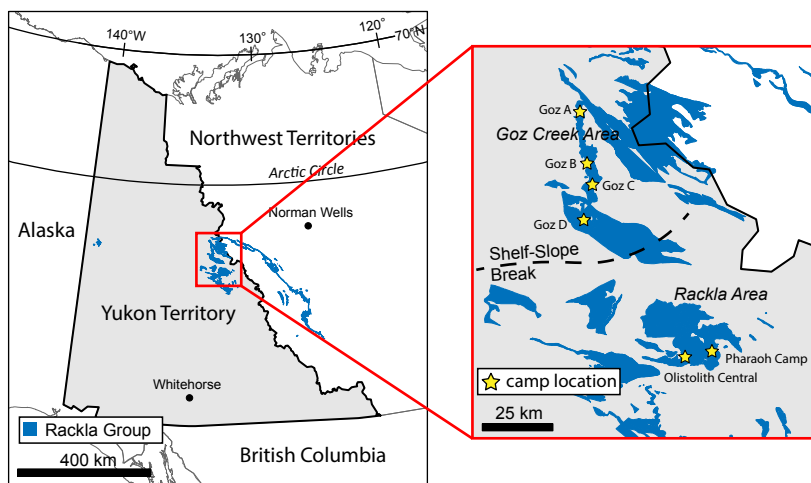


Figure 1. Location map. Study locations in the Goz Creek and Nadaleen River regions of the Wernecke Mountains, Yukon, Canada. A shelf-slope transect exists from shallow-water peritidal facies at Goz A which grade into offshore facies at Goz B-D and Fritz, before transitioning into slope deposits found at Pharaoh and Olistolith Central camps in the Nadaleen River Area. Note: Sekwi Brook locality is another Ediacaran locality in the Rackla Group in the Mackenzie Mountains.



observation that Ediacaran organisms first appeared in slope settings of the Nadaleen Formation and were absent in time-equivalent shallow-water facies before progressively inhabiting shallower environments of the Blueflower Formation by the latest Ediacaran (Figure 2).

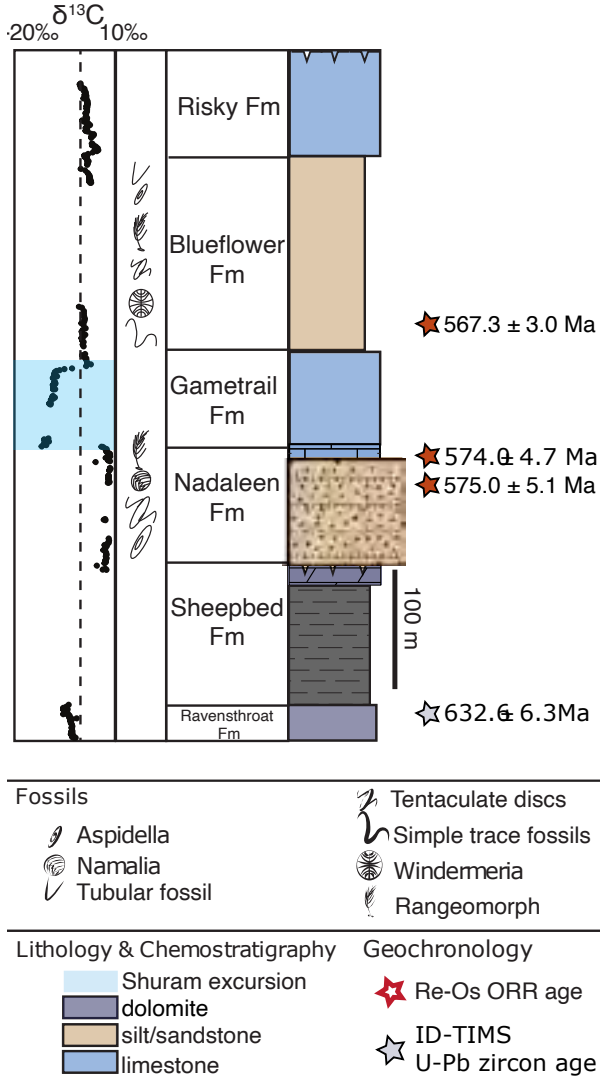


Figure 2. Stratigraphic section of the Rackla Group. Generalized stratigraphy of the Ediacaran Rackla Group. Carbonate carbon isotope profile is highlighted in blue to denote the Shuram carbon isotope excursion within the Gametrail Formation. Deep-water Rangeomorph fossils are known from the Nadaleen Formation in the Sekwi Brook area of the Mackenzie Mountains, Northwest Territories. Note that the 'sub-Cambrian' unconformity exists at the top of the Risky Formation, while the Ediacaran–Cambrian boundary is slightly higher in the Ingta Formation.



Multiple field camps extending from the shallow-water Goz Creek region (Macdonald *et al.* 2013), to the deep slope Nadaleen River area (Moynihan 2016), were used to develop a stratigraphic palaeobiological framework of Ediacaran fossil occurrences across this basin. This work revealed a diversity of fossils in both shallow- and deep-water deposits of the Blueflower Formation, while fossils in the Nadaleen Formation below the CIE were exclusively restricted to deep-water slope settings and were absent from shallow-water strata despite favourable sedimentological conditions for preservation.

Results

Palaeontology of deep-marine Nadaleen Formation

Newly discovered *Aspidella* discoidal holdfasts, including one *Ediacaria* morphotype (Figure 3A), and multiple other discs (Figure 3B-D) have been recovered from the Nadaleen Formation in multiple deep-water slope localities in the Nadaleen River (Pharaoh Camp and Olistolith Central, Figure 1). These deep-water fossils in the Wernecke Mountains are predominantly recorded through 'Fermeuse-style' preservation, either in positive hyporelief on the soles of sharp-based turbidites or in negative epirelief on the top of the underlying bed (Narbonne 2005). In this taphonomic mode, holdfast discs and trace fossils are preferentially preserved due to their semi-infaunal position during life, while fronds and structures extending into the water column are not. Nonetheless, although the general taphonomy of the deep-water Nadaleen Formation in the Nadaleen River area does not allow for the preservation and documentation of diverse fronds similar to Sekwi Brook in the nearby Mackenzie Mountains, the occurrence of *Aspidella* across multiple locations unequivocally confirms the presence of deep-water Ediacaran fronds stratigraphically beneath the Shuram CIE-containing Gametrail Formation.

'Palaeontology' of shallow-water Nadaleen Formation

Our field investigations, as well as previous field investigations (Narbonne and Hofmann 1987; Pyle *et al.* 2004; Macdonald *et al.* 2013), failed to find shallow-water fossils in the Nadaleen Formation – the critical question is whether this is due to lack of searching, lack of amenable preservation, or the organisms were simply not living there. Our research group spent more than 90 person-days in the Goz area camps, with much time spent specifically aiming to find fossils in the Nadaleen Formation. Previous researchers from Harvard and McGill spent an estimated 138 person-days working in Ediacaran stratigraphy of the Goz area (Macdonald *et al.* 2013) while researchers from Queens University spent an estimated 50 person-days in the region (Pyle *et al.* 2004). The Goz area has also been studied extensively by the Geological Survey of Canada (Fritz *et al.* 1983; Narbonne and Hofmann 1987). Considering the research efforts in the Goz area and the number of experienced Ediacaran palaeontologists and geologists who have worked there, we conclude that shallow-water Nadaleen fossils are unlikely to be found.

The trickier question is whether the fossils would have been preserved had organisms been living there in the Ediacaran. Facies across the shelf from Goz B-C are dominated by interbedded fine sandstone and siltstone, displaying features indicative of deposition in offshore shelf conditions between fair-weather and storm wave-base (Narbonne and Hofmann 1987). Importantly, many of the slabs at Goz A contain specific structures similar to fossiliferous Ediacaran deposits elsewhere in the world. Shelfal Nadaleen Formation deposits across the Goz area also record a diversity of microbial induced sedimentary structures (MISS) formed by layers of microbial mats on the

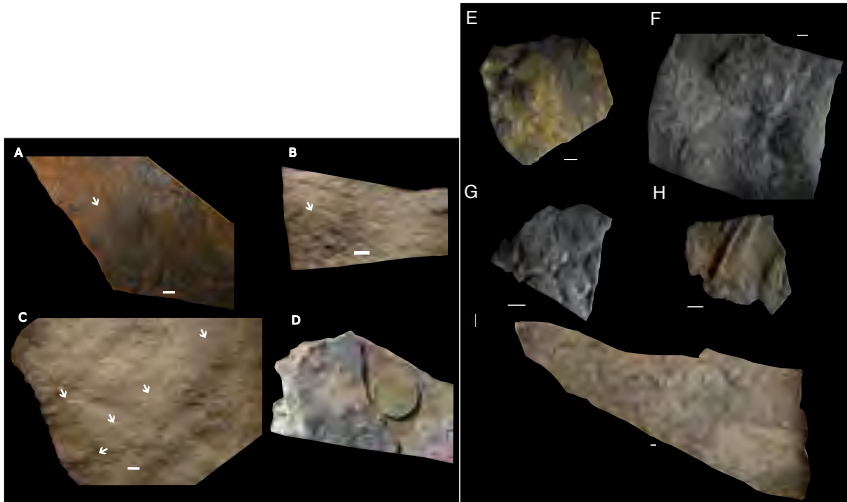


Figure 3. Deep-water fossils of the Nadaleen Formation, and shallow- and deep-water fossils of the Blueflower Formation. (A) Ediacaria-style disc in positive epirelief discovered at Pharaoh camp. (B) Single *Aspidella* displaying prominent central boss with several sets of rings surrounding it, recovered from Olistolith Central. (C) Multiple *Aspidella* displaying a range of taphonomic quality, also recovered from Olistolith Central. The range in preservation is likely due to the uprooting of a once-attached frond due to currents that eventually resulted in burial of the discs. (D) Central boss of an *Aspidella* preserved on a microbial mat from the Heterolithic Member, Nadaleen Formation at Pharaoh Camp (top left corner of slab). (E-F) Well-preserved *Aspidella* discs preserved in sandy siltstone partings discovered from Goz B camp. (G) Colonial aggregations referred to as *Beltanelliformis* (see Bobrovskiy et al. 2018), recovered from Goz A. This taxon is found in the Blueflower Formation throughout Northwest Canada and commonly co-occurs with simple horizontal trace fossils such as *Planolites* and *Helminthoidichnites*. (H) Two well-preserved juvenile *Charnia* fronds with at least one order of self-similar branching observed, found at Goz B. (I) A newly discovered Ediacaran ichnogenere from deep-water Blueflower stratigraphy at Olistolith Central in the Nadaleen River area. This large slab shows numerous visible scribing traces visible. Traces are 0.5-1.5 cm in diameter and overlap often; it is suggested that similar Cambrian fossils such as *Psammichnites* record primitive foraging behaviour of grazing molluscs. Scale bar is 1cm.

sediment surface. Microbial mats are a critical component of 'Flinders style' preservation of White Sea biota in shelf environments in Australia and Russia, as they prevent erosion and enhance the preservation of soft tissues by sealing buried organisms between layers of sand, thereby maintaining conditions favourable to tissue preservation (Gehling 1999; Gehling and Droser 2009).

Diversity of the Blueflower Formation

In contrast, the Blueflower Formation records a diversity of trace and body fossils in both shelf and slope facies. In shelf facies at Goz A and Goz B, numerous new specimens of *Aspidella* were recovered in addition to colonial aggregations of *Beltanelliformis* (Figure 3E-G). The discovery of these fossils is consistent with previous finds at these localities (Pyle et al. 2004). Also, several juvenile *Charnia* fronds preserved in excellent detail were discovered for the first time (Figure 3H). One frond preserves a circular depression at its base which likely represents the central stalk passing through the bedding plane, while the petaloidium show differential preservation indicative of the



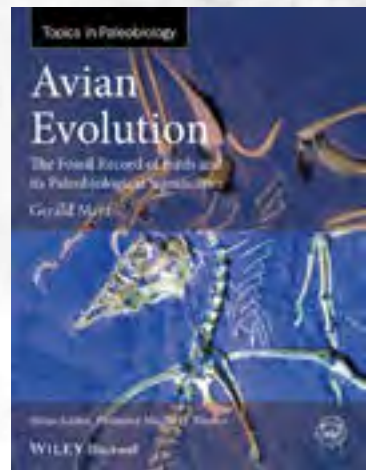
dynamic burial conditions that preserved these fronds. At a finer scale, secondary branches moving outwards from the central stalk are also visible, although the silt and sand grains are too large to see higher orders of self-similar fractal morphology. In deep-water Blueflower Formation at Olistolith Central, a new trace fossil was recovered from the Lower Carbonate Member which documents the 'scribbling' search behaviour of a grazing bilaterian (Figure 31). Traces similar to this have also been previously recognized from the Cambrian-aged Ingta Formation in the Mackenzie Mountains and later in the Phanerozoic elsewhere (Carbone and Narbonne 2014).

Acknowledgements

I thank the Geological Survey of Canada, the Yukon Geological Survey, the Yukon Palaeontologist Grant Zazula and the Yukon Government Department of Tourism and Culture for supporting fieldwork for this project. Further support from an NSERC Doctoral Fellowship, the American Philosophical Society Lewis and Clark Fund, and Stanford McGee-Levorsen fund were also extremely beneficial. Lastly, I thank the Palaeontological Association for their generous funding via a Sylvester-Bradley Award (PA-SB201702).

REFERENCES

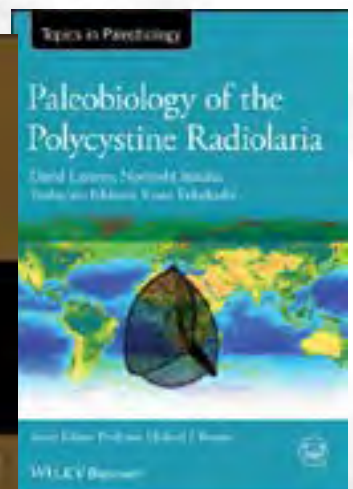
- BOAG, T. H., DARROCH, S. A. F. and LAFLAMME, M. 2016. Ediacaran distributions in space and time: testing assemblage concepts of earliest macroscopic body fossils. *Paleobiology*, **42**, 574–594
- CARBONE, C. and NARBONNE, G. M. 2014. When life got smart: the evolution of behavioral complexity through the Ediacaran and early Cambrian of NW Canada. *Journal of Paleontology*, **88**, 309–330.
- FRITZ, W. H., NARBONNE, G. and GORDEY, S. P. 1983. Strata and trace fossils near the Precambrian–Cambrian boundary, Mackenzie, Selwyn, and Wernecke mountains, Yukon and Northwest Territories. *Current Research, Part B, Geological Survey of Canada*, **83-1B**, 365–375.
- GEHLING, J. G. 1999. Microbial mats in terminal Proterozoic siliciclastics: Ediacaran death masks. *PALAIOS*, **14**, 40–57.
- GEHLING, J. G. and DROSER, M. L. 2009. Textured organic surfaces associated with the Ediacara biota in South Australia. *Earth-Science Reviews*, **96**, 196–206.
- MacDONALD, F. A., STRAUSS, J. V., SPERLING, E. A., HALVERSON, G. P., NARBONNE, G. M., JOHNSTON, D. T. *et al.* 2013. The stratigraphic relationship between the Shuram carbon isotope excursion, the oxygenation of Neoproterozoic oceans, and the first appearance of the Ediacara biota and bilaterian trace fossils in northwestern Canada. *Chemical Geology*, **362**, 250–272.
- MOYNIHAN, D. 2016. Bedrock geology compilation of the eastern Rackla Belt, NTS 105N/15, 105N/16, 105O/13, 106B/4, 106C/1, 106C/2, east-central Yukon; *Yukon Geological Survey Open File* 2016-2, scale 1:75 000.
- NARBONNE, G. M. 2005. The Ediacara Biota: Neoproterozoic origin of animals and their ecosystems. *Annual Review of Earth and Planetary Sciences*, **33**, 421–442.
- NARBONNE, G. M. and HOFMANN, H. J. 1987. Ediacaran biota of the Wernecke Mountains, Yukon, Canada. *Palaeontology*, **30**, 647–676.
- PYLE, L. J., NARBONNE, G. M., JAMES, N. P., DALRYMPLE, R. W. and KAUFMAN, A. J. 2004. Integrated Ediacaran chronostratigraphy, Wernecke Mountains, northwestern Canada. *Precambrian Research*, **132**, 1–27.



TOPA Topics in Paleobiology

All titles are available via the Wiley website with 30% discount for PalAss members. Log in to your PalAss account at www.palass.org for the discount code.

New titles now available!





Film Review

A message from the Reviews Editor

Hello members! As part of Council's workings over the last year, we have been looking at ways to update the role of the Book Review Editor. While book reviews are, and will continue to be, an important part of the Association's newsletters, I am actively looking at modernizing the role. This means, going forward, that we are looking to solicit write-ups of other types of media that pertain to Palaeontology – whether that is a film, TV programme, online blog, YouTube series, podcast, computer game, educational resource, or even a software package. If you want to highlight something you've created or something that you think the rest of the membership should know about, then we really want to hear from you!

Thomas Clements
Reviews Editor

Ammonite (2020)

Directed by: Francis Lee; Distributed: Lionsgate; Produced: BBC Films, British Film Institute, See-Saw Films; Runtime: 120 minutes; Language: English

A conversation about *Ammonite*, a film based on Mary Anning

March saw the much-delayed UK release of *Ammonite*, a film by Francis Lee, which tells the story of 19th Century Lyme Regis fossil hunter Mary Anning. Following an exchange on Twitter, **Natalia Jagielska** and **Liz Hide** discuss the portrayal of Anning in this film, and whether it helps or hinders efforts to make palaeontology more inclusive.

LH: Much has been made of the film's storyline in which Anning, played by Kate Winslet, has a sexual relationship with Charlotte Murchison, played by Saoirse Ronan. Many of the palaeontological critics of the film have focused on there being no documentary evidence of this relationship. But Tracey Chevalier's bestseller *Remarkable Creatures* also postulates a passionate romance, this time between Anning and Colonel Birch. The only 'evidence' for this is a rather spiteful contemporary quote "*they say Miss Anning attends him*" which sounds to me like a classic case of sidelining a woman's intellectual work with a slur about her sexual activity, real or imagined. What do you think about this question of historical accuracy and fictionalization? Does it work? Does it matter in this context?





NJ: We have to bear in mind that fiction has to have narrative arcs, payoffs and themes – and it is understandable that film has to simplify or fabricate facets of the story. Biopics usually anchor our protagonist in a will-they-won't-they romantic entanglement. These relationships are usually extremely heteronormative, so it is refreshing to see queer representation, out and proud, front and centre in *Ammonite*. Despite sapphic romance being the narrative centre, *Ammonite* does not dwell on implications or stigma of lesbian relationships in 1800s Britain.

LH: One of the things I liked about the film was what I felt was the realistic approach to filming the fossil hunting itself – with the Dorset Jurassic featuring heavily and with fossil-hunting shown as hard, dirty, physical work that takes place in all weathers. Do you think this helps to challenge stereotypes of “Indiana Jones” style fossil hunting, and helps people to understand the reality of field palaeontology?

NJ: The *Mirror* recently ran an article titled “*Beach fossil hunting is the new craze as Brits inspired by films Ammonite and The Dig*”, which shows that the realistic portrayal of fossil hunting resonates with people. From experience, I know how alien the concept of “fossil hunting” might be to an outsider. We need to help people understand that you do not need expensive gear or a degree to engage with your local natural history.

LH: You have pointed out that the film was directed, written, shot, scored and edited by men. How do you think this affects its impact?

NJ: It is not a secret that the film industry is extremely imbalanced. But it hurts when you have a film with themes of sexism, focusing on male dominance in work ... created by a team where all major creative roles are occupied by men. Even the geology consultant they hired was a guy. There is one thing about having diversity on screen, and other, arguably more important, diversity behind the scenes.

LH: Do you think the Mary Anning in the film is a role model that will inspire queer women to study palaeontology? For me, that the film is ‘mainstream’ and the two leads are so well known means that it will reach many more people than might watch a documentary, read a biography or visit a museum. But it is also ironic that it plays down the scientific contribution of Charlotte Murchison herself.

NJ: Palaeontology desperately needs more role models and has a long way to go to be inclusive. Museums and outdoor spaces are rife with cultural barriers, making them inaccessible or uncomfortable to various disadvantaged groups. As it is rare to have a film with a queer woman in the lead we should cherish what we get, but still be critical about it. Members of the demographic represented by Anning still face hardships in and out of academia. But with the film being an arthouse picture with a mature rating – I am worried it might not hit where it would benefit the most: the high school/college demographic.

LH: Class is also an issue that the film attempts to address, contrasting the working class Mary with the wealthy men and women who frequented Lyme Regis for leisure. At times I found this rather awkwardly delivered. Do you think this is successful? And do you think this also is helpful for those of us trying to address wealth-related barriers to participating in palaeontology?

NJ: While the director of the film, Francis Lee, comes from a working-class family himself – the film could have dwelled deeper on class as a barrier to scientific literacy or legitimacy.



Class disparity in the United Kingdom is as extreme today as it was in the 1800s, and this in turn results in a lack of ethnic and cultural diversity. Problems of class will not be resolved by one film, they require large systemic alterations to education and the university system.

LH: What of the romance? I liked the intensity of the relationship, developed through shared love of fossils. Did you feel that the relationship portrayed on the film was convincing, or did it feel like a contrivance or novelty in order to draw attention to the film?

NJ: The film focused on depression, back then known as *melancholia*, and displayed how strong supportive relationships, along with access outdoors and appreciation of the natural world, can be helpful to those struggling with mental hardships. The chemistry between the leads is riveting, but sadly, the context behind the scenes prevented me from enjoying this well-crafted narrative.

Natalia Jagielska (any) is a PhD student at the University of Edinburgh, UK. Natalia can be found on Twitter: @wrycritic. Natalia has also blogged about Ammonite: <https://wrycritic.wordpress.com/2020/10/18/she-sells-sea-shells-thoughts-on-ammonite-a-mary-anning-biopic/>

Liz Hide (she/her) is Director of the Sedgwick Museum, University of Cambridge, UK. Liz can be found on Twitter: @TheMuseumofLiz. The Sedgwick Museum will be launching a set of teaching resources relating to Anning specimens in the Museum's collections later in the year, with support from the Palaeontological Association's Engagement Grant scheme.



Book Reviews

Charles Darwin's Barnacle and David Bowie's Spider: How Scientific Names Celebrate Adventurers, Heroes, and Even a Few Scoundrels

Stephen B. Heard, 2020, 256 pp., Yale University Press, ISBN : 978-0300238280

"What's in a name? That which we call a Rosa alba¹ by any other name would smell as sweet."

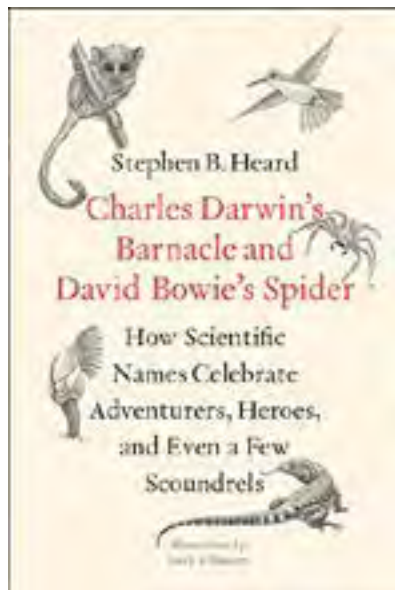
Except as palaeontologists, the naming of species, *i.e.* taxonomic classification, is imperative to our understanding of biodiversity, and a species by any other name could significantly alter the way in which we perceive evolution of life on Earth.

The Linnean system, named after its founder Carl Linnaeus (1707–1778), enjoys universal acceptance within the scientific community. A gift that came along with the Linnean system was eponymous naming, *i.e.* the naming of a taxon after a person, place or even any other existing entity. Stephen Heard in his book *Charles Darwin's Barnacle and David Bowie's Spider* not only explores how species are named but also who they are named after and most importantly, the (sometimes scandalous) reasons behind the names.

As it turns out, Heard reports, there are many reasons why scientists name species after people.

The most obvious ones are to celebrate the achievements and contribution of a person in the field or as an act of love or respect for a person whom the scientist likes but who might be unrelated to the scientific field, *e.g.* a member of the family or a celebrity. Other not-so-obvious reasons also include to bring dishonour to someone, to show spite, or even to bring light to a political situation. The book reveals two things that all of us in academia are probably aware of: (1) scientists are after all only human and (2) the academic system is thoroughly fragile and biased.

Many famous figures within and outside of academia have species named after them. The usual suspects, as Heard notes in the chapter Charles Darwin's Tangled Bank, are Charles Darwin and Alexander von Humboldt with the numbers in three digits. But he also gives equal importance to other lesser-known figures who have contributed extensively to the field of zoology, botany or palaeontology who have been remembered and immortalized through eponymous namings, *e.g.* Maria Sybilla Merian (1647–1717) – artist, botanist, naturalist and entomologist extraordinaire, Tom Iredale (1880–1972) – malacologist and ornithologist who did not have any formal university training but still went on to describe over 2,500 species and genera of Australia, and Berthe



¹ Currently what I have among my humble collections of plants in my home and most likely in yours as well.



Rakotosamimanana (1938–2005) – primatologist and palaeontologist from Madagascar who has been one of the most important pillars for scientific progress and conservation efforts in the country.

There are other less familiar names which have accumulated similarly high numbers (but not as high) as Darwin or Humboldt. Unfortunately, as Heard mentions, all of them are men, of European ancestry and/or of privileged backgrounds – a pattern that reflects the current state of modern academia that has persisted since colonial times. This not only indicates the exclusion of marginalised genders in the discipline but also that of Indigenous people who were already knowledgeable about different animals and plants even before the arrival of Westerners in the region. The scientific enterprise has repeatedly dismissed and devalued Indigenous knowledge of natural systems and processes that was developed over millennia. The ‘discovery’ and naming of certain species sometimes only represents the first record of that species in Western science when it had already long been known in the communities or locations in which it was found – a topic that is thoroughly covered in the chapter ‘The Indigenous Blindspot’. Many a time, these ‘discoveries’ would not have happened without Indigenous contributions.

Another issue that Heard highlights in the chapter ‘Names for Sale’ is the constant underfunding of universities, museums or even just research – to the extent that there are now naming programs offering taxonomic names for sale. The most well-known program, BIOPAT (Patenschaften für biologische Vielfalt or “Sponsorships for Biodiversity”) has raised about 580,000 euros in the space of 20 years, which have been used to fund small projects for biological inventories of new protected areas or designated areas for protection. In a world where taxonomic research is repeatedly experiencing budget cuts, such programs – although criticized by many – have become a modest substitute but a substitute nonetheless. Another approach to bringing the science of species discovery into the public eye has been celebrity eponymous naming. Although short-lived, the attention given to a species named after David Bowie (who gets a mention in the title), or Beyoncé, shines a light on taxonomic research and museum collections, which otherwise remain vastly unknown to the public.

You can imagine the attention that the discipline got when a moth was named after Donald Trump. The motivation behind this eponymous naming was to stress the need for biodiversity habitats in the US, at a time when the then US president’s agenda included rolling back environmental legislations to open protected land to exploitation. While then the meaning behind such naming was clear, over time this will end up being buried in the literature and in the memories of the public, to eventually be instead perceived as an honour. Similarly, Heard recounts in the chapter ‘The Name of Evil’ that some other distasteful characters have been immortalised through eponymous namings: Adolf Hitler, Benito Mussolini and Spanish conquistadors Hernán Cortés and Francesco Pizarro being among them. As of now, no formal petition has ever been made to revoke these eponymous namings – not that such a petition would ever succeed, comments Heard.

The list also contains some scientific ‘household names’ whose questionable beliefs have emerged in recent years. George Cuvier (1769–1832), considered to be the ‘founding father of palaeontology’, also promoted scientific racism, *i.e.* the use of racial observations as empirical evidence to support or even justify racism and white supremacy. Racist views held by Louis Agassiz (1807–1873), the ‘father of glaciology’, and more recently James Watson (1928–2004), one of the people who discovered the double-helix structure of the DNA molecule, have also not deterred anyone from commemorating their contributions through eponymous naming.



The Black Lives Matter movement brought attention to systematic and institutional racism in our society and a frequent response has been the defacing or removal of statues in the USA, UK and Europe, which has sparked quite some controversy. These statues however represent a chosen narrative where the immortalization of the people through these narratives only tells the “better” half of the story. If the stories told through these statues remain skewed, then the alternative is to remove them from the public space altogether. It would seem that even we, in science, have our own “statues” to deal with in the form of eponymous namings. Does this mean that scientists should simply stop naming species after people? I’ll leave this question to those who actually deal with systematics on a more regular basis than I do and who understand more about nomenclature than I ever will.

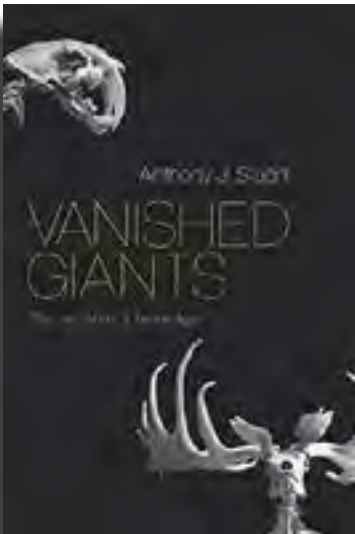
All in all, *Charles Darwin’s Barnacle and David Bowie’s Spider* was a thought-provoking and thoroughly enjoyable read that I would recommend to anyone, whether or not they are interested in taxonomy. Heard weaves the stories behind the names of species around scientific discovery, societal issues and human nature, giving us an insight into how the world of biodiversity came about and what it can teach us. There’s even something for *Game of Throne* fans (and Harry Potter in the cleverly-named chapter ‘Harry Potter and the Name of the Species’) – which I’ll certainly be relaying to my fellow, non-academic Thronies.

Nussaibah Raja

Nussaibah is a PhD student at Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany and proud mother of two cats, Noel and Nepomuk. She can be found on Twitter: @mauritiaales

Vanished Giants: The Lost World Of The Ice Age

Anthony J. Stuart, 2021, 288pp., University of Chicago Press,
ISBN: 978-0226432847.



Tony Stuart is a Pleistocene giant. His contribution to our understanding of extinct megafauna is immense and his decades-spanning career in science has produced paper after paper that are essential reading to anyone in our field. Since publishing seminal work in the 1970s on the extinct species of the European Pleistocene he has been regularly in print. But it is in the last two decades with his work on direct radiocarbon dating, often with the NHM’s Adrian Lister, that his contributions to the field have been greatest. Producing high-quality direct dates on cave hyaenas (*Crocota spelaea*), cave lions (*Panthera spelaea*), woolly rhinos (*Coelodonta antiquitatis*), woolly mammoths (*Mammuthus primigenius*), and most spectacularly on shelk (*Megaloceros giganteus*), this expensive and difficult chronology production gives us massive insights into the dynamics of extinction in the Pleistocene, and in the shocking case of the woolly mammoth and shelk, even into the Holocene.



Vanished Giants: The Lost World of the Ice Age is Stuart's new book, looking back on a career in Quaternary palaeontology and sharing five decades' worth of insight from being at the vanguard of research. Structured around a few general introductory chapters and then tackling each ecoregion (Eurasia, North America, South America, Sahul, Madagascar, New Zealand, Africa/South Asia) with its own chapter, the book looks at what happened to extinct megafauna.

Within each chapter there are subsections devoted to individual extinct taxa with overviews of evidence for last appearance, diet, human interaction *etc.* The book follows the classic example of texts like Björn Kurtén's *Pleistocene Mammals of Europe* an up-to-date bestiary of the forgotten.

This is without doubt an academic book. As an overview of where we stand in our understanding of the timings of the dynamic and individualistic waves of extinction that started in the late Pleistocene, it is without peer. Few concessions are made to lay readers and, unless you want to flip to the appendices for help, the text assumes you will be familiar with techniques like optically stimulated luminescence (OSL) dating, electron spin resonance (ESR) dating, and the semantic differences between overkill and blitzkrieg. Nonetheless, the prose is clear and incredibly informative. It feels like reading a distillation of a career spent passionately investigating the oldest cold case in history. What comes through most of all is just how even-handed Stuart has been in his approach to the evidence. It would be all too easy to produce a book that lays forth the author's hypothesis on extinction and just ignores all evidence to the contrary. But because Stuart is a consummate scientist, he gives all hypotheses a fair hearing and is very circumspect in pushing an answer. It is only in the very last chapter that he cautiously lays out where the blame should lie. It is with our Pleistocene ancestors, who spread round the world as an invasive species, upsetting ecosystems wherever they stopped.

Ross Barnett

Ross is a palaeogeneticist and author of 'The Missing Lynx'. Based in Inverness, Scotland, he is a keen mudlark and can be found on Twitter: @DeepFriedDNA



Books available to review

The following books are available to review. Please contact the Reviews Editor Thomas Clements (e-mail <bookreview@palass.org>) if you are interested in reviewing any of them.

- *Fossils of the Milwaukee Formation: A Diverse Middle Devonian Biota from Wisconsin, USA*, by Kenneth C. Gass, Joanne Kluessendorf, Donald G. Mikulic and Carlton E. Brett.
- *Fossilization: Understanding the Material Nature of Ancient Plants and Animals*, edited by Carole T. Gee, Victoria E. McCoy, and P. Martin Sander.
- *Across the Bridge*, by Henry Gee.
- *Trilobites of the British Isles*, by Robert Kennedy and Sinclair Stammers.
- *William Smith's Fossils Reunited*, by Peter Wigley (editor) with Jill Darrell, Diana Clements and Hugh Torrens.

Dr Thomas Clements

PalAss Book Review Editor,
c/o Department of Geology
School of Geography, Earth and Environmental Sciences
University of Birmingham
Edgbaston
Birmingham B15 2TT
UK



Now Available from
JOHNS HOPKINS UNIVERSITY PRESS

Special
30%
Discount



Fossilization

Understanding the Material Nature of Ancient Plants and Animals

edited by **Carole T. Gee, Victoria E. McCoy, and P. Martin Sander**

Contributors: H. Jonas Barthel, Aurore Canoville, Carole T. Gee, Thorsten Geisler, Jens Götze, Conrad C. Labandeira, Sashima Läbe, Moritz Liesegang, Victoria E. McCoy, Martina Menneken, Jes Rust, P. Martin Sander, Frank Tomaschek, Torsten Wappler, Kayleigh Wiersma, Tzu-Ruei Yang

"This well-written and well-edited volume, which is full of beautiful illustrations, describes exciting areas of fossilization while providing a guide for anyone wanting to apply some of the new techniques or look at emerging areas. Incorporating cutting-edge and revised techniques, this book will interest paleontologists, paleobotanists, and students, as well as general readers."—David Winship Taylor, Indiana University Southeast, coeditor of *Flowering Plant Origin, Early Evolution & Phylogeny*

"An exciting, novel contribution to the paleontological literature written by experts who have done groundbreaking research. There really is no comparable work."—Hans-Dieter Sues, National Museum of Natural History, Smithsonian Institution, author of *The Rise of Reptiles*

"Showcasing knowledge acquired and techniques developed in the past few decades that have given us greater understanding of the processes and mechanics of fossilization, this book is full of cutting-edge, highly original research. A useful and attractive text for paleontologists, mineralogists, biochemists, and paleomicrobiologists, *Fossilization* will be a standard reference for years to come."—Christopher A. Shaw, Idaho Museum of Natural History / ArcheoPaleo Resource Management, Inc., coeditor of *Smilodon: The Iconic Sabertooth*

Carole T. Gee is an associate professor of paleontology at the University of Bonn. She is the editor of *Plants in Mesozoic Time: Morphological Innovations, Phylogeny, Ecosystems*. **Victoria E. McCoy** is a visiting assistant professor of paleontology at the University of Wisconsin–Milwaukee. **P. Martin Sander** is a professor of vertebrate paleontology at the University of Bonn. He is the coeditor of *The Microstructure of Reptilian Tooth Enamel: Terminology, Function, and Phylogeny* and, with Gee, *Biology of the Sauropod Dinosaurs: Understanding the Life of Giants*.

ORDER

Order **978-1-4214-4021-7** in hardcover at the **special reduced price of \$84.00** (reg. \$120.00)

Online: Visit jhupbooks.press.jhu.edu and enter the promotional code **HTWN** when checking out.

Phone: Call HFS at **1-800-537-5487**. Be sure to mention the code **HTWN** to receive your 30% discount.

Be sure to mention the code **HTWN** to receive your 30% discount.

Johns Hopkins University Press c/o Hopkins Fulfillment Service P.O. Box 50370 Baltimore, MD 21211-4370



Careers Q & A

Professional palaeontologists in the wider world

Katrin Heindel completed her PhD (2006–2009) on reef microbialites – microbial carbonates – off Tahiti at MARUM Centre for Marine Environmental Sciences (University of Bremen, Germany) and postdocs at the universities of Bremen (2009–2011) and Vienna, Austria (2011–2015), switching to microbialites in the aftermath of the end-Permian mass extinction. She worked as a lecturer and consultant for contamination risks at Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany (2016). Since 2017, she has worked as Geologist at Dr. Spang – Company for Geological, Geotechnical and Environmental Engineering with a focus on environmental engineering (inspection, evaluation and controlling of polluted areas and their clean-up).



Photo courtesy of Katrin Heindel.

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

I loved to explore caves (within the karst of the Franconian mountains). So primarily I wanted to become a caver. The fascination for our environment, animals, plants, rocks and how things form and exist turned into a wish to be a natural scientist.

How did you first get interested in palaeontology?

I would say traditionally: during collecting stones and finding fossils I wondered how bivalves and corals can “grow” in mountains and within rocks. How old are the mountains, the trees, our planet? How did life develop? Moreover, my mom picked nice rocks, fossils and crystals and explained and answered my questions. My interest awoke.

What was the biggest highlight of your work as a palaeontologist?

To be a scientist/palaeontologist is to me the most exciting and fascinating job overall. Defining and answering scientific questions using different methods (laboratory, experiments, modelling *etc.*), deciding what steps are coming next, collecting samples during expeditions somewhere in the world, to be a member of an international scientific community, which meets regularly at conferences, presenting their work and results – that all is for me the biggest advantage being a palaeontologist.

What made you pursue your current job?

I started a family and decided that the unsteadiness in academic life without having a permanent position is too risky while having a



child. If I had a permanent position at the time, I most likely would have decided differently. I would continue in science.

My job as a geologist in an engineering office is more safe and steady since I am in one place and not moving every few years. My worktime is regular and is shorter than in academia (no work at night and over the weekend).

What are the main responsibilities of your job?

I am an expert and assessor with key responsibilities in managing projects for geotechnical and environmental engineering (foundation of buildings, bridges, traffic infrastructure; cleaning/reconstructing contaminated areas – “Altlastensanierung”), communication with customers and third-party companies, writing survey reports and expert reports, monitoring and controlling third-party constructing companies, managing and controlling field work.

Do you have any tips for students who consider taking a similar career path?

Being a scientist is great and fascinating and still the best job experience I have ever had – but actually it is difficult to find a safe and permanent position. It is not possible to recommend or advise a specific career-path. My suggestion is to be flexible and open to new experiences. It is not always easy to pursue one

specific path. Things change and they have to be adjusted during life.

Do you miss anything from your time in academia?

Yes, I miss making decisions on my own and being excited about doing my job. Working in industry is more routine with a more-or-less fixed working process. That makes the job easier sometimes, but also more boring.

What opinion prevails in industry about people with an academic background?

One point which is always popping up is “Not knowing how ‘real’ work is done” when you have worked solely in the academic sector before. Another point is that a scientist with a PhD is too expensive for “normal” jobs in industry. Third, people with a PhD are too complicated. Unfortunately, these may be comments you get when you apply for a job in industry.

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

It would be helpful to be offered more work experience or internships in industry for students. It could also be useful to acquire more training in writing applications and job interviews for the industrial sector.

Thanks for the chance to talk about my experiences! Greetings, Katrin.

You can find out about Dr. Spang's services at

<<https://www.dr-spang.de/en/company/services.html>>.



Palaeontology and Papers in Palaeontology

Content Alerts

Find out about the latest articles and journal issues as soon as they are published by signing up for Wiley's Content Alerts. To do this, you need an account for Wiley Online Library.

1. Visit one (or both) of our journal homepages:

Palaeontology: [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1475-4983](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1475-4983)

Papers in Palaeontology: [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)2056-2802](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2056-2802)

2. Select 'Get content alerts':

The screenshot shows the Wiley Online Library homepage for the journal 'Palaeontology'. The page features a search bar, a 'Log in / Register' link, and a 'Latest Issue' section. Below the navigation bar, there is an 'Articles' section with tabs for 'Most recent', 'Most cited', 'Latest issue', and 'Most read'. A red arrow points to the 'Get content alerts' button in the top right corner of the article list.

3. If you don't already have one, you will need to create an account for the Wiley Online Library. You can then choose to receive alerts daily, weekly or monthly.

Unfortunately PalAss cannot automatically register members, so please sign up for free alerts today.



Palaeontology

VOLUME 64 • PART 3

CONTENTS

Original Articles

- Palaeontology meets metacommunity ecology: the Maastrichtian dinosaur fossil record of North America as a case study 335
JORGE GARCÍA-GIRÓN, JANI HEINO, JANNE ALAHUHTA, ALFIO ALESSANDRO CHIARENZA *and* STEPHEN L. BRUSATTE
<<https://doi.org/10.1111/pala.12526>>
- Facilitating corals in an early Silurian deep-water assemblage 359
ALAVYA DHUNGANA *and* EMILY G. MITCHELL
<<https://doi.org/10.1111/pala.12527>>
- Testing for a dietary shift in the Early Cretaceous ceratopsian dinosaur 371
Psittacosaurus lujiatunensis
DAMIANO LANDI, LOGAN KING, QI ZHAO, EMILY J. RAYFIELD *and* MICHAEL J. BENTON
<<https://doi.org/10.1111/pala.12529>>
- Snout shape and masticatory apparatus of the rodent-like mesotheriid ungulates 385
(Notoungulata, Typotheria): exploring evolutionary trends in dietary strategies through ancestral reconstructions
MARCOS D. ERCOLI *and* MATÍAS A. ARMELLA
<<https://doi.org/10.1111/pala.12530>>
- The ontogenetic pattern of neurocentral suture closure in the axial skeleton of 409
Hyperodapedontinae (Archosauromorpha, Rhynchosauria) and its evolutionary implications
CLARA HEINRICH, VOLTAIRE D. PAES NETO, MARCEL B. LACERDA, AGUSTÍN G. MARTINELLI, MAICO S. FIEDLER *and* CESAR L. SCHULTZ
<<https://doi.org/10.1111/pala.12528>>
- Stranger than a scorpion: a reassessment of *Parioscorpio venator*, a problematic 429
arthropod from the Llandoveryan Waukesha Lagerstätte
EVAN P. ANDERSON, JAMES D. SCHIFFBAUER, SARAH M. JACQUET, JAMES C. LAMSDALL, JOANNE KLUESSENDORF *and* DONALD G. MIKULIC
<<https://doi.org/10.1111/pala.12534>>



Palaeontology

VOLUME 64 • PART 4

CONTENTS

Original Articles

- Quantitative palaeobathymetric reconstructions based on foraminiferal proxies: a case study from the Neogene of south-west Spain 475
JOSÉ N. PÉREZ-ASENSIO
<<https://doi.org/10.1111/pala.12538>>
- Unique damage-related, gap-filling tooth replacement in pycnodont fishes 489
SALLY E. COLLINS *and* CHARLIE J. UNDERWOOD
<<https://doi.org/10.1111/pala.12539>>
- Empirical distributions of homoplasy in morphological data 505
JODIE L. MURPHY, MARK N. PUTTICK, JOSEPH E. O'REILLY, DAVIDE PISANI *and* PHILIP C. J. DONOGHUE
<<https://doi.org/10.1111/pala.12535>>
- Cephalic biomechanics underpins the evolutionary success of trilobites 519
JORGE ESTEVE, JORDI MARCÉ-NOGUÉ, FRANCESC PÉREZ-PERIS *and* EMILY RAYFIELD
<<https://doi.org/10.1111/pala.12541>>
- Dryopithecine palaeobiodiversity in the Iberian Miocene revisited on the basis of molar endostructural morphology 531
JOSEP FORTUNY, CLÉMENT ZANOLLI, FEDERICO BERNARDINI, CLAUDIO TUNIZ *and* DAVID M. ALBA
<<https://doi.org/10.1111/pala.12540>>
- Trophic partitioning and feeding capacity in Permian bryozoan faunas of Gondwana 555
CATHERINE M. REID *and* YUTA TAMBERG
<<https://doi.org/10.1111/pala.12543>>

Technical Report

- A method for mapping morphological convergence on three-dimensional digital models: the case of the mammalian sabre-tooth 573
MARINA MELCHIONNA, ANTONIO PROFICO, SILVIA CASTIGLIONE, CARMELA SERIO, ALESSANDRO MONDANARO, MARIA MODAFFERI, DAVIDE TAMAGNINI, LUIGI MAIORANO, PASQUALE RAIA, LAWRENCE M. WITMER, STEPHEN WROE *and* GABRIELE SANSALONE
<<https://doi.org/10.1111/pala.12542>>



Papers in Palaeontology

VOLUME 7 | PART 2

CONTENTS

- A quantitative and statistical discrimination of morphotaxa within the Ediacaran genus *Palaeopascichnus* 657
JESSICA B. HAWCO, CHARLOTTE G. KENCHINGTON *and* DUNCAN McILROY
<<https://doi.org/10.1002/spp2.1290>>
- Cranial morphology of a new phytosaur (Diapsida, Archosauria) from the Upper Triassic of India: implications for phytosaur phylogeny and biostratigraphy 675
DEBAJIT DATTA, SANGHAMITRA RAY *and* SASWATI BANDYOPADHYAY
<<https://doi.org/10.1002/spp2.1292>>
- The overlooked aquatic green algal component of early terrestrial environments: *Triskelia scotlandica* gen. et sp. nov. from the Rhynie cherts 709
CHRISTINE STRULLU-DERRIEN, ALAIN LE HÉRISSÉ, TOMASZ GORAL, ALAN R.T. SPENCER *and* PAUL KENRICK
<<https://doi.org/10.1002/spp2.1303>>
- Computed tomographic analysis of the cranium of the early Permian recumbirostran 'microsaur' *Euryodus dalyae* reveals new details of the braincase and mandible 721
BRYAN M. GEE, JOSEPH J. BEVITT *and* ROBERT R. REISZ
<<https://doi.org/10.1002/spp2.1304>>
- Morphology and osteohistology of a large-bodied caenagnathid (Theropoda, Oviraptorosauria) from the Hell Creek Formation (Montana): implications for size-based classifications and growth reconstruction in theropods 751
THOMAS M. CULLEN, D. JADE SIMON, ELIZABETH K. C. BENNER *and* DAVID C. EVANS
<<https://doi.org/10.1002/spp2.1302>>
- Multituberculate mammals from the Middle Jurassic of Western Siberia, Russia, and the origin of Multituberculata 769
ALEXANDER O. AVERIANOV, THOMAS MARTIN, ALEXEY V. LOPATIN, JULIA A. SCHULTZ, RICO SCHELLHORN, SERGEI KRASNOLUTSKII, PAVEL SKUTSCHAS *and* STEPAN IVANTSOV
<<https://doi.org/10.1002/spp2.1317>>
- Redescription of the cranial skeleton of the Early Devonian (Emsian) sarcopterygian *Durialepis edentatus* Otto (Dipnomorpha, Porolepiformes) 789
JORGE MONDÉJAR-FERNÁNDEZ, MATT FRIEDMAN *and* SAM GILES
<<https://doi.org/10.1002/spp2.1315>>
- The ichnogenus *Lumbricaria* Münster from the Upper Jurassic of Germany interpreted as faecal strings of ammonites 807
DIRK KNAUST *and* RENÉ HOFFMANN
<<https://doi.org/10.1002/spp2.1311>>
- Ankothrips*, the most ancient extant thrips genus (Thysanoptera, Melanthripidae) 825
PATRICIA NEL, THOMAS SCHUBNEL, VINCENT PERRICHOT *and* ANDRÉ NEL
<<https://doi.org/10.1002/spp2.1320>>



- Post-embryonic development of *Fritzenellus* suggests the ancestral morphology of the early developmental stages in Trilobita 839
 LUKÁŠ LAIBL, JÖRG MALETZ *and* PASCAL OLSCHESKI
 <<https://doi.org/10.1002/spp2.1324>>
- A new Changhsingian (Lopingian) brachiopod fauna of the shallow-water clastic-shelf facies from Fujian Province, south-eastern China 861
 HUITING WU, YANG ZHANG, THOMAS L. STUBBS, JINGQI LIU *and* YUANLIN SUN
 <<https://doi.org/10.1002/spp2.1318>>
- Upper Toarcian (Lower Jurassic) marine gastropods from the Cleveland Basin, England: systematics, palaeobiogeography and contribution to biotic recovery from the early Toarcian extinction event 885
 MARIEL FERRARI, CRISPIN T.S. LITTLE *and* JED W. ATKINSON
 <<https://doi.org/10.1002/spp2.1322>>
- The oldest known bovid from China and reappraisal of the Chinese '*Eotragus*' 913
 YIKUN LI, QIANG LI, XIJUN NI, SHIQI WANG, MANUELA AIGLSTORFER *and* TAO DENG
 <<https://doi.org/10.1002/spp2.1319>>
- The post-embryonic ontogeny of the early Cambrian trilobite *Estaingia bilobata* from South Australia: trunk development and phylogenetic implications 931
 JAMES D. HOLMES, JOHN R. PATERSON *and* DIEGO C. GARCÍA-BELLIDO
 <<https://doi.org/10.1002/spp2.1323>>
- Small shelly fossils and carbon isotopes from the early Cambrian (stages 3–4) Mural Formation of western Laurentia 951
 CHRISTIAN B. SKOVSTED, UWE BALTHASAR, JAKOB VINTHER *and* ERIK A. SPERLING
 <<https://doi.org/10.1002/spp2.1313>>
- Ontogeny of the trilobite *Elrathia kingii* (Meek) and comparison of growth rates between *Elrathia kingii* and *Aulacopleura koninckii* (Barrande) 985
 MELANIE J. HOPKINS
 <<https://doi.org/10.1002/spp2.1331>>
- Ostracods from the end-Permian mass extinction in the Aras Valley section (north-west Iran) 1003
 JANA GLIWA, MARIE-BÉATRICE FOREL, SYLVIE CRASQUIN, ABBAS GHADERI *and* DIETER KORN
 <<https://doi.org/10.1002/spp2.1330>>
- A new small, mesorostrine inioid (Cetacea, Odontoceti, Delphinida) from four upper Miocene localities in the Pisco Basin, Peru 1043
 OLIVIER LAMBERT , ALBERTO COLLARETA, ALDO BENITES-PALOMINO, CLAUDIO DI CELMA, CHRISTIAN DE MUIZON, MARIO URBINA *and* GIOVANNI BIANUCCI
 <<https://doi.org/10.1002/spp2.1332>>
- Tooth eruption in the Early Cretaceous British mammal *Triconodon* and description of a new species 1065
 KAI R. K. JÄGER, RICHARD L. CIFELLI *and* THOMAS MARTIN
 <<https://doi.org/10.1002/spp2.1329>>
- An Early Devonian actinostelic euphylllophyte with secondary growth from the Emsian of Gaspé (Canada) and the importance of tracheid wall thickening patterns in early euphylllophyte systematics 1081
 KELLY C. PFEILER *and* ALEXANDRU M.F. TOMESCU
 <<https://doi.org/10.1002/spp2.1335>>



- Appearances can be deceptive: bizarre shell microanatomy and histology in a new Triassic turtle (Testudinata) from Argentina at the dawn of turtles 1097
JULIANA STERLI, RICARDO N. MARTÍNEZ, IGNACIO A. CERDA *and* CECILIA APALDETTI
<<https://doi.org/10.1002/spp2.1334>>
- Exceptional avian pellet from the Paleocene of Patagonia and description of its content: a new species of calyptocephalellid (Neobatrachia) anuran 1133
PAULA MUZZOPAPPA, AGUSTÍN G. MARTINELLI, JUAN P. GARDERES *and* GUILLERMO W. ROUGIER
<<https://doi.org/10.1002/spp2.1333>>
- The earliest baleen whale from the Mediterranean: large-scale implications of an early Miocene thalassotherian mysticete from Piedmont, Italy 1147
MICHELANGELO BISCONTI, PIERO DAMARCO, SELINA MAO, MARCO PAVIA *and* GIORGIO CARNEVALE
<<https://doi.org/10.1002/spp2.1336>>
- Tooth replacement in *Manidens condorensis*: baseline study to address the replacement pattern in dentitions of early ornithischians 1167
MARCOS G. BECERRA, DIEGO POL, JOHN A. WHITLOCK *and* LAURA B. PORRO
<<https://doi.org/10.1002/spp2.1337>>
- A Hirnantian holdover from the Late Ordovician mass extinction: phylogeny and biogeography of a new anthracocrinid crinoid from Estonia 1195
SELINA R. COLE, WILLIAM I. AUSICH *and* MARK A. WILSON
<<https://doi.org/10.1002/spp2.1345>>



Overseas Representatives

- Argentina:** PROFESSOR FRANCO TORTELLO, Division Paleozoologia invertebrados, Facultad de Ciencias Naturales y Museo, Paseo del Bosque, 1900 La Plata, Argentina.
- Australia:** ELIZABETH M. DOWDING, School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney, NSW 2052, Australia.
- China:** DR ZHOU ZHONGE, Institute of Vertebrate Palaeontology and Palaeoanthropology, Academia Sinica, P.O. Box 643, Beijing 100044.
- France:** DR JEAN VANNIER, Centre des Sciences de la Terre, Université Claude Bernard Lyon 1, 43 Blvd du 11 Novembre 1918, 69622 Villeurbanne, France.
- Germany:** PROFESSOR FRANZ T. FÜRSICH, GeoZentrum Nordbayern, Fachgruppe Paläoumwelt, Universität Erlangen-Nürnberg, Loewenichstrasse 28, D-91054 Erlangen, Germany.
- USA:** DR RUDY LEROSEY-AUBRIL, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138, USA.
PROFESSOR NORMAN M. SAVAGE, Department of Geology, University of Oregon, Eugene, Oregon 97403, USA.

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 Emilia Jarochowska, e-mail <newsletter@palass.org>. The *Newsletter* is prepared by Nick Stroud, and printed by Y Lolfa, Talybont, Ceredigion.

Deadline for copy for Issue No. 108 is 4th October 2021.

Palaeontological Association on the Internet

The Palaeontological Association has its own pages on the World Wide Web, including information about the Association, and copies of the *Newsletter*. Internet Officer Russell Garwood can be reached by e-mail at <webmaster@palass.org>. The locator is <<http://www.palass.org/>>.

Advertising in the Newsletter

Advertising space in the *Newsletter* will be made available at the rates given below to any organization or individual provided the content is appropriate to the aims of the Palaeontological Association. Association Members receive a 30% discount on the rates listed. All copy will be subjected to editorial control. Although every effort will be made to ensure the *bona fide* nature of advertisements in the *Newsletter*, the Palaeontological Association cannot accept any responsibility for their content.

£80 for half a page

£150 for a full page

These rates are for simple text advertisements printed in the same type face and size as the standard Newsletter text. Other type faces, line drawings *etc.* can be printed.

Rates for distribution of separate fliers with the Newsletter:

1,200 copies for worldwide distribution £250

1,000 copies for worldwide distribution exclusive of North America £200

650 copies for UK circulation only £150

THE PALAEOLOGICAL ASSOCIATION: Council 2021

President:	P. J. ORR, School of Earth Sciences, University College Dublin, Belfield, Dublin 4, Ireland
Vice-Presidents:	F. L. GULL, School of Earth and Environment, University of Leeds, Leeds LS2 9JT, UK R. J. BUTLER, School of Geography, Earth & Env Sciences, University of Birmingham, Birmingham B15 2TT, UK
Secretary:	C. T. S. LITTLE, School of Earth and Environment, University of Leeds, Leeds LS2 9JT, UK
Treasurer:	M. SAKAMOTO, School of Biological Sciences, University of Reading, Reading, UK
Internet Officer:	R. GARWOOD, School of Earth and Environmental Sciences, University of Manchester, Manchester M13 9PT, UK
Editor-in-Chief:	M. A. PURNELL, School of Geography, Geology and Environment, University of Leicester, Leicester LE1 7RH, UK
Editor Trustees:	N. J. BUTTERFIELD, Department of Earth Sciences, University of Cambridge, Cambridge CB2 3EQ, UK S. C. R. MAIDMENT, Natural History Museum, Cromwell Road, London SW7 5BD, UK
Newsletter Editor:	E. JAROCHOWSKA, GeoZentrum Nordbayern, University of Erlangen-Nuremberg, Erlangen, Germany
Reviews Editor:	T. CLEMENTS, School of Geography, Earth & Env Sciences, University of Birmingham, Birmingham B15 2TT, UK
Publicity Officer:	S. J. LYDON, Faculty of Science, University of Nottingham, Sutton Bonington Campus LE12 5RD, UK
Outreach Officer:	Z. E. HUGHES, Natural History Museum, Cromwell Road, London SW7 5BD, UK
Education Officer:	E. WALLACE, iCRAG Irish Centre for Research in Applied Geosciences, University College Dublin, Dublin 4, Ireland
Meetings Coord.:	U. BALTHASAR, Geography, Earth & Env. Sciences, University of Plymouth, Drake Circus, Plymouth PL4 8AA, UK
Diversity Officer:	F. SALEH, Institute of Palaeontology, Yunnan University, Kunming, 650091, China
Ordinary Members of Council:	S. GILES, School of Geography, Earth and Env Sciences, University of Birmingham, Birmingham B15 2TT, UK T. H. P. HARVEY, School of Geography, Geology & Environment, University of Leicester, Leicester LE1 7RH, UK E. A. HIDE, Sedgwick Museum of Earth Sciences, University of Cambridge, Cambridge CB2 3EQ, UK R. THEODORE, Sedgwick Museum of Earth Sciences, University of Cambridge, Cambridge CB2 3EQ, UK
Co-opted:	A. R. T. SPENCER, Dept of Earth Science and Engineering, Imperial College London SW7 2AZ, UK R. SANSOM, School of Earth and Environmental Sciences, University of Manchester, Manchester M13 9PT, UK C. S. C. NICHOLL, UCL Earth Sciences, University College London, London WC1E 6BT M. KOUVARI, UCL Earth Sciences, University College London, London WC1E 6BT

Executive Officer:
J. HELLAWELL, Alport House, 35 Old Elvet, Durham DH1 3HN, UK
Publications Officer:
S. THOMAS, Cambridge, UK