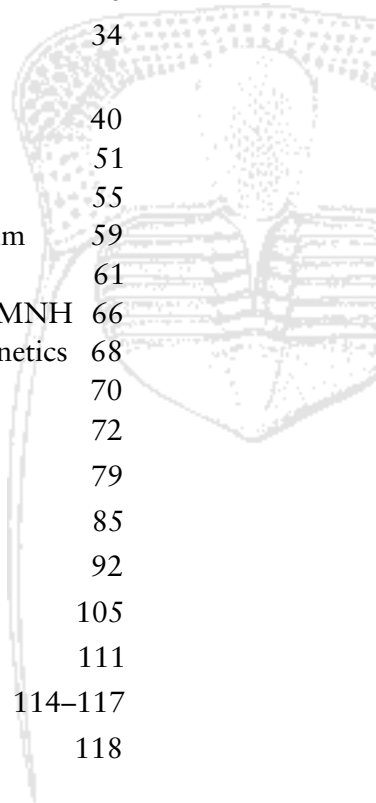


## The Palaeontology Newsletter

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Reminder: The deadline for copy for Issue no. 104 is 1st June 2020.

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

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## Editorial

This issue might be the biggest I have been involved in in my time as Editor, and one of the most important too.

Your usual favourites are all here. In the news piece you will find out what new fossil find **Susannah Lydon** calls “fanboy gold”, whilst **Jan Zalasiewicz** explores all manner of “blobs” in his column. A Palaeontologist Abroad takes us to Argentina, Brazil/South Africa and China via **Christophe Hendrickx**, **Blair McPhee** and **Luke Strotz**, respectively, and in Behind the Scenes at the Museum we visit Japan’s Kitakyushu Museum of Natural History & Human History, courtesy of **Akihiro Misaki**. **Andrew Simpson** introduces us to the latest Legend of Rock, Dorothy Hill, and our Careers Q & A features another palaeontologist who has parlayed her academic skills into a data science role, **Briana McHorse**. In sadder news, this issue features three obituaries, on the lives and careers of Keith Allen, Joe Collins and Margaret Sudbury.

Elsewhere, **Sally Thomas** explains a major change in the Association’s publishing strategy: the switch away from paper copies to online-only. No doubt many members will be sad to see the hard copies of *Palaeontology* and *Papers in Palaeontology* retire, and the decision was not reached lightly, so please see Sally’s piece for the (multi-faceted) rationale behind it.

This issue also sees the start of a new numerical methods series for the *Newsletter*. As a student and postdoc I found the previous pieces – Peter Forey on cladistics, Norm MacLeod on morphometrics and Mark Bell on using R – very helpful in developing my own skills, and I hope this will continue. Our new contributor, **April Wright**, brings this full circle, with a return to phylogenetic inference, but this time from a Bayesian perspective. You can get started on installing the required software using the details in her first piece.

Finally, this issue once again has a strong diversity focus. **Emma Dunne** and her Progressive Palaeontology co-organizers share the many tips they used to make last year’s meeting as inclusive as possible and it is hoped that this can be used as a blueprint for anyone organizing a scientific meeting. Meanwhile, this issue’s Spotlight on Diversity features **Catherine Strickson**, who discusses the challenges of being trans in palaeontology. This issue also features a major new report from a team of authors led by our Diversity Officer **Rachel Warnock**. They explore the gender diversity of authors in the entire run of our flagship journal, *Palaeontology*. Interested readers should consult the full report for details, but importantly it shows (despite what many might expect) that there is no clear improvement in the proportion of women authors over the sixty-year span. The piece also discusses changes that could be made by all of us to improve the situation, and is followed by a response from the Editorial Board, courtesy of **Barry Lomax**, on some new policies we will be adopting.

**Graeme Lloyd**

*Newsletter Editor*

<newsletter@palass.org>

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## Association Business

# Annual Meeting 2020

### Notification of the 2020 Annual Meeting, AGM and Annual Address

The 2020 Annual Meeting of the Palaeontological Association will be held at the University of Manchester, UK, on 19th – 21st December, organized by Dr Rob Sansom and colleagues.

## Nominations for Council

### AGM 2020

At the AGM in December 2020, the following vacancies will occur on Council:

- Vice President
- Treasurer
- Newsletter Editor
- Book Review Editor
- Education Officer
- Meetings Coordinator
- Diversity Officer
- Up to two Ordinary Member posts

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](mailto:secretary@palass.org)>. Anyone interested in a particular role is invited to contact the current post-holder(s) (see inside back cover).

The closing date for nominations is **1st September 2020**. They should be sent in PDF format to the Secretary, Dr Crispin Little, via e-mail to <[secretary@palass.org](mailto: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 sub-committees, particularly those tasked with making recommendations for the awards of grants.

### **Treasurer (five-year term)**

The Treasurer's main role is to oversee the financial management of the Association, providing an independent sounding board for financial matters and being the link between the Executive Officer and the Trustees on finance. The Executive Officer manages the day-to-day financial aspects of the Association (*e.g.* processing payments, collecting annual membership and conference fees, producing the annual accounts *etc.*), although the Treasurer is a cheque signatory and is called on to counter-sign larger payments. The Treasurer attends annual meetings with our investment managers, is a member of the Public Engagement Group, and regularly contributes to committees considering grant applications.

### **Newsletter Editor (three-year term)**

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

### **Book Review Editor (three-year term)**

The main duty of the Book Review Editor is to provide a range of new and recently-published scientific book titles for members to review. Books available span all areas of palaeontological and evolutionary research and, as such, it is necessary to establish and maintain contact with a broad range of publishers, search for new titles and request review copies from publishers. For each *Newsletter*, a list of recently-acquired titles is prepared and, as requests come in from members to review the books, each copy must be sent to the prospective reviewer. Reviews recently received from members must be edited in time for each *Newsletter* deadline. It is often necessary to remind reviewers when their text is required so records must be kept monitoring movement of books and receipt of reviews. The Book Review Editor may volunteer to sit on one or more of the Association sub-committees to review grants and awards.

### **Education Officer (three-year term)**

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



### **Meetings Coordinator (three-year term)**

The Meetings Coordinator ensures the Palaeontological Association is present at most of the major international meetings in the wider Earth Sciences domain, mainly by soliciting and/or organizing symposia that are hosted or sponsored by the Association, and via other initiatives. The Meetings Coordinator interacts with the Annual Meeting organizers regarding the topic of the symposium at the Annual Meeting, and with other conveners of Palaeontological Association-sponsored symposia to avoid overlaps and enhance the visibility of a wide range of palaeontological topics. The Meetings Coordinator also is responsible for the evaluation of applications to and the administration of the Association's Postgraduate Travel Fund. The Meetings Coordinator may volunteer to sit on one or more of the Association sub-committees to review grants and awards.

### **Diversity Officer (three-year term)**

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

### **Up to two Ordinary Members (three-year term)**

Depending on how the other posts are filled (and due to the upper limit of 20 Trustee positions) there may be vacancies for up to two Ordinary Member roles. Ordinary Members do not have a formal portfolio. They attend Council meetings and contribute to discussion, decision-making and future planning. They often participate in important sub-committees, such as those tasked with reviewing and making decisions on grant applications.

## **Awards and Prizes**

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

### ***Statement of Diversity***

The Palaeontological Association has an Unconscious Bias document, 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.

## 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 PalAss 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 not 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 PalAss 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 not 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 the 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 PalAss 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 not 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, and 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 PalAss 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 at the request of the awardee. Awards will be announced in the *Newsletter*, on the Association website and through social media. Council reserves the right to not 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 members
- the results of project evaluation to demonstrate the quality and effectiveness of the project
- links to any digital components
- mechanisms for obtaining feedback

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

Awarded for the best talk 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. Each prize consists of a cash award of £200, and is announced immediately after the oral sessions at the end of the Annual Meeting.

## ***Best Paper Awards***

The aim of these awards is to recognize papers published in either *Palaeontology* or *Papers in Palaeontology* and reward excellence in our field. The selection criteria are: 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 for a list of all papers published during the year to be drawn up in October (when papers for the final part are allocated) and circulated around the science editors. The science editors are asked to nominate any papers that stand out, providing a few sentences explaining why each is deserving. The Chair of the Editorial Board 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 Chair of the Editorial Board will contact the winning authors and write a short synopsis 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.

E-mail <[executive@palass.org](mailto: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 delivered 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 web page as a single PDF format file (max. 8 MB). In addition, a 60-second video summary (in mp4 format; max. size: 30 MB) OR two powerpoint slides (in ppt/pptx format; max. size: 30MB) outlining a proposed seminar topic must be submitted via the Association's web page.

The PalAss Exceptional Lecturer will be chosen based on 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 web page 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](http://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 the May and October Council 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. Enquiries may be made to the Secretary (e-mail <[secretary@palass.org](mailto: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 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 the website for details regarding the categories of expenditure for which the Palaeontological Association does not provide support, at <<https://www.palass.org/awardsgrants/grants/engagement-grants>>).

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 (see website for details of the Required Supporting Information).

The application deadline is **1st September** and funds will normally be available from 1st November each year. In rare cases where rapid access to funds is critical, applications submitted outside the normal deadlines may be considered. The awards will be announced at the following AGM. Enquiries may be made to the Outreach Officer, Zoë Hughes (e-mail <[outreach@palass.org](mailto:outreach@palass.org)>).

## Carer's Bursary

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



Bursaries will be awarded to applications received prior to the application deadline. Applications will be assessed by the PalAss Diversity Group; if there are several eligible applicants, awards will be made on a first-come first-served basis. No subsequent report on expenditure is required. Successful applicants will be invited to submit a brief statement (<60 words) describing the impact of the bursary on their career. This statement may be used in publicity for the bursary scheme and thus should not contain any confidential or sensitive information. The principal applicant must be a member of the Association. Applications must be submitted electronically through the PalAss website. Any publicity associated with the activity must mention the support of the Association. Successful awards will be paid retrospectively on the submission of receipts for reasonable costs (e.g. economy air fares or train tickets, accommodation, subsistence).

Deadline: 1st May (Progressive Palaeontology) and 1st October (Annual Meeting) at 23:59 GMT.

Required supporting information:

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

These documents must be submitted in a single PDF file.



## Awards and Prizes AGM 2019

### *Lapworth Medal: Professor Derek E. G. Briggs*

*Lucy McCobb and Maria McNamara write:*

Derek Briggs is, by any measure, an outstanding palaeobiologist. Over the course of his career Derek has published over 375 scientific articles, including an astonishing number in top-tier journals (20 in *Nature* and 14 in *Science*). He has published several important books, including the seminal volumes *Palaeobiology* and *Palaeobiology II*, which gave us the first syntheses of the field of palaeobiology. Not only is Derek remarkably prolific, but his research has been influential in diverse fields, providing critical insights into arthropod palaeobiology and evolution, the nature of the Cambrian radiation, functional morphology, ichnology and taphonomy. He has been involved in many important discoveries that are simply too numerous to list; highlights include the resolution of the nature of the conodont animal, the anatomy of the giant Cambrian predator *Anomalocaris*, the chemical mechanisms by which fossils preserve as organic remains, and the colours of dinosaurs.



Photo: Alan Spencer

In particular, Derek has been a pioneer in the study of Konservat-Lagerstätten, driving a paradigm shift in palaeontology that has fundamentally altered our perception of these fossil deposits from being trivial oddities to providing critical evidence of the evolution of life. Linked to this, he has spearheaded experimental approaches to understanding the impact of decay and fossilization of soft tissues that are now widely used by researchers around the world, and has revealed the mechanisms and controls on soft tissue preservation in authigenic minerals such as pyrite, phosphate and as organic remains. What's more, his work has yielded substantial insights into the palaeobiological significance of many important fossil deposits, most notably the Burgess Shale, Fezouta, Winneshiek, Beecher's Bed, Herefordshire and Hunsrück. Collectively, these academic contributions have driven the revolution of palaeobiology, and his characteristic quantitative and analytical approach and emphasis on combining data from fossil and modern systems have been central to the transformation of palaeontology into the robust analytical science it is today.

Derek's career also features a consistently high level of service to the field. In addition to having held editorial positions with many journals, he has acted as supervisor and mentor to almost 80 PhD students and postdoctoral researchers, many of whom now occupy influential positions of their own. It is a privilege to benefit from his mentorship, guidance and support; his attention to detail, especially in the crafting of a paper, is second to none. He has promoted the discipline by



serving as president of both the Palaeontological Association and the Paleontological Society, and has served the broader community through his time as Assistant Dean of Science and Mathematics at Goldsmiths, University of London, as Chair of the School of Earth Sciences at the University of Bristol, as Director of the Yale Institute of Biospheric Studies, and as Director of the Yale Peabody Museum of Natural History. His contributions have been recognized by various notable distinctions, including the Geological Society Lyell Medal, the Paleontological Society Medal and his election to fellowship of the Royal Society.

In sum, Derek has made an outstanding contribution to palaeontology, shaping the discipline as we know it today. He will undoubtedly make many more valuable contributions through his involvement in research themes that continue to push the boundaries of what is possible in palaeobiology, as well as being an inspiration to generations of younger scientists.

## ***President's Medal: Dr Mark D. Sutton***



Photo: Alan Spencer.

*Alan Spencer and Russell Garwood write:* Mark has been a Senior Lecturer in Palaeontology at Imperial College London since 2009. He studied at Cambridge (undergraduate) and Cardiff (PhD), and has held academic appointments at Lampeter, Oxford and, since 2005, Imperial College London. Since Mark first appeared on the palaeontological stage he has continuously worked on ground-breaking palaeontological research, taught and mentored students (many of whom have gone on to their own successful careers in palaeontology) and has served many years on the PalAss Council. His first foray into the world of palaeontology commenced with humble brachiopods, an enduring fascination that he has returned to over the years.

Mark has always been computationally-minded, and soon after this neophyte phase as a 'traditional' invertebrate palaeontologist, he was instrumental in developing SPIERS, one of the first freely available software packages to facilitate the reconstruction of three-dimensional fossils. This has been a pivotal and ground-breaking approach that has, for instance, enabled study of the Herefordshire Lagerstätte; work that Mark is still heavily involved in publishing. The resulting papers for this site have featured in numerous high-impact journals (*Nature*, *Science*, *PNAS*, *Proceedings of the Royal Society B*, *Palaeontology*) and have allowed the reconstruction of this important early ecosystem with its diverse range of taxonomic groups. In addition to SPIERS, Mark has been instrumental in disseminating his novel computational techniques to the wider community, through numerous talks, papers and a recent book covering methodologies in virtual





palaeontology. His related academic output has included such diverse contributions as: R packages to aid phylogenetic tree manipulation; multiple papers looking into what defines a living-species and methods to quantify them; manuscripts studying birth–death models in the context of trying to improve systematic approaches; and, more recently, a novel evolutionary simulator published in *Palaeontology* that allows large populations to be tracked over substantial time periods.

Besides this more computationally-oriented research, Mark has a long history of publishing research grounded in more traditional approaches, including: work on Mesozoic extinctions and the environmental interactions associated with them; papers on arthropod, molluscan, and cephalopod phylogenies; and taxonomic descriptions of numerous taxa across geologic time (e.g. Carboniferous seeds-plants, Silurian echinoderms). Mark has a long history with the Association, starting as a PhD student who won over the audience with one of the first PowerPoint presentations, to a bit later in life taking up the mantle of Internet Officer, before escaping Council temporarily after a stint as Vice-President. This sabbatical did not last long, as very soon after Mark was back on Council as the primary organizer of the highly successful 2017 Annual Meeting. This is by no means the only large scale and well-run meeting Mark has helped organize, with the 2010 IPC3 meeting in London standing out as a highlight. As a lecturer Mark has nurtured the interests of many proto-palaeontologists and geologists alike, totalling hundreds of undergraduate and masters students; indeed he has won awards for his pedagogically-focused teaching output. More recently he has stepped up to be the head of undergraduate teaching for his department. This breadth of achievements and depth of research in diverse areas is frequently obscured by Mark's unassuming nature and disregard for self-promotion. He is richly deserving of this award in recognition of his work to date, his contributions to the palaeontology community, and his influence on our science and the younger generation of palaeontologists.

## ***Hodson Award: Dr Silvia Danise***

*Stefano Dominici, Steven Holland and*

*Richard Twitchett write:* Silvia is a world-class invertebrate palaeontologist, excellent field geologist and stratigrapher and is highly numerate. She is a shining example of what the modern palaeobiologist should be, and is as much at home in the field as in the lab; is as comfortable writing taxonomic descriptions as interpreting geochemical data; can manipulate and analyse large databases using code she has written herself; and uses all these skills to tackle big questions in Earth history that also have relevance for the present. It is this high quality and unique breadth and blend of skills that sets Silvia apart from the rest of her peers. Quantitative field-based palaeontology is a tough science to do well, demanding excellent field skills, excellent and broad skills



*Photo: Alan Spencer.*



in taxonomy and ecology and excellent mathematical and analytical skills. At best, most individuals, including current world leaders, excel in just two of these. Silvia has all three already.

Following her PhD, Silvia spent three years at Plymouth as a postdoctoral research assistant studying Mesozoic marine ecosystems. She was then awarded a Marie Curie Outgoing Fellowship that enabled her to spend two years with Steve Holland on a project that integrated palaeontology, sequence stratigraphy and geochemistry. Following the return leg of that fellowship, she was then awarded a fellowship from the Rita Levi Montalcini Programme for young researchers – an extremely competitive and highly prestigious Italian research programme – to study benthic marine response to the mid-Pliocene climatic optimum. Silvia is already a world leader in the study of fossil deadfall communities – including both whales and marine reptiles – and has an excellent and growing international reputation in the study of Mesozoic and Cenozoic marine ecosystems and their responses to environmental change. Her notable outputs include high-profile, lead-author papers in *Biology Letters*, *Nature Communications*, *Geology*, *Palaeontology* and *PLOS ONE*. Her academic work is of the highest quality in terms of rigour and originality. For example, Silvia was the first to discover bone-eating *Osedax* in the Mesozoic and to document in detail the ecological succession in a Jurassic ichthyosaur deadfall. Her work on the Pliensbachian–Toarcian event has been, and continues to be, truly outstanding, from her detailed, high-resolution studies of the ecological changes in benthic fossil communities, to her pioneering analyses combining her quantitative palaeontological data with geochemical proxy data from the same horizons to determine which environmental changes exerted the most control on the marine fauna. Her latest quantitative field-based studies of the Pliensbachian–Toarcian extinction and warming event are currently in press.

Silvia's expertise and interests encompass a breath-taking range of fields of study from modern and fossil vertebrate deadfall communities, mass extinctions and ecological responses to past climate change, and large-scale stratigraphic controls on the fossil record. Incredibly impressive for someone at her career stage! She is also an excellent lecturer and well-liked mentor to her students, undergraduate and postgraduate alike, is happy involving undergraduates in her research, and is an inspirational and easy-to-approach advisor.

## **Mary Anning Award: Dr Hans Hagdorn**

*William Ausich, Andy Gale, George Sevastopulo, Mike Simms and Andrew Smith write:* Hans Hagdorn was born in 1949 in Baden-Württemberg, Germany. He trained as a teacher at the University of Tübingen, entering the profession as a trainee in 1974 and retiring with the grade of Oberstudienrat ("Senior grammar school teacher") in 2013. His name is almost synonymous with Triassic palaeontology and geology, with which he has been engaged since at least 1978, when he published his first paper in the *Neues Jahrbuch für Geologie und Paläontologie*. His main fields of interest are in the Muschelkalk and its fossils, particularly crinoids and other echinoderms, but his research has carried him to many countries outside of Europe, including China, Saudi Arabia and the USA, and has involved several other fossil groups. He has published over 200 papers, both as sole author and in collaboration with an extensive list of professional palaeontologists. These have appeared in national and international journals including *Geology*, *Ichnos*, *Journal of Vertebrate Paleontology*, *Palaeontology*; *Paläontologische Zeitschrift* and *Swiss Journal of Palaeontology*. Hans



has at one time or another been a member of the Sonderforschungsbereiche 53 at the University of Tübingen; a board member of the Paläontologische Gesellschaft; a corresponding member of the Permian/Triassic Subcommittee; a voluntary collaborator of the Geological Survey of Baden-Württemberg; and a Board member of the Friedrich von Alberti-Stiftung ('Friedrich von Alberti Foundation'). His palaeontological and stratigraphical work has been recognized internationally and he has been awarded an honorary doctorate (Dr. rer. nat. h. c.) by the University of Tübingen (1988); the Karl Alfred von Zittel Medal of the Paläontologische Gesellschaft (1995); the Harrell L. Strimple Award of the Paleontological Society (1997); honorary membership of the Paläontologische



Photo: Alan Spencer.

Gesellschaft (2002); the R H Worth Prize of the Geological Society of London (2013); and honorary membership of the Gesellschaft für Naturkunde in Württemberg (2015). In 1986, Hans put on public display his extensive collection of Triassic fossils in his own eighteenth century house in Ingelfingen. This was the genesis of Muschelkalkmuseum Hagdorn Stadt Ingelfingen. In 1996, the town council of Ingelfingen made available space in the building at Schloßstraße 3, and it was possible to display there all major groups of Muschelkalk and Lower Keuper fossils, as well as exhibits illustrating Triassic geology. The Museum has expanded further and now houses a collection of more than 25,000 specimens of fossils, minerals and rocks, with many published reference specimens and several types. The ownership of the collections has been vested in the Alberti Foundation, which was set up in 1997 by quarrying companies to promote research on the Muschelkalk of North Baden-Württemberg. Hans is the Director of the Museum which is entirely staffed by volunteers and is supported financially by the Municipality of Ingelfingen and the Alberti Foundation. He has been very supportive of visiting collaborators, providing accommodation and hospitality in addition to access to his vast collection.

## ***Gertrude Elles Award: Elspeth Wallace***

*Rob Sansom writes:* Elspeth Wallace received 2019's Gertrude Elles award in recognition of her tireless work as part of the University of Manchester's widening participation programme. In her role as a widening participation fellow, Elspeth designed and conducted a wide range of outreach activities for groups of learners with historically low participation in university education, using palaeontology as a vehicle for engagement and understanding of science. Through these activities she has been able to reach a wide range of learners who have had little experience or knowledge of palaeontology or careers in STEM. The target audiences for the widening participation activities cover a broad range of pre- and post-16 learners, but in all instances the emphasis has been on



pupils in groups, schools and areas with previously low participation in higher education. Elspeth's work has had direct impact in socio-economic groups that were seen to be under-represented in the Palaeontological Association's Diversity Study; many of the young people involved are from disadvantaged backgrounds. The workshops that Elspeth designed and delivered include 'Dino-sores' where young people learn about pathologies in the fossil record and figure out the cause of death of the *Gorgosaurus* located in the University of Manchester Museum, and 'Dinosaurs, adapting to survive!' in which young people build on their knowledge of adaptation in biology and are exposed to comparative anatomical study, figuring out the use of various specialized dinosaur body parts. To specifically tackle the under-representation of women in STEM professions,



Photo: Alan Spencer.

Elspeth has designed and delivered a Mary Anning workshop, in which students learn about the life and work of Mary Anning and reconstruct the palaeoecology of the Lias using her discoveries. By running a large number of workshops in and around Manchester, Elspeth was able to reach 600 students as part of the widening participation programme, and many more have attended talks or interacted with her and her team at STEM careers events. The feedback on these events was extremely positive not only from attendees, but also supervisors. We look forward to welcoming future generations of STEM researchers inspired by her outreach and engagement efforts.

## ***Best Paper Awards***

*Barry Lomax (Chair of the Editorial Board) writes:* The Palaeontological Association awards annual prizes to the best papers published in *Palaeontology* and *Papers in Palaeontology*, to recognize and reward excellence in our field of science. Each year the science editors (who have the task of steering papers through the review process) are asked to nominate papers that they feel stand out as being particularly noteworthy and that have scientific breadth and impact. For articles published in *Palaeontology*, the papers should have a wide impact and shape future research directions, and for *Papers in Palaeontology* novelty, breadth, quality of the description and a clear and robust discussion of why the fauna or flora has wider significance are sought. The nominated papers are then voted on by the Editorial Board. The awards are open to all authors irrespective of age or nationality, and membership of the Association is not required. Frontiers Reviews, Rapid Communications and regular research articles are all eligible. Both of the Association's journals are attracting many high-quality papers, which made this year's competition keenly contested, giving the Editorial Board a difficult choice. The two papers that emerged as winners were as follows:



EVERS, S.W. and BENSON, R.B.J. 2019. A new phylogenetic hypothesis of turtles with implications for the timing and number of evolutionary transitions to marine lifestyles in the group.

*Palaeontology*, **62**, 93–134.

<<https://doi.org/10.1111/pala.12384>>

This paper is an important contribution to understanding the evolutionary ecology of turtles, both comprehensive and rigorous in its approach. The Editorial Board were of the opinion that this paper sets the benchmark for any future discussion concerning turtle evolution, as reflected in the fact that the paper has already attracted a number of citations since publication.

FOSTER, W. J., LEHRMANN, D. J., HIRTZ, J. A., WHITE, M., YU, M., LI, J. and MARTINDALE, R. C. 2019.

Early Triassic benthic invertebrates from the Great Bank of Guizhou, South China: systematic palaeontology and palaeobiology. *Papers in Palaeontology*, **5**, 613–656.

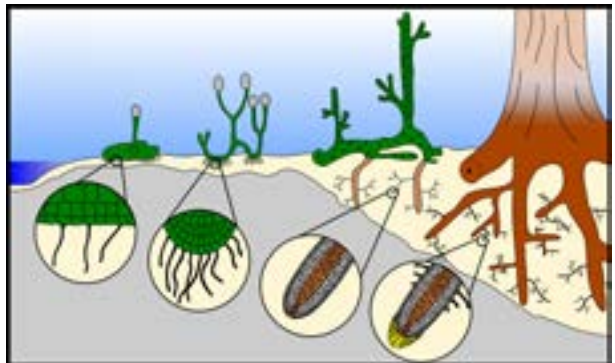
<<https://doi.org/10.1002/spp2.1252>>

This is an excellent paper combining the description of a diverse fauna and placing it into a broader context. The paper describes a rich new post-Permian recovery fauna. This is then discussed in terms of its significance with a focus on palaeoecology and local/global palaeobiogeographical distribution. It has also already attracted citations.

## PalAss Exceptional Lecturer

We are pleased to announce that **Dr Sandy Hetherington** has been appointed as the PalAss Exceptional Lecturer for the academic year 2020/21. He will be presenting the PalAss 'Innovations in Palaeontology' lecture series at institutions that apply to host him over the coming months. As a research fellow in evolutionary biology at the University of Oxford, Sandy's research focuses on uncovering the origin and early diversification of plant roots – an organ whose origin made profound changes to the terrestrial landscape and was essential for plants to evolve the tree life habit. His proposed lecture is entitled 'In search of the roots of roots: 400 million years of plant root evolution'. Sandy will highlight cutting-edge palaeobotanical research and reveal the hidden history of plant roots. The talk will take audiences on a journey following root evolution, including new insights from the world-famous 407 million-year-old Rhynie chert, the discovery of the roots that underpinned the iconic Carboniferous coal swamp forests and finally the hidden history of roots written in the genomes of living species.

Any academic institution (universities and museums) from any country can apply to participate in the Innovations in Palaeontology Lecture Series as a host institution. Sandy will be available to present this lecture from September 2020 until May 2021, and institutions wishing to host him should see page 10 in this *Newsletter* and/or the Association website for details.





## Small Grant Awards AGM 2019

The small grants awarded by the Association for funding in 2019 include the Sylvester-Bradley, Callomon, Whittington and Stan Wood awards. Council agreed that the following applicants should receive Sylvester-Bradley awards: Namiko Machida (£1,188.30), Dr Ninon Robin (£1,500) and Jack O. Shaw (£1,420). The Callomon Award was made to Roy Smith (£1,455); the Whittington Award to Dr Emma M. Dunne (£1,500); and Stan Wood awards to Rebecca F. Bennion (£1,500) and Christina Shears-Ozeki (£1,500). Details of the proposed research are given below.

### *The importance of environmental factors in driving paedomorphic evolution in the suborder Phacopina*

**Namiko Machida**

*West Virginia University*

Morphological innovation can be achieved by changes in the rates and timing of developmental series, known as heterochrony. Trilobites are very informative in the study of heterochrony because they moult multiple times throughout their life and their highly calcified exoskeletons are preserved well enough to provide a unique window of evolutionary modification of the ontogenies. Cases where descendant adults retain ancestral juvenile characters have been widely recognized across trilobites' evolutionary history; however, the universality of suggested causes and mechanisms for this mode of evolution have not been tested. I will focus on the suborder Phacopina, which has good records of ontogeny and paedomorphy. This study aims to create a comprehensive phylogenetic framework of the Phacopina and to assess driving factors for the paedomorphosis. Compiling and expanding data for the new phylogenetic analysis requires observations of many well-preserved specimens. The vast trilobite collection in the Cincinnati Museum Center, which holds numerous early Palaeozoic unsampled taxa, will be studied in this project. Various environmental factors such as water depth, palaeolatitudes and sedimentary facies for each phacopine taxon will be mapped on the resultant tree to test for their relationships with heterochronic trends. Evaluating the driving forces for the heterochrony will provide new insight into the interaction between environmental changes and morphological novelties.

### *Investigating the enigmatic Devonian arthropod Oxyuropoda*

**Ninon Robin**

*University College Cork*

Isopoda (marine lice and woodlice) are the most ecologically diverse crustaceans (predators, scavengers, parasites). These ecologies were acquired over time along with the colonization of land, deep sea and freshwater environments since their diversification in the Ordovician. Ecological transitions from shallow water to land and deep sea were dated by molecular phylogenies to have



occurred from the Late Carboniferous onward. However, when calibrated with the oldest fossil isopods, molecular phylogenies evidence an even earlier ecological transition from shallow to freshwater environments. Contrary to the two others, this earlier transition has never been studied, presumably due to a lack of fossilized examples of stem-isopods. Found in 1908, the freshwater arthropod *Oxyuropoda* (Upper Devonian, Kilkenny, Ireland) has been ascribed to various arthropod groups, but mostly, to isopods. Few studies are based directly on the study of the specimen itself, held in Dublin. This project aims to test for the affinity of *Oxyuropoda* with crown-Isopoda, by analysing its holotype for the first time using scanning and electronic microscopy/spectroscopy techniques. The much-compressed fossil will be investigated for its whole anatomy using X-ray computed laminography, and by electronic microscopy (SEM-EDS) for cuticle and appendages ultrastructures. If affinity with isopods are confirmed, *Oxyuropoda* may help to shed light on the timing of freshwater colonization among Isopoda and relatives.

## ***Manitoba Lagerstätten: elucidating connections between the Cambrian Explosion and Great Ordovician Biodiversification Event***

**Jack O. Shaw**  
*Yale University*

Animal diversity was built across the Cambrian Explosion (CE) and Great Ordovician Biodiversification Event (GOBE) but evolutionary connections between the two are less well known. Whereas the CE involved global increases in morphological disparity, higher-rank origination and extinction rates, the GOBE involved localized rises in lower-rank diversity. Complicating matters further, the CE is evidenced by a range of fossils including soft- and hard-bodied taxa, whereas the GOBE is based mainly on shelly deposits. However, newly discovered Ordovician Lagerstätten can refine our understanding of connections between the CE and GOBE. I will compare features of Cambro–Ordovician Lagerstätten to address three questions: is there a continuum between CE and GOBE diversification dynamics? Are Ordovician Lagerstätten representative of true Ordovician diversity or are they unusual in capturing ‘Cambrian’ taxa? And, do distinct taphonomic biases affect CE and GOBE deposits? Preliminary analyses of 15 Lagerstätten show smooth transitions in taxonomic composition, but a lack of Ordovician data reduces the results’ fidelity. To remedy this, I will generate faunal lists for three new deposits in Manitoba, Canada, which bridge the gap between rapid Cambro–Ordovician diversification and a subsequent diversity plateau. By also considering environmental, taphonomic and phylogenetic data in comparisons of early Palaeozoic Lagerstätten, I will elucidate relationships between the CE and GOBE.



## *A new and unique Kem Kem beds (mid Cretaceous) locality near the oasis of Tarda, south eastern Morocco*

**Roy Smith**

*University of Portsmouth*

The mid Cretaceous Kem Kem beds of Morocco (?Albian–Cenomanian) represent a dominantly fluvial environment with a diverse, but heavily biased vertebrate fossil assemblage. The dinosaur fauna, for which the deposit is world famous, is dominated by large predators, but the lack of ornithischians is particularly intriguing. Despite the lack of ornithischian body fossils, a number of footprints have been assigned to the Ornithopoda. A new Kem Kem beds fossil site near the remote oasis of Tarda, Errachidia Province, south east Morocco, was discovered during fieldwork in the spring of 2019. This new site has an abundance of dinosaur footprints preserved as three-dimensional casts, some of which can be tentatively assigned to ornithopods, as well as theropods and perhaps sauropods. Therefore, this new site may hold the key to understanding the discrepancy in the lack of ornithischian remains in the Kem Kem beds in general. The aim of the project is to investigate and describe the sedimentological and palaeontological aspects of this new and seemingly unique Kem Kem beds locality.

## *Harnessing the power of ‘dark data’ for enhancing estimates of tetrapod diversity*

**Emma M. Dunne**

*University of Birmingham*

Reconstructions of past diversity require large aggregations of fossil occurrence data, the most comprehensive and widely used of which is the Paleobiology Database (PBDB, <[www.paleobiodb.org](http://www.paleobiodb.org)>). The PBDB contains almost 1.5 million fossil occurrences; however, these data are sourced solely from published data. The published literature, although rich, documents only a fraction of the fossils housed in the world’s museums. A previous estimate suggests that the data accompanying museum specimens (‘dark data’) can contain up to 23 times more localities per fossil group than the PBDB, implying enormous potential to enhance reconstructions of past diversity. However, the impact of these additional data from museum collections on estimates of diversity has not yet been evaluated. This project focuses on European early tetrapods to determine the feasibility and impact of incorporating ‘dark data’ in occurrence datasets for diversity analyses. Selected museum collections will be assessed first-hand to create a new dataset of ‘dark data’ alongside existing PBDB data. Quantitative analyses of species richness will be conducted using this new dataset and the results directly compared to recently published estimates. Finally, this study will be developed into a protocol for future work with vertebrate ‘dark data’, with the aim of forging greater connections between curators and researchers in quantitative palaeobiology.





## ***Disparity and niche partitioning in toothed cetaceans from the early Miocene of Peru***

**Rebecca F. Bennion**

*University of Liège*

The Early Miocene was an important time in the evolution of echolocating toothed cetaceans (odontocetes) as it saw the extinction of archaic groups and the radiation of early members of various modern lineages. The Chilcatay Formation of Peru dates to this time period and is known for its extremely diverse odontocete fauna, of which just under half of the taxa represented are undescribed. Recent stratigraphic work has found that these fossils were all deposited within a narrow time interval, therefore providing a unique opportunity to investigate the ecology of Early Miocene odontocetes at the ecosystem level. This project aims to investigate niche partitioning in the Chilcatay Formation odontocete fauna using 3D scanning to accurately capture the morphology of well-preserved skulls. These models will be analysed using a mixture of landmarking and traditional morphometric methods to highlight variations in skull shape and inferred feeding strategy. As the Chilcatay fauna shows a range of body sizes, including between closely related taxa, the morphological data from the 3D models will be analysed alongside total body length reconstructions to determine how important this is as a driver of partitioning. Finally, a similar series of analyses will be conducted on an equivalent extant sympatric odontocete fauna in order to compare the structure of the niche partitioning in the Early Miocene and the modern day.

## ***Bone modification of the Mesozoic marine vertebrates of southern England***

**Christina Shears-Ozeki**

*Kyoto University*

In modern ocean sea-floor environments, both macro and microorganisms such as sharks, hagfish, crabs, hard substrate borers (e.g. *Osedax*) and various bacteria exploit wood, whale or reptile carcasses ('deadfalls'). These food bounties provide sustenance for years, through various stages of colonization, in otherwise nutrient scarce environments. The final most diverse stage, known as the sulphophilic stage, can continue for decades and relates to the activity of sulphur-reducing bacteria breaking down the lipids. Their activity generates by-products, attracting further communities of bacteria and other organisms. Recently, inspection of ancient marine reptile bones from both Triassic and Jurassic palaeomarine environments in Japan revealed microscopic marks on the surface of the bone, in the form of microborings. Originally assumed to be from physicochemical weathering processes, identification of sedimentary and bioerosional features, including microborings in the osteons, now suggest microorganism activity that occurred prior to fossilization. This study aims to investigate microscopic traces on fossil marine vertebrates (including the Mesozoic marine reptiles) that inhabited various palaeomarine environments and spanned Japan's geological and evolutionary periods, as well as global fossil and modern specimens in order to identify the microorganisms responsible for these marks, the reasons for their activity and their effect on the preservation processes.



## ASSOCIATION MEETINGS



**64th Annual Meeting of the Palaeontological Association**  
University of Manchester, UK 16 – 21 December 2020

The 2020 Annual Meeting of the Palaeontological Association will be held at the University of Manchester, the largest single-site university in the UK. The organizing committee is chaired by Robert Sansom, with help from 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 64th Annual Meeting will be held from 19th to 21st December 2020, with a pre-conference field-trip led by Phil Manning from 16th to 18th December. All scientific sessions, workshops and the symposium will take place on the Oxford Road campus of the University of Manchester, at University Place and the adjacent Department of Earth and Environmental Sciences.

### **Workshops and symposium**

The meeting will begin with several workshops during the morning of Saturday 19th December at the Department of Earth and Environmental Sciences. The two planned workshops will focus on: 1) training in tomography and visualization, supported by AVIZO, and 2) public engagement and scientific communication.

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.

The symposium will close with an evening drinks reception in the fossil galleries of Manchester Museum on the Oxford Road university campus.

### **Conference and Annual Address**

The main conference will begin on Sunday 20th December with a full day of talks and posters, followed by the Annual General Meeting and the Annual Address that evening. Following this, the Annual Dinner will be held in the iconic and grand Midland Hotel in Manchester city centre. The final day of the conference is Monday 21st December, and will be a full day of posters and talks in parallel sessions. Talks for both days will be allocated 15 minutes including time for questions.

### **Field-trips**

There will be a three-day pre-conference field-trip run by Phil Manning to the Jurassic succession exposed on the Yorkshire Coast between Port Mulgrave and Scarborough, visiting numerous palaeontological sites from the Whitby Mudstone Formation (Toarcian) to the estuarine Scarborough Formation (Bajocian).

The trip will depart on 16th December early in the morning from Manchester, and return on the 18th late in the afternoon, arriving in time for checking-in and relaxing before the start of the Annual Meeting.



The field-trip fees will include three days of meals, transport, the field-trip guide and accommodation for the duration (including the night of the 15th to facilitate an early departure for the group on the 16th). The number of participants will be limited to 30 due to the size of the two vehicles that will be used to transport the group between localities.

The sections being visited are steep, tidal and quite strenuous. They involve walking down and back up cliff paths and along slippery, uneven surfaces.

### **Getting to Manchester**

Manchester has excellent travel connections to the rest of the UK and Europe. The venue on the Oxford Road campus is a short walk (<2 km) from the city centre and Manchester Piccadilly railway station, which has direct services to most UK cities (the 147 bus connects campus and Piccadilly). Manchester Airport is the UK's third busiest with frequent connections to a wide range of European and North American destinations; it is a short train journey (~£4) or taxi ride (£20) from the university campus.

Visitors from outside the UK should be reassured that normal travel and visa requirements will be in place at the time of the Manchester meeting; the Annual Meeting takes place during the "transition period" for the UK's departure from the European Union (until the end of 2020, at least).

### **Registration and booking**

Registration, booking and abstract submission will commence in June 2020. 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 2020. Registration and bookings will be taken on a strictly first-come, first-served basis. No refunds will be available after the final deadline. Registration, abstract submission, booking and payment (by credit card) will be available online via the Palaeontological Association website (<[www.palass.org](http://www.palass.org)>) from June 2020.

### **Accommodation**

Manchester is a large city with a broad range of accommodation options. We ask delegates to book their own accommodation independently to match their own requirements. Hyatt House/Regency Hotel is on the university campus (Booth Street West) whilst Holiday Inn Express (Oxford Road) and Ibis Hotel (Princess Street) are a short walk from the conference venues.

### **Travel grants to student members**

The Palaeontological Association runs a programme of travel grants to assist student members with no other means of support (doctoral and earlier) to attend the Annual Meeting and present a talk or poster. For the Manchester 2020 meeting, grants of up to £100 will be available to student presenters who are travelling from outside Manchester. The actual amount available will depend on the number of applicants and the distance travelled. Payment of these awards is given as a disbursement at the Meeting, not as an advance payment. Students interested in applying for a travel grant should contact the Executive Officer, Dr Jo Hellawell (e-mail <[executive@palass.org](mailto:executive@palass.org)>) once the organizers have confirmed that their presentation is accepted, and before 1st December 2020. Entitle the e-mail "Travel Grant Request". No awards can be made to those who have not followed this procedure.



### **The city of Manchester**

Manchester is a large city with a historic industrial past, currently undergoing an energetic period of growth and regeneration. This includes a long history of engineering and science innovation at the University, from Ernest Rutherford's work in physics, Alan Turing's pioneering approaches in computing and Marie Stopes' work in palaeobotany and family planning. Evidence of Manchester's industrial, 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 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 attendees of the Annual Meeting to make a visit and enjoy some mulled wine with colleagues.

We look forward to welcoming you to Manchester!





## **Code of Conduct for Palaeontological Association Meetings**

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

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

### **Behavioural expectations**

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

### **Digital images and social media**

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



Student conference  
run by University of Leeds students  
at the Yorkshire Museum, York

**Thursday 11<sup>th</sup> – Saturday 13<sup>th</sup> June**

Talks, posters  
and social  
events

Geochemistry for  
Palaeontologists and  
Sampling Bias in the Fossil  
Record workshops

Field trip to  
Robin Hood's  
Bay

**Registration and abstract submission  
opening soon**



@ProgPal2020



  
UNIVERSITY OF LEEDS  
**Yorkshire Museum**





# Creating an accessible and inclusive conference: tips from ProgPal 2019

For many, conferences are an essential and exciting part of academic life, but they can also be a source of considerable stress, especially for minorities. Conferences, and other academic events, can be made more accessible and inclusive to as many people as possible by taking into consideration many factors that are often overlooked.

*Progressive Palaeontology* (ProgPal) is the Palaeontological Association's student conference, organized each year by research students for research students, and is aimed at creating an open and inclusive environment for discussing ongoing research. ProgPal is free to attend and also provides travel grants to delegates in need of assistance.

Below are some actions and policies we implemented as organizers of the 2019 ProgPal meeting. Many of these are based on feedback from previous meetings and conferences as well as from the PalAss Diversity Study. Some points may seem obvious while others require considerable planning, but we hope that this is a useful starting point for anyone trying to increase the accessibility and inclusivity of future conferences.

## **Code of Conduct**

The Palaeontological Association's Code of Conduct was in place throughout the meeting and associated events (e.g. field-trips).

Delegates experiencing or noticing a breach of the Code of Conduct could contact a member of the organizing committee in person (easily identified by their photo in the meeting abstract booklet and bright branded t-shirts), a member of the PalAss Council via e-mail listed on the Code of Conduct web page, or a member of the organizing committee through the social media or Gmail accounts. This information was circulated in advance of the meeting and e-mail/online reporting allowed contact to be anonymous if the reporter wished.

## **Venues and facilities**

Annotated maps and rough schedules (followed quickly by exact schedules) were circulated as far in advance as possible to allow delegates to plan their schedules and journeys. The maps indicated the primary public transport options, the main conference venues, as well as food outlets and facilities on campus. This may not seem like a revolutionary step but having this information available in advance of a conference allows delegates to plan ahead in plenty of time, reducing some stress and anxiety.

Also circulated to delegates ahead of the meeting was a list of gender-neutral toilets close to the conference venue, as well as lactation rooms and prayer rooms across campus.

A gender-neutral toilet was available close to the main venue throughout the conference. This was usually a disabled/baby changing toilet, but with permission from museum staff we were able to designate it gender neutral throughout the conference. This option may not be available at all venues, but it is important to try – you won't know what venues would be willing to do unless you ask.

A 'quiet room' was available at all times for delegates to take time out from the conference. This was a smaller lecture room located on the floor above the main venue.



All venues were fully accessible and air conditioned with plenty of space for the number of registered delegates. This was especially tricky for us as the university building available to us for the meeting is a listed property (with few modern modifications for accessibility and no lecture theatres on the ground floor), but we tried our absolute best to make it work.

### **Presentations and abstracts**

All oral presentations were given using a microphone, and the organizing committee endeavoured to make most announcements using the microphone. Using a microphone should be non-negotiable, as it not only benefits everyone regardless of ability, but asking audience members if they can hear the presenter may force some to disclose a disability.

All presentations were kept strictly to time to allow adequate time during the breaks and to not disadvantage other speakers.

Posters were on display prominently throughout the conference and arranged so that no poster was obscured, allowing delegates time and space to see each one. There was also a dedicated poster session, which was catered with non-alcoholic drinks and nibbles.

Abstract scoring and presentation judging were as transparent as possible. Abstract scoring procedures (a double-blind assessment) were available on our web page ahead of abstract submissions and judges announced the reasons behind their choices for presentation prize winners during the awards. In future, we anticipate that the judging criteria will also appear on the web page prior to the meeting.

The abstract scoring and judging panels as well as the session chairs were assembled so that each group was as diverse as possible (in terms of gender, career stage, and research area). We also tried to have at least a gender balance amongst our workshop and discussion group leaders, but we were unable to make this happen due to schedule clashes.

While allocating presentation slots to applicants we paid close attention to the gender and career stage balance. At ProgPal we don't invite speakers to present at a symposium (or similar) but at other meetings where this is the case particular close attention should be paid to the diversity of the speaker line-up.

### **Catering: food and drink**

All dietary requirements (vegetarian, vegan, gluten intolerant, *etc.*) and allergies were catered for during each part of the meeting that involved refreshments.

Non-alcoholic options were available (in the same quantity as alcoholic drinks) and instead of just juices/fizzy drinks we made an effort to have tastier options available (*e.g.* sparkling elderflower flavoured soft drinks). Both non-alcoholic drinks and wine were served in glasses (several delegates commented on how nice this was!).

Alcoholic drinks were not included in the price for the conference dinner and only our icebreaker event catered alcoholic options. This reduced costs (for delegates and the meeting budget) and many delegates commented that de-emphasising alcohol was a positive change that they would like to see more of during future conferences.





### Displaying diversity

Stickers displaying pronouns (she/her, he/him, they/their) were available at the registration desk to be affixed to name tags. Blank stickers and markers were also available for adding any further information (e.g. Twitter handles, research expertise, *etc.*) to name tags if desired.

Pride badges ('Queerlobites') were also provided at the registration desk – see the Palaeoiris web page (<<https://www.palaeoiris.com>>) for more details.

An LGBTQ+ meet-up was organized to take place during lunchtime and was open to all who wished to attend.

### Other points

Name badges were printed double-sided and in large font for increased visibility, a simple step that many conferences overlook.

In all aspects of the meeting, we tried to be as sustainable and environmentally friendly as possible: conference 'swag' (pens, bags, notebooks, *etc.*) was not included, used materials were recycled where possible, the abstract booklet was in digital format only (with the option to print at home), only compostable cups were used, and delegates were encouraged to carry their own reusable cups and water bottles.

We followed previous ProgPal organizing committees by creating a detailed handover document to pass on to next year's committee.

This list is by no means exhaustive, so we encourage everyone to take a look at the plethora of fantastic resources available online to help make your event even more accessible and inclusive to all. Also, not every point of this list (or other lists) will be possible for every conference to accomplish, but it is incredibly important that we make the effort, because in the long run, the more accommodations are made, the more normalized they become.

### Acknowledgements

The ProgPal 2019 organizing committee would like to express sincere thanks to the Earth Sciences and Lapworth Museum staff at the University of Birmingham, especially Jon Clatworthy, Richard Butler, Sam Giles, Sarah Greene and Stephan Lautenschlager, for their guidance, insight and support throughout the meeting and beyond.

<b>Emma Dunne</b>	<b>Luke Meade</b>	<b>Daniel Cashmore</b>	<b>Juan Pablo Castaneda</b>	<b>Amy Jones</b>
<b>Emma Hanson</b>	<b>Struan Henderson</b>	<b>Nicola Kirby</b>	<b>Fion Ma</b>	<b>Lisa Schnetz</b>

*University of Birmingham*



news



## *Palaeontology in the news*

The biggest palaeontology story to hit the headlines in recent weeks was the discovery of a new tyrannosaur, *Thanatotheristes degrootorum*, from the excellently-named Foremost Formation of southern Alberta, Canada. Dating from the mid-Campanian (around 80 million years ago) of the Cretaceous, this newly-described species is the oldest named tyrannosaur in North America, and the first to be described from Canada for fifty years. The new species, described by Jared Voris of the University of Calgary and colleagues, in the journal *Cretaceous Research*, is considered to be a sister group to the slightly younger *Daspletosaurus*, and helps to fill in the gaps in the North American tyrannosaur evolutionary tree.

The species is named after John and Sandra De Groot, who discovered a skull and jaw in 2010 and brought it to the attention of the Royal Tyrrell Museum. However, it is the genus name which has drawn a vast amount of media attention. *Thanatotheristes* translates as 'reaper of death'. Rarely has a dinosaur name aligned so closely with the hopes and expectations of a certain type of dinosaur fan. The membership of PalAss reading this newsletter no doubt view palaeontology as a broad field which seeks to understand life, in all its diversity, through deep time. For a great many people outside our bubble however, 'fossil' and 'dinosaur' are synonymous. And for many of these folks, dinosaur usually means '*T. rex*' (where the 'T' is a name in itself). For this audience, a new eight-metre-long apex predator, with jaws full of steak-knife teeth, is big news. Throw in a name that sounds like it came straight from the track-list of an Eighties metal album and you've hit dino fanboy gold.

Unsurprisingly, media coverage focused primarily on the 'reaper of death' moniker, which gained its own #ReaperOfDeath hashtag, and many news outlets ran with headlines such as "*T. rex*'s older/faster/badass cousin" (delete as applicable). The monsterization of the new species was reflected in the language of other headlines: "horrific", "ravenous", and "massive meat-munching monster". A news source that ran with "a huge dinosaur that could eat anyone" also showed the blurring of fact and fiction in a world where Jurassic World-style dinosaurs are people-eating monsters, rather than animals from the deep past for which we have a palaeontological evidence base. These are audiences who would much rather hear about sharp teeth and inferred top speeds, rather than feathers and nesting behaviours. Some of the discussions on Twitter were quite telling: a comment along the lines that "this guy would have got all the chicks eighty million years ago" shows the slightly odd way in which theropods are deeply associated with masculinity in the world of shrink-wrapped, featherless theropod fandom. There was a mixed reaction on social media amongst the palaeo-community, with some people calling out the sensational nature of the choice of name. Others viewed the name as a fun choice, and one that six-year-old kids would enjoy teaching their parents to say. If the aim of the choice of name was to get people talking, it certainly succeeded.



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

One more important piece of palaeontology news: our own latest approach to portraying the full breadth of palaeontology is available online. The new PalAss YouTube channel, comprising short videos for a non-specialist audience, was launched at the Valencia Annual Meeting in December:

<<https://www.youtube.com/channel/UCVedLnMZg6RiZ8W6RY5QNfG>>

Topics covered so far include **Tom Challands** talking about fossil fish, **Lucy McCobb** explaining why some trilobites might have been so spiky, and **Maria McNamara** discussing evidence for colour in extinct animals. Stay tuned for more videos, which are being released each month, and please subscribe to the channel if you wish to be notified when a new video is posted. So far, the videos have featured members of the PalAss Council, but we welcome video submissions from the wider palaeontological community. If you have an idea for a video, please read our guidelines and give it a go:

<<https://www.palass.org/outreach/creator-guidelines-palaeontological-association-youtube-channel>>

**Susannah Lydon**

*Publicity Officer*

NEWS



## *Journals to go online only*

As you may have heard at the AGM in Valencia, the PalAss Council has taken the difficult decision to cease printing their journals *Palaeontology* and *Papers in Palaeontology*, most probably from January 2021. This is not a decision that was taken lightly, and on behalf of the Editorial Board I wanted to take the opportunity to explain the reasoning behind it. Academic publishing has changed enormously since publication of our first issue of *Palaeontology* in 1957 in terms of production process, speed of publication and the medium through which most of our readers access our content, and we would like to continue to publish quality research in the most appropriate way.

We have seen a steady decrease in the number of members ordering print copies. In 2019 only about 24 % of members opted to receive a physical copy of *Palaeontology* and fewer than 10 % received *Papers in Palaeontology*. This means that our print runs are now extremely low, and the proportional costs of these printed copies is rising. The production expenditure related to printing and distributing these copies in 2019 was nearly half of the total production budget for the two journals. The majority of our members therefore access articles through their online accounts, and the journals are also available to readers in over 6,000 institutions worldwide in an electronic-only format. Wiley no longer supplies print copies to any of its institutional subscribers. We would like to redistribute some of these disproportionately allotted costs to allow us to maintain our high editorial standards. One way in which we intend to do this is to retain the services of a professional, dedicated copyeditor.

Figure reproduction is an important issue, particularly for our taxonomic papers. Maintaining a higher quality of paper to facilitate this has meant rising paper and distribution costs. However, recent advances in the quality of online figure reproduction means that we now feel that images can be satisfactorily reproduced electronically, even where detailed photographs are required for comparative purposes.

Some members have raised concerns about journal archiving. Many academic journals are now automatically archived in more than one place, not simply by the publisher. Both of our journals are archived in CLOCKSS (<<https://www.clockss.org>>), LOCKSS (<<https://www.lockss.org>>) and Portico (<<https://portico.org>>). As an aside, all *Palaeontology* articles published in volumes 1–41 (1959–1998) are freely available online in the Biodiversity Heritage Library (<<https://www.biodiversitylibrary.org>>).

Due to the financial constraints imposed by distribution of the printed journal, we have to limit the number of articles that can be published in each issue. Each year, we publish more papers online than we can include in the volumes for that year. This leads to confusion in referencing, which is most problematic when the paper includes taxonomic descriptions. To allow new taxonomic names to be included in our Early View articles online, we publish the final version of record immediately and that year of publication must be cited in all future nomenclatural citations, even when this differs from the final print issue date. It is therefore the online edition and not the printed edition that is registered with ZooBank. We would like to continue to publish more than our current printed page budgets allow without the risk of online and print issue publication occurring in different years; continuous publication would facilitate this. We can only move towards a continuous publication model if the journal is online-only.



Furthermore, there is the factor of the lead time required to paginate, print and distribute a physical issue. The November issue of *Palaeontology* cannot include any article not ready for publication before the beginning of October and the next available issue for any remaining papers is the following year.

Personally, I will be sad to no longer receive the smartly printed issues, but I also feel that we are trying to maintain elements of two publishing models that are not entirely compatible. Academia demands rapid publication and technology can provide this, but we are trying to maintain a more sedate process at the same time. I also have to admit that I always turn first to the online edition, rather than the printed copy on my shelf. I believe we should retain those elements of traditional publishing that will most benefit our community and provide a high-quality editorial service to our authors through the most efficient medium available.

**Sally Thomas**

*Publications Officer*

*(On behalf of the Editorial Board)*

## *Mentoring Scheme*

The Palaeontological Association mentoring scheme aims to assist palaeontologists at the start of their academic careers and focuses on those transitioning from postdoctoral positions to permanent jobs. (We hope to roll the scheme out to other transition points such as late stage PhD to postdoctoral position and mid-career to senior leadership in the future.) Mentoring is a valuable tool, helping individuals make informed choices via the exchange of knowledge and experience. The scheme uses a direct mentoring approach, with mentors in permanent positions offering direct contact via e-mail, Skype or other forms of communication. Full guidelines on expectations, lines of communication and length of mentorship are provided. It is expected that mentors should provide open and honest advice whilst maintaining confidentiality at all times. If you are a postdoctoral palaeontologist and are interested in having a mentor, or a palaeontologist in a permanent position who would be willing to act as mentor, please e-mail me (<[vicepresident1@palass.org](mailto:vicepresident1@palass.org)>) for more information.

**Fiona Gill**

*Vice-President*

## *Innovations in Palaeontology Lecture Series*

We are pleased to announce that **Sandy Hetherington** from the University of Oxford has been appointed as the PalAss Exceptional Lecturer for 2020/21. Sandy will present the Innovations in Palaeontology Lecture Series on plant evolution (proposed title: In search of the roots of roots: 400 million years of plant root evolution) and we now invite interested institutions to apply to host him via the Association's website. Please provide a timeframe (between September 2020 and May 2021) during which you would like Sandy to give a lecture at your institution. The list of interested institutions will be forwarded to Sandy on 1st May, although any applications from institutions submitted after this date will still be considered depending on the remaining time



and budget. The Association will pay for any reasonable travel costs incurred by the Exceptional Lecturer in visiting each of the host institutions (up to a maximum of £500 per lecture). The host institutions are expected to cover costs for accommodation (where necessary) and hospitality. Please see the website for more details: <<https://www.palass.org/awards-grants/awards/innovations-palaeontology-lecture-series-and-palass-exceptional-lecturer>>.

**Uwe Balthasar**

*Meetings Coordinator*

## ***Outreach volunteer opportunity for postgraduate students***

In recent years the Palaeontological Association has had an outreach presence at the Lyme Regis Fossil Festival and the Yorkshire Fossil Festival, where we have delivered activities to primary schools and the general public. We plan to take part again in 2020 and are looking for several new postgraduate volunteers to help. If you would like to take part, please write to us (no more than one A4 page) explaining why you are interested and describe details of your previous outreach experience. Please also state if you have a preference for helping at Lyme Regis (1–3 May 2020) or Yorkshire (18–20 September 2020). We also need a letter of support from your supervisor. Please send these documents to the Executive Officer (e-mail <[executive@palass.org](mailto:executive@palass.org)>) by 5th April 2020. Whilst undertaking these outreach activities all travel and living expenses will be covered by the Association.

**Zoë Hughes**

*Outreach Officer*



*PalAss volunteers at the Yorkshire Fossil Festival. Photo by Susannah Lydon.*



## The Marsh Awards 2019

David Penney is the recipient of the prestigious Marsh Award for Palaeontology for 2019. The annual award was presented by John Bennett on behalf of the Marsh Christian Trust and the Natural History Museum, London where the ceremony took place in December. The Marsh Award for Palaeontology celebrates those who have made an outstanding or cumulative contribution to palaeontology in the UK, yet whose efforts have not been widely recognized. David (on the left in the photo) received the award in recognition of his major contribution to palaeontology. He is noted for his expertise on insects in amber, and projects have included demonstrating the extinction resistance of spiders through the K–Pg event, co-radiation of spiders and their insect prey, and applying computed tomography and the application of next-generation DNA sequencing techniques to fossils in amber. Although an independent researcher, David has an honorary affiliation to the University of Manchester. He also owns and runs Siri Scientific Press, a specialist publisher of palaeontology and entomology books, set up with the aim of publishing books at the interface of academia and general public interest.



Photo © Natural History Museum, London.

The Marsh Award for the Best Earth Sciences Book of the Year was made to *In the Footsteps of Darwin: Geoheritage, Geotourism and Geoconservation in the Galapagos Islands*, by authors Daniel Kelley, Kevin Page, Diego Quiroga, Raul Salazar (Springer 2019, 183 pp). This very accessible and compelling book combines geology, ecology, history, conservation and culture, with a firm focus on the importance and potential of the geoheritage to contribute to tourism as a positive driver for the Galapagos. The book deals with an area fundamental to the history of palaeontology and as such it may be of interest to PalAss members.

**Martha Richter**

*Natural History Museum, London*



## Special report

### *Are we reaching gender parity among Palaeontology authors?*

#### Summary

We examine whether the proportion of women publishing in palaeontology is approaching parity, using data from the journal *Palaeontology* as a proxy for the discipline. This work was motivated by the sense that, despite increased representation of women, articles on palaeontological subjects almost never appear to have 50% female authorship, regardless of the journal. Indeed, we find that <20% of authors are female, and perhaps more surprisingly, insubstantial increase in the proportion of women contributing to the journal over the past 20 years. We highlight important barriers that remain for women and other under-represented groups in science, and we make several recommendations to help improve their representation in palaeontology.

#### Background

Women remain under-represented in almost all areas of STEM, especially at senior levels, with palaeontology being no exception<sup>1</sup>. There is a widespread perception that the situation is improving (e.g. more than half of postgraduate students studying science in the UK are now women<sup>2</sup>), and that it is simply a matter of time before this improvement is reflected at higher career stages. However, the well-characterized “leaky pipeline” (the term used to describe the phenomenon of gender inequality persisting for much longer at senior career stages) suggests that further progress will be slow (Grogan 2018). Evidence that formidable barriers remain for women in palaeontology derives from a recent analysis of career prospects in palaeontology<sup>3</sup>, the results of the PalAss Diversity Study<sup>1</sup>, and the experiences of many women in the field. Under-representation of any group in the workforce matters, not only in the interests of fairness, but because diverse work environments are more productive, lead to better research, and are more inclusive in ways that benefit everyone (Berenbaum 2019; Fine and Sojo 2019). Therefore, we must question how much progress towards gender equality has been made in order to continue on a path towards equity. The extent to which circumstances are improving for any group of individuals in science can be hard to assess, partly due to the complex factors that ultimately lead individuals to make career choices. However, information and data are available, and it is essential that we try to utilize such data, both in regard to ensuring current policies and initiatives are effective, and as a starting point for identifying remaining barriers to inclusion.

With a view to contributing quantitative data to this discussion in palaeontology, we take a look at the scientific output of men versus women in our field. If the gender balance in palaeontology has been shifting over time, we should expect to see this manifest across different metrics for measuring scientific productivity, including the number of peer-reviewed publications. Publication-based metrics are important because they are used widely as a measure of scientific

<sup>1</sup> <<https://www.palass.org/association/diversity-study>>.

<sup>2</sup> <<https://www.hesa.ac.uk/data-and-analysis/students/whos-in-he>>.

<sup>3</sup> <<https://www.palass.org/publications/newsletter/long-term-career-prospects-phd-students-palaeontology>>.





productivity, and ultimately determine whether an individual is employed, promoted or accoladed in academia. In this article, we examine the proportion of women publishing in the Association's flagship journal *Palaeontology*. Published work on gender-based publication biases considers much broader research areas (e.g. Earth<sup>4</sup>, physical or biological sciences; Bendels *et al.* 2018), and no data exist for publications that fall within the palaeontology or palaeobiology subdisciplines. *Palaeontology* is currently the most successful (in terms of impact factor and other metrics<sup>5</sup>) subject-specific palaeontological journal, and publishes broadly within the subject (e.g. both vertebrate and invertebrate work; descriptions and macroevolutionary studies). Our findings are therefore likely to reflect patterns across palaeontology more generally.

### **Why might women remain under-represented in the literature?**

There are many reasons women continue to remain under-represented in the literature<sup>6</sup>. In the context of academic publishing, women have been found to publish fewer papers and are less likely to be listed as first authors<sup>7</sup>, will have their papers cited less either by themselves or by others (Larivière 2013; King *et al.* 2017), are less likely to submit to high-impact journals (Filardo *et al.* 2016; Mayer and Rathmann 2018; Shen *et al.* 2018), are less likely to be invited to peer review at all career stages (Lerback and Hanson 2017), including within Earth sciences<sup>8</sup>, are held to a higher standard (Knobloch-Westerwick 2013; Hengel 2017; Fox and Paine 2019) and are more likely to be pressured into adding co-authors (Fong 2017). They are also less likely to be invited to participate in seminars, conferences and panels (Nittrouer *et al.* 2018). Within their institutes, women are also more likely to shoulder greater administrative and teaching responsibilities (Guarino and Borden 2017), and be paid less than their male counterparts. Women with childcare responsibilities are also less able to travel for work and are presented with fewer networking opportunities.

Additional factors determining whether women stay in science long term include challenges associated with childcare responsibilities (in addition to travel), widespread sexual harassment and bullying in research institutes<sup>9</sup>, and the so-called 'subtle sexism' that women and girls experience in science and throughout their lives (Serio 2016). Until women are equally represented at all levels in research, we can expect to see inequality reflected in the literature.

### **What proportion of female authors do we expect to see in palaeontology?**

We know fewer women than men are employed in long-term positions in palaeontology, and this disparity is anticipated in published-author gender ratios. A useful basis for comparison would therefore be the proportion of women actually employed in palaeontology. Data collected during the PalAss Diversity Study suggest that women make up 35% of individuals working in the field, with 80% of female respondents under 45 years of age. Age (a general proxy for career stage) of authors is important to consider, because women have been under-represented historically in the Earth sciences. This means the proportion of women contributing to the literature is expected to be lowest among senior academics, which is commonly considered the most productive phase

<sup>4</sup> <<https://www.nature.com/articles/ngeo3026>>.

<sup>5</sup> <<https://sites.google.com/site/kennethdebaetswebpage/home/journals-in-paleontology-and-evolutionary-biology>>.

<sup>6</sup> <<https://nplusonemag.com/issue-34/essays/sexism-in-the-academy/>>.

<sup>7</sup> <<https://www.elsevier.com/research-intelligence/campaigns/gender-17>>.

<sup>8</sup> <<https://www.nature.com/articles/ngeo3026>>.

<sup>9</sup> <[https://1752group.files.wordpress.com/2018/09/silencing-students\\_the-1752-group.pdf](https://1752group.files.wordpress.com/2018/09/silencing-students_the-1752-group.pdf)>.



(in terms of publication output) of an individual's career. Even considering these factors, lack of change in the proportion of women contributing to palaeontology in recent decades might seem surprising – especially among first authors, who are more likely to be at earlier career stages.

### Data and Methods

Author information was downloaded from the *Palaeontology* journal website for all available articles, which span the interval 1957–2019, using the R packages `xml2` and `Rvest`. Gender was predicted based on first names with the R package `gender` using three methods (= databases): *ssa*, *ipums* and *napp*. Gender was assigned using the most frequent value returned using the three methods, and uncertainty (the proportion of times that another gender was associated with a given name) was taken as the average across methods. Names that could not be assigned to either gender above the 80% confidence level were treated as “unknown”. Most unknowns can be attributed to first names being represented in the database by initials only. We emphasize that our approach to gender assignment makes the assumption that gender is binary, which is not representative of the diversity of genders within the palaeontology community<sup>1</sup>. Best practice would be to ask authors to self-declare their gender upon article submission, or to contact authors individually and ask them to report their gender or opt out of analyses, and we encourage this approach going forward. However, this methodology is not possible for analyses such as this, which use historical data on a large scale. We also note that the name data in this package is based on US and Northern European census data, and thus a demographic bias will be introduced. No attempts were made to assign gender manually, in order to ensure the results are fully reproducible. We also note that such an approach in this instance would often be practically impossible (for example, where common initial and surname combinations occur). All code available to reproduce figures and tables is available online<sup>10</sup>.

As of 23rd August 2019, the database contains 6,748 individual author entries across 3,291 unique articles, of which 4,288 were assigned a gender above the 0.8 confidence level (male = 3,486, female = 802). 2,214 articles have at least one gender-assigned author, 1,657 have 100% gender-assigned authors.

### Overview of findings

The data (Figures 1–5) indicate that the percentage of female authors contributing to the journal and the percentage of first authors who are female has increased over time, based on the total number of authors, including unknowns<sup>11</sup>. However, the overall increase is low and the percentage of female authors remains below 20%. The percentage of articles that have over 50% female co-authorship remains unchanged. The proportion of articles that have no female authors is decreasing, but this partly reflects an increase in the average number of authors per article, which has increased from 1 to 3.5. The overall number of women publishing in palaeontology has increased, but this parallels an increase in the number of men. In other words, women may seem more prominent in palaeontology now simply because there are more total palaeontologists, but it does not follow that their relative proportion has also increased.

<sup>10</sup> <<https://bitbucket.org/rachelwarnock/diversity-study/>>.

<sup>11</sup> Note that anecdotal evidence suggests most unknowns are male, although the reason for this has changed over time. In the past, unknowns are mainly attributable to individuals publishing under their initials, who are more likely to be male. More recently, unknowns are attributable to non-European names that are less well represented in name databases, who are also more likely to be male.

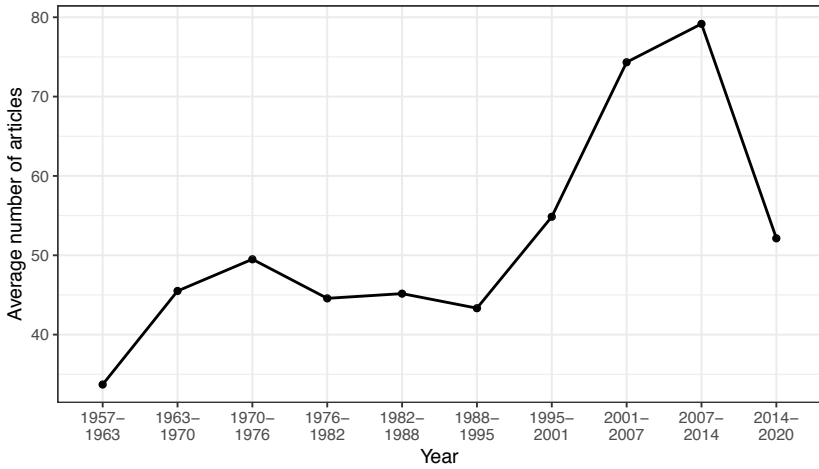


Figure 1. Average number of peer-reviewed articles published per year in Palaeontology.

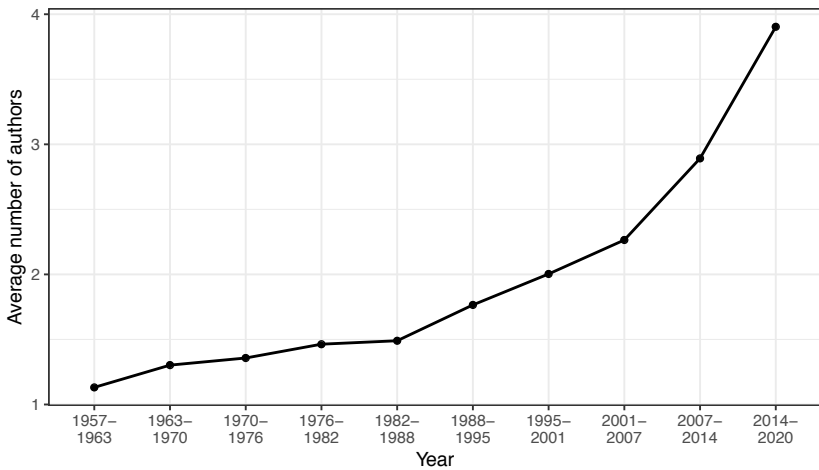


Figure 2. Average number of authors per article published in Palaeontology.

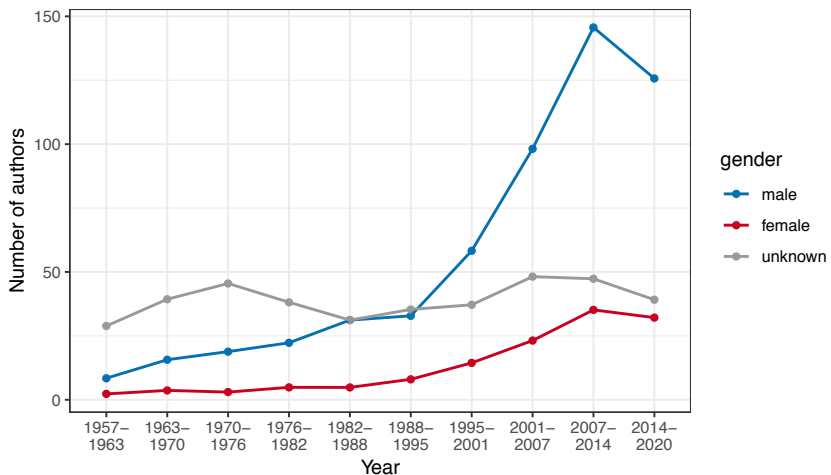


Figure 3. Total number of male versus female authors across all articles published in Palaeontology.

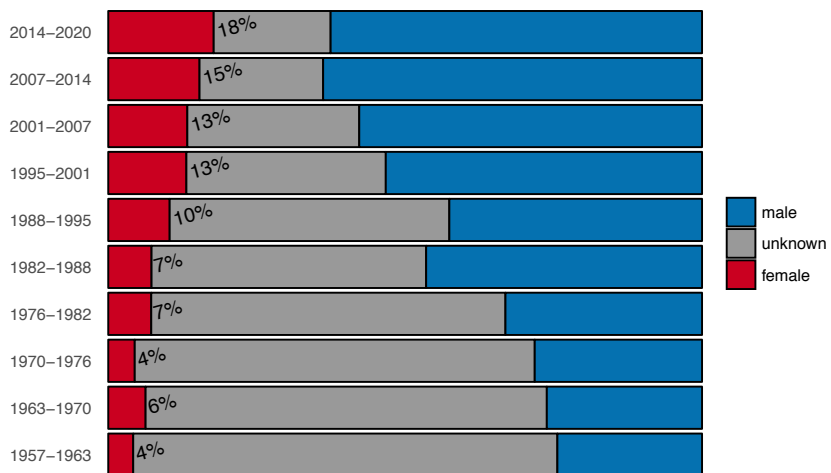


Figure 4. Percentage of male versus female authors across all articles published in Palaeontology.

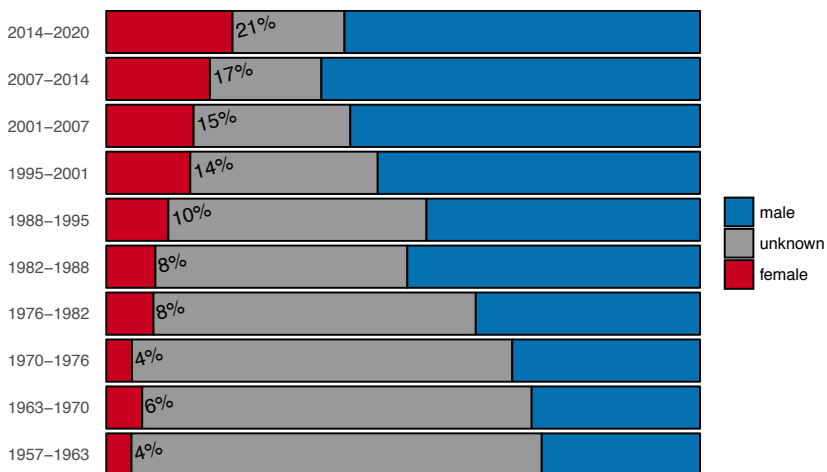


Figure 5. Percentage of male versus female authors that are first authors of articles published in Palaeontology.

Our findings match the proportions of women publishing reported in broader studies of the scientific literature (Holman *et al.* 2018), which generally report <40% in biological sciences and <30% in the Earth sciences (*e.g.* Bendels *et al.* 2018). Studies that have examined temporal trends also report slow progress, with one study reporting <1% increase in female authors each year (Shen *et al.* 2018). Progress with respect to other aspects of diversity, including representation of ethnicity and race, appear to be even worse, based on other metrics of scientific productivity (Bernard and Cooperdock 2018). *Palaeontology* is therefore not alone in under-representing women or other aspects of diversity, and faces the same challenges as other scientific journals. This, however, is not equivalent to saying there is nothing to be done to increase gender balance and, importantly, initiatives that are shown to work in other disciplines are also likely to work in palaeontology.

**The importance of intersectionality**

We emphasize that while this work focuses on gender diversity, there are many aspects of diversity, in addition to gender, that must be considered. These aspects (including socioeconomic background, race, sexual orientation, age and disability), however, cannot be determined from name data. The PalAss Diversity Study (together with evidence from other studies, Bernard and Cooperdock 2018) suggest other components of diversity also remain under-represented in palaeontology, and individuals from under-represented or minority groups often feel unsupported by the community. It is important to recognize that the intersectionality of more than one under-represented identity can exacerbate the challenges of succeeding in academia (Crenshaw 1990), including in the Earth sciences<sup>12</sup> (see also Clancy *et al.* 2017). We also note that North American and European institutions are hugely over-represented in the scientific literature<sup>13</sup>.

<sup>12</sup> <<https://www.nature.com/articles/s41561-019-0519-z>>.

<sup>13</sup> <<https://www.nature.com/articles/ngeo3026>>.



## What next?

Here, we make four recommendations that can be adopted by anyone involved in academic publishing and palaeontology more broadly:

### *Take diversity issues seriously*

Research shows that members of over-represented groups are more likely to be sceptical of studies that highlight diversity issues (Handley *et al.* 2015), more likely to over-estimate social progress (Kraus *et al.* 2017), and less likely to engage with diversity and inclusion efforts (Rodríguez *et al.* 2015). One consequence of this is that women and minorities are taking on the burden of trying to tackle diversity issues without the active support of their more advantaged colleagues (Grogan 2019). Substantive change requires engaging the entire scientific community, and broader awareness of discrimination issues and the implicit and unconscious biases that are inherent to us all<sup>14</sup>.

### *Recruit more women into all levels of academic publishing*

Anyone engaged in primary research can invite women to contribute as co-authors and collaborators, both to gain insights from individuals who may be overlooked and to acknowledge their contributions. It is important to be mindful of acknowledging the contributions of others and citing their work where relevant. Authors and editors can recommend or invite more women to review articles. If you are invited to review an article and cannot, identify women in your field and suggest them instead. The *Women in Paleontology Directory*<sup>15</sup> may be helpful here if you are struggling to think of individuals, and if you are a woman you can consider adding your name through the online form. At the same time, we should respect an individual's decision to turn down opportunities to contribute or review. Editorial board members should seek to ensure women are well represented among editors. Presently, <30% of *Palaentology* editors are women (7/25) and, until recently, the Editorial Board comprised 100% men (4/4). This year, we welcome the appointment of the journal's first female Editorial Board member, Susie Maidment. Interestingly, one study found that biomedical journals with senior female editors have a higher proportion of articles with female first authors (Filardo *et al.* 2016). We also can look to other organizations for advice and support in identifying effective strategies for tackling diversity issues.

### *Actively promote individuals from minority and other under-represented groups*

Beyond academic publishing, we can invite individuals from under-represented groups to give talks, join working groups and meetings, chair conference sessions, participate in field and outreach work, participate in the grant application and review processes, and nominate individuals for awards. Notably, women are more likely to be invited to give colloquium talks when women are among the organizers (Nittrouer *et al.* 2018). For conference organizers, *500 Women Scientists* recently produced a guide for diversity and inclusion at scientific meetings<sup>16</sup>. We can also take the opportunity to engage with and encourage a diverse range of individuals in the classroom, at conferences, and at other meetings (see Gates *et al.* 2019 for further examples and suggestions).

<sup>14</sup> <<https://royalsociety.org/topics-policy/publications/2015/unconscious-bias/>>.

<sup>15</sup> <<https://docs.google.com/spreadsheets/d/1c9HUR13HiCpFLy02FKKWPYQq2DGcwDcoL9r9zKb2dA8/edit#gid=0>>.

<sup>16</sup> <<https://500womenscientists.org/inclusive-scientific-meetings>>



*Collect relevant data and different perspectives*

Keeping track of relevant data to monitor the participation of individuals involved at different levels and in different aspects of palaeontology (e.g. publishing, teaching, conferences) will make a huge difference. If data for past events do not exist or are unavailable in a format that is easy to use, changes can be made to ensure that information can be collected in a usable format in the future. For example, Butler and Maidment were able to examine career prospects in palaeontology using available data to track individuals over time<sup>3</sup>.

Quantitative data, such as that presented here, are extremely valuable for highlighting and monitoring participation in science, but do not provide a complete picture. In particular, it remains challenging to understand the reasons that some groups remain under-represented in palaeontology. To gain a better understanding, we can look to published research on the barriers to inclusion, and we should continually engage with individuals from different backgrounds. Listening to and promoting the perspectives of others is another way of collecting and disseminating information that will be useful in diversifying our field.

PalAss are committed to increasing diversity within palaeontology. Following the PalAss Diversity Study, initial steps have included the creation of a Diversity Officer role and a Diversity Group on Council, the introduction of a carers' bursary to assist parents and carers attending the Annual Meeting, and the initiation of a mentoring scheme. We will also continue to monitor available data and present perspectives in the *Newsletter*.

If you have any ideas or would like to see a particular aspect of diversity discussed in the *Newsletter* please contact <[diversity@palass.org](mailto:diversity@palass.org)> or <[newsletter@palass.org](mailto:newsletter@palass.org)>.

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## ***Reply to: Are we reaching gender parity among Palaeontology authors?***

As Chair of and on behalf of the Editorial Board (Mark Purnell, Nicholas Butterfield and Susannah Maidment) we thank Rachel Warnock and her co-authors for this study on gender balance in authorship in our flagship journal *Palaeontology*. The data generated are of interest and raise a number of important issues on which we, as the Editorial Board, and the wider community need to reflect.

Prior to the initiation of the study we had recognized that the Editorial Board lacked gender balance, with four male editors and a male Editor-in-Chief. We have taken steps to start to redress this with the appointment of Susannah Maidment to the Editorial Board. With respect to handling editors, 28% of our handling editors are female and we acknowledge this is a long way short of gender parity. Currently 80% of female members of the Association are under the age of 45 and 56% are under the age of 35. It is likely that the experience required to act as a handling editor falls at some point within these two age ranges; this makes direct comparisons about representation difficult, but the Editorial Board will actively monitor gender balance and take action to ensure we move in the right direction.

New and existing handling editors will be informed of the need to garner reviewers from a broad cross-section of our community to reflect the issues highlighted by Warnock and colleagues in their article. On behalf of all our hard-working handling editors, I would like to encourage everyone in our community to actively engage in the peer review process. If you are invited to review but are unable to provide one it would greatly assist us if you could let us know in a timely manner, and we would always warmly welcome recommendations of potential reviewers. In making recommendations, if your suggestions include only men, please consider whether this reflects the diversity of the field.

Quantitative data, such as those presented by Warnock and colleagues, are an important first step towards understanding aspects of diversity and how these have changed through time, and they provide a benchmark for future analyses. However, these data should not be viewed in isolation. The Association and the journal have changed markedly since their inception, shifting from a UK-focused group to a truly international association and brace of publications. Likewise, how we as a community undertake our research has radically changed. Many more papers are now the result of collaborations between networks of researchers, many of which are international in scope. How we as individuals manage and develop our networks in the coming years has the capacity to shape our community and influence gender balance in publications.

Our journal *Palaeontology* is recognized as a field-leading publication currently ranked third in the ISI Journal Citation Reports subject category. We are committed to maintaining this excellence and will do all that we can to drive up the quality and scientific impact of the papers we publish. We also recognize that palaeontology, as a journal and a discipline, works best as a broad and diverse community. We remain open and committed to all aspects of diversity and welcome submissions with authorship that reflects this. To reflect on the issues raised by Warnock and colleagues we will undertake the following actions as first steps towards addressing the gender imbalance in publishing:



- We will continue to improve the degree to which our pool of handling editors represents the community. Disciplinary balance across handling editors must be maintained, but by asking women in the first instance to replace our retiring editors, we can make progress towards improved gender balance. Where appropriate, we will look to support early-career academics and to further internationalize our pool of handling editors.
- We will require all handling editors to request reviews from at least one female reviewer, unless an appropriate female reviewer cannot be found.

If you are interested in submitting your work to either *Palaeontology* or *Papers in Palaeontology* please consult the guidelines for submission which can be found at <<https://www.palass.org/publications/publishing-palass-journals>>. If you are unsure if your manuscript is within scope of either journal, we are happy to offer advice.

**Barry Lomax**

*Chair of the Editorial Board*



# 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 Christophe Hendrickx, Blair McPhee and Luke Strotz.**

**Christophe Hendrickx is a Belgian in Argentina, employed as a postdoctoral researcher at the Unidad Ejecutora de Lillo (Museu Miguel Lillo de Ciencias Naturales) in San Miguel de Tucumán on a CONICET postdoctoral fellowship.**



## **Q1: How did you end up in Argentina?**

I was a postdoctoral fellow for three years at the Evolutionary Studies Institute of the University of the Witwatersrand in South Africa under the supervision of Jonah Choiniere and Fernando Abdala. When Fernando moved to San Miguel de Tucumán (a city in North western Argentina), where my Argentinian wife comes from, it was a logical step for me to pursue my career there. I thus applied for an Argentinian postdoctoral fellowship and luckily my application was successful.

## **Q2: How is your position funded?**

My research is funded by a CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas) postdoctoral fellowship (“beca interna postdoctorale”), which comes from a scheme that funds scientists from all stages (Masters, PhD, postdoctoral, early and advanced career researchers) to do research in Argentina. My fellowship funds me for two years to complete a research project at any university or research institution in Argentina. In 2018, applications were due between 25th June and 27th July (the results were known in December) for fellowships beginning on 1st April of the following year.

## **Q3: What is your project about?**

My research project aims to investigate the evolution of the dentition in pre-mammalian cynodonts by examining discrete dental characters and their phylogenetic potential, and by identifying the main evolutionary transformations occurring in the dentition of non-mammaliaform cynodonts. Part of my project consists of exploring rates of morphological change and morphospace occupation throughout the Permian, Triassic and Jurassic using a dentition-based datamatrix. I finally aim to determine changes in postcanine complexity through time using three-dimensional crown surface and Geographic Information Systems (GIS) methods, and test correlations between disparity in dental complexity and different macroevolutionary variables such as species richness and body size.

## **Q4: What surprised you most about living in Argentina?**

The fact that Argentinians are extremely cool, very sociable and fun people who enjoy going



out on a regular basis. Although a big economic crisis has impacted Argentinians for several years, with months of recession and high inflation, life here remains cool, which is particularly enjoyable. The landscapes are also amazing, especially those in the Andes. Argentinian palaeontology is truly excellent, with worldwide specialists on cynodonts, dinosaurs and Cenozoic mammals, among others. Argentina also offers the opportunity to see amazing specimens all over the country and to dig on world-class fossil sites such as the Valle de la Luna.

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

Two things: a working bureaucracy and food diversity. I needed a visa to get my postdoctoral fellowship and our daughter was born in San Miguel de Tucumán last year. Any administrative procedure related to getting a visa, registering a new-born baby or getting a bank account, is a tremendously long process here, whereas the same things could be accomplished in just a few hours in Belgium. I have lived in many countries (Australia, Belgium, Portugal, South Africa and the UK) and Argentina is by far the least efficient in terms of bureaucracy. Likewise, because we are living in a remote place and Argentina is facing a big crisis, the food diversity is nothing close to what my country offers (we love eating in Belgium!). I often miss charcuterie, sea-food, good chocolate and fruit pies. On a more positive tone, the meat is truly amazing here and nothing compares to a home-made 'asado' (the Argentinian barbecue).

You can keep up to date on Christophe's work through his website:

<<https://sites.google.com/site/hendrickxchristophe/home>>.

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**Blair McPhee is a New Zealander who until recently lived in both South Africa and Brazil, studying and working, respectively – first as a Masters/PhD student at the Evolutionary Studies Institute at the University of the Witwatersrand (Johannesburg), and then as a post-doc at the University of Sao Paulo in Ribeirao Preto.**

**Q1: How did you end up in South Africa and Brazil?**

My palaeontological career has been a bit of a path-of-least-resistance affair. I first went to South Africa to visit friends and then, having wandered into a researcher's (Adam Yates') office at Wits and asking if I could study dinosaurs, I decided to stick around. With Brazil I applied for an advertised post-doc and was successful.

**Q2: How is your position funded?**

My PhD in South Africa was funded by an NRF (South African National Research Foundation) African Origins bursary. My post-doc in Brazil was funded as part of a FAPESP (Sao Paulo Research Foundation) grant to my academic host, Max Langer.

**Q3: What is your project about?**

In both cases, some combination of the taxonomy, phylogeny, anatomy, palaeoecology and biomechanics of (mainly basal) sauropodomorph dinosaurs.

**Q4: What surprised you most about living in South Africa and Brazil?**

Living in South Africa was a real eye-opener. One of the most difficult things to get used to was the degree to which its fraught history filters into almost every aspect of life there, with the ongoing ramifications of apartheid and its colonial progenitors (inequality, corruption, prejudice) setting the tone of almost every debate, public and otherwise. It can be both a very dynamic and very depressing/exhausting place to live at times. That said, South Africa still shares, with the likes of Australia and New Zealand, a certain Gondwanan cultural heritage and, depending on



the precise context (rugby and braais), was at times not all that different from home. And, of course – the fossils! The fact that you could just walk around vast areas of the countryside and pick up the bones of 200-million-year old animals – so very unlike New Zealand in the best of ways.

Compared to South Africa, living in Brazil was like living on a different planet. Culturally, linguistically and environmentally unlike anything I had encountered before. So everything was laced with surprise, including the eternal patience with which people would entertain a perennially confused and incoherent gringo.

**Q5: Apart from friends and family what did you miss most about New Zealand?**

Compared to South Africa, it was not being reminded on a daily basis that abject poverty exists. Along with being able to walk pretty much anywhere you like irrespective of place and time of day. In Brazil it was simply the English language.

Blair eschews social media, but you can keep up with his publications online:

<[https://www.researchgate.net/scientific-contributions/2046886899\\_Blair\\_W\\_McPhee](https://www.researchgate.net/scientific-contributions/2046886899_Blair_W_McPhee)>.



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**Luke Strotz is an Australian in China, employed as a Professor in the Department of Geology at Northwest University, Xi'an.**

**Q1: How did you end up in China?**

For a number of years, I had been collaborating with colleagues who were working with researchers in China. It was through these collaborations that I first made contact with researchers at Northwest University, and it was they who encouraged me to apply for funding to create a position for myself. I was also becoming increasingly interested in undertaking palaeoecological studies of Cambrian communities and a position in China would allow me to access material from their multiple lagerstätten. Given all this, and with my funding coming to an end in the United States (I was working at the University of Kansas at the time), moving to Northwest University seemed like a good opportunity and I took up the offer to apply.

I submitted a written application first and then – a few months later, whilst holidaying in Europe – I found out I was fortunate enough to be selected for interview. That led to a rather crazy seven days where I flew from Europe to Australia to get a visa for China, then to Xi'an to learn how the interview process worked, then to Beijing for the actual interview and then back to Europe to continue my holiday. The interview was conducted at a convention centre in Beijing where thousands of people were being interviewed simultaneously for government-funded positions in all research fields. It was certainly very different from my previous interview experiences. Soon after I was informed I was successful and I moved to China in February 2019.



**Q2: How is your position funded?**

My position is funded by the Geology Department at Northwest University, the Shaanxi provincial government and the Chinese Central government. This funding includes salary, covers my living expenses and also provides research support that I am able to use to fund my work both in China and in other parts of the world. This method of funding, where multiple university and government partners contribute funds to a research project and/or position, is very common in China.

**Q3: What is your project about?**

My research more broadly focuses on the factors that shape the structure of biological communities. To answer this question, I attempt to integrate concepts, methods and data from paleoecology and evolutionary biology to undertake a macroscale appraisal of changes in communities over time. Specific areas of interest include identifying the importance of population subdivision as a driver of community diversity, assessing how extinction risk is connected to the energetic requirements of a species, and quantifying the relative importance of biotic interactions as a mechanism for evolutionary change.

Right now, I'm working on a range of projects focusing on the structure of communities before, during and immediately after the Cambrian Radiation. Some example projects include palaeoecological analyses of Cambrian lagerstätten, quantifying the first parasite–host animal systems, and investigating how changes in physiology and the complexity of Cambrian ecosystem engineering may have influenced the tempo of the Cambrian Radiation.

**Q4: What surprised you most about living in China?**

Where to begin! Coming from Sydney, Australia, I thought I had some idea about Chinese culture (Sydney has a very prominent Chinese community), but I didn't realize how little I really knew. As well as Australia, I've lived in both the United States and Europe, and in all those places I felt like there were cultural touchstones I could easily connect with. In China, almost every day I feel like I'm experiencing a new and different way of doing things. As a person who enjoys an adventure, this has been an interesting experience, but you certainly have to learn to be adaptable and adjust quickly to unexpected changes if you are going to live in China.

There's also a lot of little day-to-day things. For example, almost all communication is done through social media apps like WeChat, including official communication with university administrators. And you pay for everything with your phone. Even the local stall selling noodles by the side of the road will have a QR code you scan with your phone to pay for your food.

Speaking of which, probably the most pleasant surprise is the cuisine. Xi'an is the starting point for the Silk Road and, as such, the local cuisine contains a lot of Middle Eastern influences. As a person who often travels for culinary experiences, I've really enjoyed a range of dishes that are atypical of what you find in Chinese restaurants outside of China.



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

The activities I miss aren't necessarily exclusive to Australia but are things I used to do in Australia that I don't really get to do so much anymore now I live in China. I miss easy access to the coast and quality beaches, something that's just omnipresent for most Australians (Xi'an is located in central China). I also miss sunny afternoons watching my local rugby team, going to the cricket or sitting in the pub chatting with my mates.

After living in various other parts of the world, I now really notice just how laid-back Australia is and, along with the Australian sense of humour, that's something I miss as well.

Luke Strotz is pretty terrible at social media, but you can check out his website at <<https://lukestrotz.com/>>.

## Legends of Rock

### *Dorothy Hill*

### *An Australian Palaeontological Pioneer*

Dorothy Hill was a world-renowned palaeontologist and highly respected educator of the 20th century. She is best remembered for her pioneering work on Palaeozoic corals and archaeocyathids and their application to stratigraphy. She had a stellar career as an Australian researcher based at the University of Queensland.

Dorothy Hill was born in Brisbane in 1907. She won an open scholarship to the University of Queensland after attending Brisbane Girls Grammar School. Dorothy was a gifted sportswoman representing both the University and Queensland in hockey. One unsourced story suggested she chose geology over chemistry for her science studies at the University of Queensland because it didn't interfere with hockey practice. After her first year of science, she was inspired to continue her studies of geology by H. C. Richards, the Foundation Professor in the Department of Geology and Mineralogy.



*Dorothy Hill in her office at the University of Queensland, 1972 (image courtesy of the School of Earth and Environmental Sciences, University of Queensland).*

For her honours project in geology she mapped the district from Bellevue to Linville in the Brisbane Valley on horseback<sup>1</sup> seeking coal deposits and collecting fossil plants. She graduated in 1928 with First Class Honours and a University Gold Medal; she was the first woman to receive

<sup>1</sup> This was a primary means of doing field work at the time because of the distances that could be covered and the reduced risk of encounters with snakes.



this highest undergraduate award. This was the first of many firsts during her life.

Soon after her Honours she was shown a Carboniferous limestone with fossil corals in the Mundubbera district while visiting friends. This began a lifetime passion for studying these Palaeozoic fossils. This was inexpensive but important research work. The taxonomy was done by examining the internal structure with the use of orientated thin sections only requiring a rock saw, a microscope and photographic equipment. At the time, the regional geological mapping of Queensland was imperative for the development of the state's natural resources and Dorothy Hill's studies underpinned knowledge of the time relationships between rock units.

There were no PhD programmes available anywhere in Australia at this time; Dorothy undertook PhD studies at Cambridge and was awarded the degree in 1932. From 1932 to 1937 she was a Fellow of Newnham College supported by research scholarships. During this time she undertook a revision of the terminology used for the study of fossil corals and produced a major monograph on fossil corals from Scotland. Her time in the UK had a profound effect, giving her a deep appreciation of the scientific research methodology and the value of collaboration and a good scientific library and reference collection. She soon gained pre-eminence in her chosen field, but was no cloistered academic. She continued her sporting interests and developed a broad range of new cultural interests, including drama and architecture; she also gained a Class A pilot's licence.

Dorothy then obtained one of the new Commonwealth Research Fellowships and returned to the University of Queensland to continue collecting and studying fossil corals. Her research output expanded to cover coral studies throughout Australia encompassing all Palaeozoic time intervals. In 1942 she was awarded Doctor of Science, the first woman at the University of Queensland to achieve this. The Fellowship was interrupted by World War 2 when she enlisted in the Women's Royal Australian Naval Service in 1942. She worked on codes and ciphers in the office of the naval officer in charge of HMAS Moreton. This was an important position as much war material for Allied forces was passing through eastern Australia.

After the War she was appointed Lecturer in Historical Geology, specializing in palaeontology. This was the start of a highly productive career as a researcher and teacher at the University that lasted until the mid-1980s. She produced a continuous stream of high-quality scientific literature that saw her international reputation grow. Some highlights from this period include the Anglo-



*Dorothy Hill in the Brisbane Valley c.1929 (image courtesy of The University of Queensland Fryer Library).*





American production of the *Treatise of Invertebrate Paleontology*, of which she was involved in the production of three and a half volumes.

There were many practical outcomes that contributed greatly to our understanding of eastern Australian geology. She worked closely with the Geological Survey of Queensland. Her compilation of the Geological Map of Queensland and the Geology of Queensland (1960) formed the basis for much subsequent economic activity. During this phase of her career she developed a reputation as a great teacher. She viewed the role of the teacher as the development of inquiring minds, done by confronting students with real problems then providing the intellectual tools to seek appropriate solutions. She supervised many Honours and higher degree projects, based on Australian geological problems or issues. Her students went on to take up positions of leadership in commercial or community spheres. The Australasian Association of Palaeontologists, an organization she was instrumental in founding, held a symposium in honour of her 75th birthday and published a volume of papers. Of the companies and government instrumentalities that contributed financially to the enterprise, many were headed up by her former students.

In 1956, Dorothy Hill became the first woman appointed to a Professorial position at an Australian University, and in 1971 she joined the President of the University of Queensland's professorial board – the first woman to hold such a position in any Australian university. She was the first woman elected a Fellow of the Australian Academy of Science (1956), the first woman elected President of the geology section of ANZAAS (1956), and the first woman elected Fellow of the Royal Society (1965). She was awarded a CBE in 1971 and Companion of the Order of Australia in 1993.

She did much to advance the position of women in Australian science and society without ever seeking to be a champion of this cause. She recognized the existence of in-built inequalities and believed the best way to combat this was through outstanding performance. Two of her most outstanding achievements at her University of Queensland department were the development of an outstanding reference collection of geological materials based on the structures and processes of the Sedgwick Museum, and the development of an outstanding departmental reference library of scientific publications done through exchanges with scientific colleagues around the globe. Unfortunately, these were not enduring legacies. The University of Queensland transferred ownership of its geological collections to the state museum and the holdings of the departmental library were consigned to a larger library of Physical Sciences and Engineering that was subsequently named in her honour.

Professor Dorothy Hill passed away aged 89 in her home town in April 1997. Her life and work were commemorated in an exhibition at the Queensland Museum titled "Brilliant Careers" highlighting the work of 34 women collectors and illustrators<sup>2</sup>. She also features as one of 100 people who have shaped Australia in a permanent exhibition in the Australian Museum<sup>3</sup>. She is commemorated by the Dorothy Hill Chair in Palaeontology & Stratigraphy at the University of Queensland. In recent years her former department at the University of Queensland (now the

<sup>2</sup> She also features in a book of the same name edited by Judith MacKay and published by the Queensland Museum in 1997.

<sup>3</sup> 100 people who have shaped Australia. Australian Museum press release at: [https://media.australianmuseum.net.au/media/dd/Uploads/Documents/35956/MediaRelease\\_100-People.ecab994.pdf](https://media.australianmuseum.net.au/media/dd/Uploads/Documents/35956/MediaRelease_100-People.ecab994.pdf).



Dorothy Hill up close with the grotesque of her holding a rugose coral c.1981. The grotesque adorns the Richards Geology building in the Great Court of the University of Queensland (image courtesy of the School of Earth and Environmental Sciences, University of Queensland). You can also view an interactive three-dimensional version of the grotesque here: <<https://sketchfab.com/3d-models/3d-model-of-professor-dorothy-hill-1982-cd3d3848fb4348a79d2b6d1d45ed78c5>>.

Department of Earth and Environmental Sciences) hosts an annual “Dorothy Hill Women in Earth Sciences Symposium”. Her name is also memorialized with a school campus at Coorparoo State School, a research vessel on the Great Barrier Reef, a scholarship at The University of Queensland, a state electorate, a street in the Commonwealth Games Village, and two medals awarded in her name each year by the Australian Academy of Science and the Geological Society of Australia-Queensland<sup>4</sup>.

#### **Acknowledgement**

This note is an abbreviated version of a previously published article (Simpson 1999<sup>5</sup>) with some additional sourced material.

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#### **REFERENCE**

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<sup>4</sup> From the online exhibition “Dorothy Hill: Pioneer and Professor” at <<https://uqlibraryonlineexhibitions.omeka.net/exhibits/show/dorothy-hill-online-exhibition>> (accessed 6/2/2020).

<sup>5</sup> Available online at <<https://protect-au.mimecast.com/s/brA8Clx10YU6M8R7UGw-Ly?domain=geocurator.org>>.



# Behind the Scenes at the Museum

## *Kitakyushu Museum of Natural History & Human History, Japan*



Figure 1. Kitakyushu Museum of Natural History & Human History.

In 1974 an elementary school student incidentally found fish fossils from the Cretaceous Kanmon Group in the city of Kitakyushu, western Japan, and the excavation of them was conducted by researchers in 1976 and 1977. This led to the establishment of the Kitakyushu Museum of Natural History, which opened in 1981. The Museum merged with the Kitakyushu Museum of History (established in 1975) and the Kitakyushu Municipal Archeological Museum (established in 1983) to form the Kitakyushu Museum of Natural History & Human History in 2002 (Figure 1).

Today the collection consists of about 84,000 historical and archaeological items, about 670,000 biological items and about 50,000 geological items. About 21,000 of the geological items are palaeontological specimens. Fossils from the Kanmon Group form one of the main palaeontological collections of the Museum (Figure 2). Not only freshwater fish remains but also many other fossils such as dinosaurs, turtles, molluscs and conchostracans have been found from this group, and they are housed here. Palaeontological specimens also contain a diversified fossil assemblage (molluscs, crustaceans, echinoids, whales, birds, shark teeth) of the Paleogene Ashiya Group around Kitakyushu. Parts of the palaeontological collection consist of Carboniferous to Permian shallow marine organisms (corals, brachiopods, fusulinids) in mid-oceanic atoll carbonates, Triassic plants and insects, and Jurassic ammonites from nearby cities are housed here, as well as many fish fossils from various countries and Cretaceous molluscan fossils from various parts of Japan – reflecting the curators' specialized fields. Several hundred palaeontological specimens are added every year in the course of the curators' field work.

More than 100 type specimens of fossils are housed in the Museum, and they include 18 species of Cretaceous fishes such as *Diplomystus kokuraensis* and *D. primotinus* from the Kanmon Group and an archaic mysticete *Yamatocetus canaliculatus* from the Ashiya Group in Kitakyushu. Many of these type specimens of fishes from the Kanmon Group along with cervical vertebrae and left forelimb bones of *Y. canaliculatus* are on permanent display. Other type specimens on permanent display contain the Jurassic and Cretaceous coelacanths *Parnaibaia maranhaensis* and *Mawsonia brasiliensis*, from Brazil. The Museum also holds several type specimens of



Figure 2. A part of the collection of freshwater fish fossils from the Cretaceous Kanmon Group.

invertebrate fossils (insects, crustaceans, molluscs), including extremely large lower jaws of the Cretaceous coleoids *Nanaimoteuthis hikidai* and *Haboroteuthis poseidon*.

The Museum is very active in collecting significant specimens representing the history of life on Earth for exhibition and education, and the permanent exhibition contains many fossils from



Figure 3. The main exhibition room.



famous Lagerstätten such as the Holzmaden Shale, Solnhofen Limestone and Santana Formation, and replica skeletons of dinosaurs (*Camarasaurus*, *Allosaurus*, *Stegosaurus*, *Tyrannosaurus*, *Triceratops*), pterosaur (*Pteranodon*, *Quetzalcoatlus*), a plesiosaur (*Thalassomedon*), a mosasaur (*Tylosaurus*), a mammoth and others (Figure 3). These specimens are used for talks, school programmes and other events as well as for exhibitions.

### **Akihiro Misaki**

*Kitakyushu Museum of Natural History & Human History*

*Find out more about the Kitakyushu Museum of Natural History & Human History:*

*through the official website: <<http://www.kmnh.jp/>>*

*or take a virtual tour of the Museum on YouTube:*

*<[https://www.youtube.com/watch?v=Fhn5Rt6R-2k&feature=emb\\_title](https://www.youtube.com/watch?v=Fhn5Rt6R-2k&feature=emb_title)>*

## The blob returns

In the heady days of the ramshackle adventure that was my PhD studies at the Sedgwick Museum in Cambridge, one of the more persistent apocryphal stories that circulated was about my supervisor, Harry Whittington, who was both unquestioned doyen of all matters ancient and arthropodic and a thoroughly nice man. The story was of some previous, mysterious PhD student of his in the mists of time who was convinced that he had found a new kind of trilobite. Harry was urged to the microscope where the discovery lay, and the verdict was eagerly awaited. Straightening up from examining this prodigious find, Harry removed the trademark cigar from his mouth, and considered a response that would be precise, yet delicately steer around any unnecessary unkindness. “Hmm” he said. “Looks like a blob to me”.

It was a scrupulously chosen description: one of those words that can be eloquent in so many circumstances, but seems to have a specific affinity to palaeontology within which, all by itself, it can counterbalance all of those wonderful, exquisite qualities of fossils that make the imagination soar, and so bring the whole discipline crashing back to earth – where, of course, it naturally belongs. Consult the dictionaries, and one will see that the word ‘blob’ seems to have no distinguished antecedents in Greek or Latin, but to have emerged in ‘late Middle English’, sometime in the 15th century, as a verb to make marks that (perhaps) were meant to recall bubbles. From 1725, there are records of the word being used as a noun, for things that were globule-shaped or blister-like.

Its use now has spread from its common meaning – to signify some generally shapeless mass – to some quite specific characterizations, not all of them with humorous intent. In astronomy, there are Lyman-alpha blobs, widely used enough to have their own acronym, LABs. Their sheer scale precludes any attempted levity (or, indeed, palaeontology): these are hydrogen gas clouds hundreds of thousands of light-years across, among some of the largest known objects in the observable Universe. If they grow up – or, more precisely, compress down – they may become a galaxy. On a corner of one such galaxy, some resident humanoids use the word for the key item of a sport called blobbing, which I had never come across before, but which has made it into



the Wiktionary annals. Blobbing involves having someone sit on one side of a blob – a partially inflated airbag – and someone else jump on to the other side of the blob from a high platform, so that the sittee is propelled into an adjacent pool of water. Olympic status, surely, cannot be far away.

And there is also a blob that, quite specifically, and most surprisingly, does make it into the fossil world. It is one of the several aliases for some members of the Cottidae, a family of small fish, the common sculpins: more familiar names for the sculpin version of the blob are bullhead and Miller's thumb, and one can also use aliases such as mufflejaw and springfish. 'Blob' seems to be more current in north America than Europe, though the sculpins range across both. Sculpins are often said to be 'inconspicuous', perhaps because they are small and clearly not built for speed or elegance, but they often possess magnificently developed pectoral fins.

The sculpins do have a fossil record, and there is a 1925 paper by David Starr Jordan describing some from the deposits of prehistoric Lake Lahontan, in Nevada. Flattened, with large heads and small bodies, the term 'blob' seems not at all amiss, but on some specimens the wing-like pectoral fins are quite clear, to clinch the identity. Jordan describes consulting a colleague about the age of the deposits, who replied that they are of 'Lahontan age' – a most academic response – though adds that this is likely a millennium or so into the past, so late Holocene. As to older examples, there is a note in the paper of 'four fossil species, described by Cope in 1883 from the Pliocene deposits of former Lake Idaho'. Was this *the* Cope? – the Edward Drinker Cope who famously battled with Charles Othniel Marsh in the badlands of nineteenth-century North America over that nation's most magnificent dinosaurs?

It was indeed, and it certainly puts the old warrior – that 'militant palaeontologist', as one colleague called him – into a different light. He penned thirty-three pages for the *Proceedings of the Academy of Natural Sciences of Philadelphia* on the 'Fishes of the Recent and Pliocene Lakes of the Western Part of the Great Basin, and of the Idaho Pliocene Lake'. It's most impressively wide-ranging stuff. Cope describes those iconic landscapes, links modern lakes with ancient ones, talks about past climate change, quotes analyses of lakewater chemistry and describes fish both modern and fossil, including quite a few new species (and a new genus and species of freshwater hydroid, for good measure). Jordan, now, was a little snifty about Cope's descriptions – the fossil sculpid species were 'known only as many detached preopercles', he said – but then we know that Cope was a man in a hurry.

Amid the palaeogeography and ichthyological detail in Philadelphia's *Proceedings*, a hint of Cope's more adventurous past comes through, where, just before he gets stuck into the taxonomy, he acknowledges help from the captains of the local forts, with 'especial thanks to General W. T. Sherman, commander-in-chief of the army, from whom I have received many favours, on this and other occasions'. Now, *there* would be a fascinating connection to pursue. William Tecumseh Sherman, leader of the Union forces in the American Civil War, was in at least some ways a good match for the hunter of dinosaurs (and small fishes, we now know), as a militant military man by anybody's standards.

One might detect, furthermore, a slight similarity in field practice. Sherman became notorious for his ruthlessly effective scorched earth policy in the Civil War, destroying buildings and crops in Confederate areas, to deny their forces the means to house and feed themselves. Both Cope



and Marsh used something of the same *modus operandi* whenever their gangs came across each other's field sites, destroying both equipment and those dinosaur bones that they could not steal or carry away. One might say they had less excuse than did Sherman, who was under no illusions whatsoever that cruelty could be removed from war. The bone wars between Cope and Marsh may have created a legend around the crazier limits of bitter enmity in science. But it's nice to be reminded that one of the protagonists, at least, could show the better angels of his nature in delicately pursuing a fishy fossil blob.

The palaeontology of the blob runs most spectacularly through the long wastelands of the Precambrian, where the strata are bereft of the geometrical extravagances of trilobites<sup>1</sup>, graptolites, ammonites and other such intricate metazoans. This was the empire of microbial mats, and the slight and sticky grip that these colonies imposed upon layers of sand and mud. Petrified now as indisputably blobby shapes and textures in the resultant rock, these have become the province of palaeontology, in a way that might have had the good Dr Rorschach, inventor of the infamous ink-blot psychological test, rubbing his hands with glee at the thought of so much more material at his disposal<sup>2</sup>.

Indeed, it is now almost impossible – well, for me, at least – to give any lecture on the life of the Precambrian without including reference to *The Blob*, the 1958 movie that launched Steve McQueen to stardom, as finely-chiselled hero facing the entirely un-chiselled villain, a hungry and homicidal wobbly red jelly from outer space. The magnificently lurid film poster announces the meteorite-brought visitor with unfortunate table manners as *Indescribable!* and *Indestructable!*, affirming that *Nothing Can Stop It!*. So, it is a little anti-climactic that the weapon of choice was not a nuclear missile, laser beam or Godzilla, but a one-two punch of domestic refrigerator followed by massed fire extinguishers<sup>3</sup>.

The eponymous Blob of that saga, nevertheless, gained most of its *frisson* because unlike the stromatolites and microbial mats of the Precambrian, it could move fast enough to snare a few passing Pennsylvanians. So, for true analogy with the Hollywood ecosystem, intrepid palaeontologists hankering after that kind of star quality need to seek properly motile microbial mats, preferably ones that are carnivorous. And – perhaps now is the time for a few sinister chords from the brass instruments in the pit orchestra – to my surprise, such things really exist – and have, moreover, been petrified...

John Bonner – the man who happily devoted a lifetime to studying these eerie organisms – and who was given the monicker of 'Sultan of Slime' for his pains – described them as 'little more than a bag of amoebae enclosed in a thin slime sheath'. These are the slime moulds, protists that belie that terse description to get up to all kinds of co-operative tricks. Normally living as separate cells in soils, when food beckons, they clump together as centimetres-sized masses of cytoplasm and nuclei – and go on the hunt.

*Dictyostelium discoideum* was Bonner's pet species. Cells begin to gather as the local food – usually bacteria – runs low, and mass above the ground surface to form the most blobby of translucent blobs, a protistan Tower of Babel that then releases some of the cells as spores into

<sup>1</sup> The non-blob ones, naturally.

<sup>2</sup> The palaeontological connection would have been an added attraction for Rorschach: a person he turned to for advice early in his career was Ernst Haeckel.

<sup>3</sup> This was a truly low-budget horror film.



the air, to be carried to fresh hunting grounds. The tower then comes crashing down in a mass of dying cells, sacrificed for the greater good of the genome. There is a lovely short film, set to one of the slower and moodier contemporary musical ostinati, of this quite riveting balletic process<sup>4</sup>. And the protean slime mould machinery is nothing if not determined – cut one in half and two mini-moulds will reassemble and carry on going about their business.

Inference of psychological state is not entirely flippant. Another slime mould researcher, clearly quite as happily bemused as John Bonner, observed that while different species have different behaviours, even different strains of the same species can act differently, quoting a strain from the USA always trying to escape from its dish, while its Australian kin was just “really quiet”<sup>5</sup>. There is something quite touching about the thought of a melancholy slime mould, while it’s probably best to keep out of the way of an aggressively confident one.

It is life, but not quite as we generally know it. It can also be, extraordinarily – albeit extremely rarely – palaeontology. The first generally accepted record of a slime mould was by one W. Domke in 1952, in Baltic amber, in a paper so obscure that it has so far escaped the tentacles of Google, but which pointedly announces in the title that it is the first *certain* record of a fossil slime mould: all previous claims being, therefore, just blobs.

Another amber specimen, Eocene in age, was described by Heinrich Dörfelt and colleagues in 2003. It is an almost deliriously pleasing mélange of the hyper-contemporary and the antique. The slime mould here was rather deeply inside the not-quite-transparent amber, so conventional light microscopy would not work so well. However, by hooking up some differential interference contrast microscopy with three lasers at different wavelengths and a long-distance objective, these ingenious researchers produced a fluorescence image stack that nicely showed the beast itself – a new species, they opined, which they then proceeded to describe. In Latin, at that. So, the *sporocarpium fossile calyciforme* was, they said, *superne cumcapillitia*, and not only that, it was *sine columella*, with additionally *a base usque ad apicem ca 910 um longum...* and so on, for a paragraph that likely had the shade of Linnaeus nodding approvingly, if perhaps a little surprised at the precision of the micron-scale measurements.

For the barbarians among the readership, the species description is paraphrased in English. The laser-guided images, furthermore, are certainly pretty. A blob? It’s more like a tiny ice-cream cone, the cone squashed as if by the clutch of an over-enthusiastic infant, and the generously applied ice cream spilling out. The squashed cone is the stalk expanding into the cup-shaped base of the spore capsule, while the ice-cream is a mix of ‘capillitia’, a tangle of filaments, with spores among them: these latter at least are blob-like, though well-preserved enough to see a warty surface texture. (A few years later part of that research team described yet another amber-encased slime mould. It’s a different species, and this time resembling more like a collection of elegant if slightly droopy daisies attached to part of a conifer cone.)

It’s rather beautiful material, all in all, especially when transformed into the colourful modern art of the fluorescence image stacks. It’s conceptually surprising, too. As these are protists, albeit ones with most elaborate behaviour, I had always thought of them as truly ancient forms of life, stretching back deep into the mists of the Precambrian. But perhaps not so. The authors

<sup>4</sup> <<https://www.princeton.edu/news/2010/01/20/video-john-bonnors-slime-mold-movies?section=mm-featured>>.

<sup>5</sup> <<https://www.livescience.com/64218-slime-mold-hunts-prey-gif.html>>.





declared themselves formally amazed in the paper that slime moulds do not have a longer geological history, especially as some can have lime-encrusted spore capsules. Perhaps, they say, true slime moulds are a relatively late invention, quoting the example of the diatoms as a similarly late arrival among single-celled organisms, with no undoubted fossil diatoms known before Cretaceous times. For some reason, this inference regarding slime moulds seems stranger, perhaps even more unsettling, than the newfound ability of some algae to build themselves a complicated silica overcoat. Perhaps it's something to do with realizing that amoebae might have learnt to play such co-operative tricks so late in their history. After all, the group as a whole has been around for a long time – from at least the Neoproterozoic, as suggested by some nicely preserved vase-shaped microfossils, pulled out of rocks of that age from Arizona's Grand Canyon, that, the discoverers emphasized, were 'essentially identical' to the housings of some modern amoebae (Porter and Knoll 2000).

So, is there a faint echo of the 'Cambrian explosion', of evolving multicellular life-forms, being echoed here? The slime moulds, of course, did not go for the fiddly and oh-so-inflexible business of building cell walls. What will these enterprising protists dream up next, one asks? Maybe, one day, they will learn to hunt bigger prey, and give Hollywood a more properly scary role model.

Homonymically speaking, the film moguls already have one, if they would have the wit to use it. It's truly monstrous, and all too real. The Blob, as it was christened by marine ecologists undergoing a severe and understandable case of the heebie-jeebies, caught the headlines a few years ago as it roamed the Pacific Ocean, killing millions of fish and seabirds. It was a growing mass of warm water that clamped itself against the western side of North America, from the Aleutian Islands as far south as California. From the summer of 2015 to 2016, food chains were up-ended, there were mass starvations, counterbalanced by bizarre blooms of say, the luminous, gelatinous and, yes, blob-like pelagic tunicate *Pyrosoma*<sup>6</sup>. It was a gigantic and long-lived example of one of the newest and fastest-growing terms in oceanography, of a *marine heat wave*, one of those phenomena that show that global heating<sup>7</sup> is catching up with us perhaps a little sooner than expected.

Now, here is a kind of blob that seems seriously worth chasing in the fossil record, for there surely have been prehistoric examples of such disruptive oceanic heatwaves. That might give some advance warning of what to expect. This Blob will surely return, and, all too soon, grow ever larger.

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<sup>6</sup> The comparison made by Cornwell (2019) was with a floppy pink hot dog.

<sup>7</sup> A newer and better term than global warming. It makes the whole thing less cosy in prospect.



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## First Animals exhibition, Oxford University Museum of Natural History

The Cambrian Explosion has been a subject of fascination for scientists and the public alike and has been publicized in popular books by Stephen J Gould and Simon Conway Morris. It even made it to the title page of Times Magazine whose 4th December 1995 title page read, “Evolution’s Big Bang – New discoveries show that life as we know it began in an amazing biological frenzy that changed the planet almost overnight”. A lot has happened over the past 25 years and although an overnight biological frenzy seems unlikely, the excitement has never ceased.

A multitude of new fossil discoveries from the Cambrian and Ediacaran sites has provided an ever richer and more complete picture of the seemingly alien forms of early animals. Together with a better understanding of fossil preservation and molecular insights into the deep ancestry of animals these form the cornerstones that shape our current view of the transition from single-celled to complex life.

The Museum of Natural History at the University of Oxford brings this history to life with its exhibition ‘First Animals’ that combines authoritative science with a combination of classical specimen showcases and more playful interactive exhibits to tell the story of the origins of animals from many different angles.

‘First animals’ is furthermore accompanied by ‘First Impressions’, 25 prints and etched plates inspired by the first animals and the impressions they left in rock. These 25 pieces of art spill out from the actual First Animals



*Cricocosmia jinningensis* from the Chengjiang Lagerstätte.



exhibit and can be found throughout the wider museum, thus creating a sense of discovery reminiscent of fossil hunting out in the field.

The scientific backbone of 'First Animals' is formed by dozens of specimens from the three most iconic Cambrian Lagerstätten (Burgess Shale, Chengjiang and Sirius Passet, brought together for the first time for a museum exhibit) and realistic-looking casts of key Ediacaran fossils like *Charnia* and *Kimberella*. Additional exhibits cover Hox genes, animal complexity and biomineralization (amongst others), and further context comes from short videos by leading scientists adding perspectives on what animals are and how fossils are key to understanding their origins. An extra bit of fun is provided by the 'Cambrian Diver', a three-panelled interactive animation that lets you take control of a submarine exploring the Cambrian seafloor.

'First Animals' and 'First Impressions' at the Oxford University Museum of Natural History is free to the public and open until 1st September 2020. It is also accompanied by an excellent web page: <<http://www.oum.ox.ac.uk/firstanimals/>>.



*Cambrian Seas* by Charlie Davies is part of the *First Impressions* art exhibit.



# An Introduction to Bayesian Phylogenetics

## Part 1: Introduction and Installation

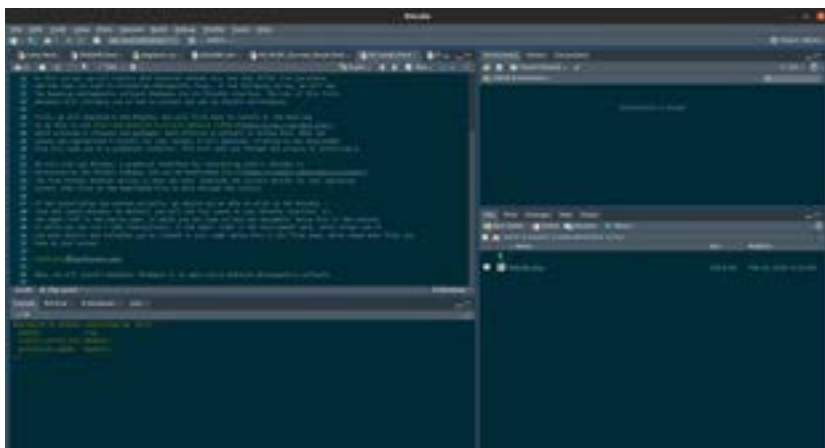
Very few controversies in palaeontology have set passions alight like how to best build a tree. The most obvious manifestation of this is in the argument of whether to use Bayesian or parsimony methods to estimate a tree. But we also see this controversy in the exact type of parsimony to use, and why.

In this series, we will explore what Bayesian methods are, how they differ from parsimony, and how they are used in estimating phylogenetic trees. In the following series, we will use the Bayesian phylogenetic software RevBayes via its RStudio interface. The rest of this first instalment will show you how to install and set up RStudio and RevBayes.

First, we will download R and RStudio. You will first want to install R. The best way to do this is via the Comprehensive R Archive Network (CRAN; <<https://cran.r-project.org/>>), which archives R releases and packages. Most official R software is hosted here. When you choose the appropriate R install for your system, R will download. Clicking on the downloaded file will take you to a graphical installer. This will walk you through the process of installing R.

We will also use RStudio, a graphical interface for interacting with R. RStudio is maintained by the RStudio company, and can be downloaded here: <<https://rstudio.com/products/rstudio/>>. The free RStudio Desktop version is what you want. Download the correct version for your operating system, then click on the downloaded file to walk through the install.

If the installation has worked correctly, we should now be able to click on the RStudio icon and launch RStudio. By default, you will see four panes to your RStudio interface. In the upper left is the source pane, in which you can type scripts and documents. Below this is the console, in which you can run R code interactively. In the upper right is the environment pane, which allows you to see what objects and variables you've created in your code. Below this is the files





pane, which shows what files you have on your system. The colour scheme of RStudio can be manipulated under `Tools > Global Options`.

To make sure everything is working as expected, we will try installing an R package. Under 'Tools', choose 'Install Packages'. Enter 'devtools' as the package to install. By default, 'Install dependencies' should be checked. If not, check it. This will install a package called 'devtools', which has some advanced options for R packages.

Next, we will install RevBayes. RevBayes is open-source Bayesian phylogenetics software. It can be installed from here: <<https://revbayes.github.io/download>>. One additional step you might consider doing is adding RevBayes to your system path. This allows the software to be executed from anywhere, and by RStudio. Instructions for doing this on Windows are here: <[https://docs.microsoft.com/en-us/previous-versions/office/developer/sharepoint-2010/ee537574\(v=office.14\)](https://docs.microsoft.com/en-us/previous-versions/office/developer/sharepoint-2010/ee537574(v=office.14))>, and for Mac here: <<https://www.architectryan.com/2012/10/02/add-to-the-path-on-mac-os-x-mountain-lion/>>. This step is not essential, but may make life easier later.

Finally, we will install RevKnitR, RevBayes' RStudio interface. In the console, type:

```
devtools::install_github("revbayes/RevKnitR")
```

This step may ask you to update some packages, depending on the age of your install. Allow this.

That's all for this instalment. Next time: What is a Bayesian method, anyway?

**April Wright**

*Southeastern Louisiana University*



# Spotlight on Diversity

**Highlighting different experiences in palaeontology. This issue's palaeontologist, Catherine Strickson (Liverpool John Moores University), discusses being trans in academia.**

What does it mean to be a woman? Have you had the surgery? What even is non-binary? Isn't the singular 'they' grammatically incorrect?

While many cis (not transgender) people are eager to go out of their way to learn about and show support to transgender colleagues, attempts to have a fruitful discussion about the issues trans people have in academia are often stymied by barrages of lines of questioning that are at best unproductive, and at worst, profoundly offensive. The above is a small selection of the questions that we are often left having to answer in lieu of talking about real issues affecting trans people in our field – such as harassment, assault, healthcare and safety concerns when travelling. It is difficult to have productive conversations about improving the safety and comfort of trans and gender non-conforming people in science, when we are left to essentially defend ourselves from ignorance, misunderstanding and loaded rhetoric posed against us by the media and certain politicians and regimes. It is exhausting to have discussions of diversity and intersectionality when so many even well-meaning members of our community enter these discussions unwilling to hear our voices, treating trans and non-binary colleagues as a curiosity, or even a subject of intense debate, rather than as human beings with emotions, ambitions and value outside of our gender.

The existence of trans and non-binary people is not up for debate. Our existence is well-documented. Nor are we a recent phenomenon. Elagabalus predates Caitlyn Jenner by almost two thousand years<sup>1</sup>. The fact that we are now out of the shadows and in the public imaginary might seem like a shock to many, but this is no reason to dismiss our concerns, or worse, our personhoods. The media backlash to our newfound visibility is harsh and unrelenting, especially in the UK, where media outlets on all sides of the political spectrum have a record of publishing barefacedly transphobic articles, ignoring their author's links to far-right organisations in the US<sup>2,3,4</sup>. As scientists we need to do better than to listen to these hit pieces, but we cannot improve if we are not listening to trans and non-binary people, as we should be listening to all marginalised groups, and looking for solutions to roadblocks to their inclusion on both an individual and an institutional level.

One such roadblock is simply medical access and leave. Trans people who pursue medical transition (use of hormones, or surgeries, for example) are in a prime position to face major disadvantages from medical insurance, lack thereof, and from a lack of adequate provisions

<sup>1</sup> Transgender people in history: <<https://historycollection.co/11-remarkable-transgender-people-history/>>.

<sup>2</sup> The rise of TERFism: <<https://www.vox.com/identities/2019/9/5/20840101/terfs-radical-feminists-gender-critical>>.

<sup>3</sup> The UK media's transphobia problem: <<https://theoutline.com/post/6536/british-feminists-media-transphobic?zd=1&zi=jlakhjppq>>.

<sup>4</sup> The Guardian US rejects Guardian UK's transphobic editorial: <<https://www.theguardian.com/commentisfree/2018/nov/02/guardian-editorial-response-transgender-rights-uk>>.



for medical leave<sup>5,6,7,8</sup>. Living in the UK, the National Health Service covers much of the cost of my healthcare, yet when seeking leave for major surgery during my PhD, I was left to pay for rent, food and other expenses out of pocket. Waiting lists for trans healthcare and surgery are long, often multiple years, and postponing could result in going to the back of the queue<sup>9</sup>. Given the dire financial situation of most PhD students, this is a major concern. Indeed, when complications followed with an urgent need for further hospitalisation, those stays were not accompanied by medical leave. I simply could not afford it. And all that eats into the quality and quantity of research that can be done within a tight time period. In the US, I likely would have had to pay for that surgery itself out of pocket, to the tune of possibly tens of thousands of dollars.

As with other people who are reliant on medical care and regular access to medicine, trans people can be knocked into precarious financial circumstances rapidly, risking having to drop out of study entirely just to keep afloat. If we are to retain a more diverse set of academics, we need safety nets in place for these emergencies. These risks are heightened in countries without adequate access to healthcare, but even in countries where health care is seen as a right, trans patients have been known to face abuse and neglect from medical professionals once their trans status is revealed<sup>7,8,10</sup>. This speaks to the direst issue at hand here: lack of safety even in places which for most people would be safe environments. In the US, there are still many states where 'trans panic' is a valid legal defence – here murderers of trans people can get off without charge<sup>11</sup>. Anti-LGBT+ laws are commonplace throughout the world, and being perceived as, or revealed to be transgender can be a death sentence. The safety of trans and non-binary people should be first and foremost on the minds of academics when speaking of us. How do we keep our colleagues and friends safe? What arrangements can be made to make fieldwork in dangerous countries more secure? How do we make sure they have adequate healthcare provisions? How do we make sure any inconsistencies with name, title and gender markers do not make life difficult or even dangerous? We need to move past the fascination with trans people as sex dressing, and start addressing very real safety and social concerns. No good comes from patting oneself on the back for inviting a trans person to speak when that trans person could be facing real and tangible harm from lack of social, financial, bureaucratic and medical support.

Extending a hand is a great first step. The next is not shaking our hands, but helping us up from the ground.

<sup>5</sup> Professional statements supporting trans care: <<https://genderanalysis.net/factsheets/professional-statements-supporting-transgender-medical-care/>>.

<sup>6</sup> Humiliation in trans healthcare: <<https://www.advisory.com/daily-briefing/2019/06/25/trans>>.

<sup>7</sup> US trans patients denied healthcare: <<https://eu.usatoday.com/story/news/2018/12/11/transgender-health-care-patients-advocates-call-improvements/1829307002/>>.

<sup>8</sup> Difficulties getting trans healthcare in the US: <<https://www.npr.org/sections/health-shots/2017/11/21/564817975/health-care-system-fails-many-transgender-americans?t=1580419481294>>.

<sup>9</sup> UK waiting list 'hell': <<https://www.bbc.co.uk/news/uk-england-51006264>>.

<sup>10</sup> Pakistani trans patient left to die from gunshot wound: <<https://www.telegraph.co.uk/news/2016/05/25/transgender-activist-dies-after-being-denied-treatment-in-pakistan/>>.

<sup>11</sup> Overview of LGBTQ+ panic laws: <<https://lgbtbar.org/programs/advocacy/gay-trans-panic-defense/>>.



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



**36th International Geological Congress \*POSTPONED\***  
India Expo Centre, Delhi, India 2 – 8 March 2020

Postponement of 36th IGC: the Government of India has reviewed the situation regarding the outbreak of the novel coronavirus (COVID-19). It considers the health and safety of delegates and guests of the 36th International Geological Congress paramount. In view of this, the Government has postponed the congress to a later date.

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



**Association for Materials and Methods in Paleontology 13th Annual Meeting**  
Johnson City, Tennessee, USA 21 – 25 April 2020

The Association for Materials and Methods in Paleontology (AMMP) would like to invite you to the 13th Annual Meeting, featuring pre-meeting workshops and field-trips, working groups, 'palaeo speed dating', mini-courses, demonstrations, collections tours, a poster session and reception, banquet and silent auction. Registration is open online.

See <<https://www.paleomethods.org/events>>.



**2nd Palaeontological Virtual Congress**  
Virtual environment 1 – 15 May 2020

The emergence of new applications and technologies opens a wide range of possibilities regarding new forms of communication in the scientific world. Following a successful virtual congress in 2018, the second congress is being convened, again with the purpose of spreading the most recent scientific advances in palaeontology worldwide in a fast, easy and economical way. Oral communications and posters about any palaeontological field will be presented through an online platform. The simplicity of this new format allows for low-cost registration fees and saves travel and other expenses. Consequently, this initiative aims to give international projection to the palaeontological research carried out by groups with limited economic resources, and promotes participation of palaeontologists from developing countries.

Abstract submission has now closed but registration remains open at the website:  
<<http://palaeovc.uv.es/index.php/downloads/>>.





**Marine Reptiles Conference 2020**

The Etches Collection, Kimmeridge, UK 5–7 May 2020

All professionals, amateurs and enthusiasts of marine reptiles are invited to attend. The conference consists of two days of oral platform presentations, discussions and posters plus an optional conference meal on the first day and an optional field-trip to the fossiliferous Kimmeridge Bay area on the third day.

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.

Registration has now closed. For more information please visit the website:  
<<https://marinereptiles.org/index.php>>.



**European Geosciences Union General Assembly (EGU)**

Austria Center Vienna, Austria 3–8 May 2020

The EGU General Assembly 2020 will bring together geoscientists from all over the world to one meeting covering all disciplines of the Earth, planetary and space sciences. The EGU aims to provide a forum where scientists, especially early-career researchers, can present their work and discuss their ideas with experts in all fields of geoscience. The EGU is looking forward to cordially welcoming you to Vienna. Early bird registration closes on 31st March.

For more information, please visit the website: <<https://egu2020.eu/>>.



**5th International Meeting of Early-stage Researchers in Palaeontology (IMERP)**

Naujoji Akmenė, Lithuania 18–21 May 2020

The IMERP is aimed at early-stage palaeontologists, from undergraduate students to recent post-doctoral researchers, and hopes to bring young palaeontologists together from all over the world. The meeting's character is informal and its aim is to create a friendly environment where young researchers can present their work and meet other palaeontologists from many different fields of expertise. The meeting's sessions will include presentations (oral and poster) from different fields of palaeontology, such as: vertebrate and invertebrate palaeontology, micropalaeontology, palaeobotany, taphonomy, palaeoanthropology, palaeoenvironment, palaeoclimate studies *etc.*

Abstract submission closes on 31st March, standard registration closes on 18th April.

For more information please visit the website: <<https://imerp2020.weebly.com/>>.



**10th International Meeting of the Society of Avian Paleontology and Evolution (SAPE 2020)**

University of Málaga, Spain 25 – 29 May 2020

The meeting is open to palaeontologists, ornithologists and anyone with a general interest in bird evolution. Birds are excellent models for addressing a wide range of scientific questions, hence students and professionals of relevant research areas – functional morphology, evo-devo, conservation palaeontology and molecular systematics, among others – are encouraged to take part in the scientific sessions. A scientific committee of renowned researchers will review the abstracts to ensure the quality of the scientific sessions. Abstract submission is open until 15th April and early bird registration will close on 25th April.

For further details see the website: <<https://sape2020.com/>>.



**35th IAS Meeting of Sedimentology**

Vienna House Diplomat Prague, Czech Republic 23 – 25 June 2020

The meeting will feature several sessions with a palaeobiological theme, including 'Sedimentary environments as the theatres of life and evolution' (session T05-SS05). Researchers from a broad range of fields including ichnology, palaeoecology, sedimentary geology, geochemistry and geomorphology, in both marine and non-marine settings, have been encouraged to contribute. The abstract submission deadline has passed; early bird registration is open until 14th April.

For more information please visit the website: <<https://www.iasprague2020.com/>>.



**Women in Earth Science 2020**

University College London, UK 24 – 25 June 2020

The inaugural Women in Earth Science (WiES) conference is to be held at UCL. Applications are invited from female and female-identifying Earth scientists across all related fields of study to present their research to a new global network. The meeting will span the complete spectrum of Earth sciences and include vibrant poster sessions as well as a host of speakers to encourage new collaborations and provide an opportunity to discuss and exchange cutting edge results. Registration will close on 31st March 2020.

Whether a women-only event will enable an atmosphere of increased engagement and better performance will be explored via a thorough impact assessment of the event, which will then be publicized on the website and through a short journal article.

For more information please visit the website: <<https://www.ucl.ac.uk/earth-sciences/Wies>>.

**18th Conference of the European Association of Vertebrate Palaeontologists (EAVP2020)**

Benevento, Italy 29 June – 4 July 2020

The 18th conference of the EAVP will be hosted by the Ente Geopaleontologico di Pietraroja and the operational office of the Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Caserta e Benevento in southern Italy, a land of history, art and culture. The Soprintendenza Archeologia has a special significance in the recent history of palaeontological research, being the resting place of the exceptionally well-preserved small theropod *Scipionyx samniticum* named 'Ciro', the first dinosaur discovered in Italy. The event is also supported by the SPI (Società Paleontologica Italiana), the Sapienza University of Rome and the University of Florence. Oral and poster sessions are planned as well as flash talk sessions for poster presenters, plus roundtables, workshops, symposia and field-trips. Abstract submission closes on 31st March and early bird registration ends on 20th May. Early registration is encouraged due to a limit on the number of participants.

For more information please visit the website: <<https://sites.google.com/view/eavp2020/>>.

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

Palacio Congressos De Canarias, Gran Canaria, Spain 13 – 17 July 2020

The scientific programme will be devoted to the latest developments in studies of living and fossil dinoflagellates. Dinoflagellates are one of the most important groups of planktonic and benthic marine microalgae and, as such, are of interest to both biologists and geologists. In keeping with the tradition of this conference series, the programme of the meeting (held only every 3–5 years) will consist of oral presentations and posters, supplemented by a small number of invited and keynote talks. Abstract submission and early bird registration close on 1st April.

For more information please see <<https://dino12conference.com/>>.

**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 – 6th September 2020

The 2020 meeting joins the the 9th edition of TAPHOS and the International Council for Archaeozoology to bring together palaeontologists and archaeologists and also calls on other researchers to participate, such as forensic scholars, molecular biologists, histologists and anthropologists. This special joint congress will celebrate the 80th anniversary of taphonomy as a research discipline and the 30th anniversary of the first TAPHOS meeting. 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. Kay Behrensmeyer (Smithsonian Institution), a leader in this discipline, will give the opening address. Abstract submission closes on 11th May and early bird registration on 1st June.

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 2020

A three-and-a-half-day meeting is planned without parallel sessions, 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. Student prizes will be available for the best presentations. A reception event will take place in the Museum's dinosaur hall on 6th September. 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. Abstract submission is open until 4th May.

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

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

Clarion Congress Hotel Prague, Czech Republic 12 – 19 September 2020

This congress will celebrate 200 years of modern palaeobotany. 1820 saw the first use of binomial nomenclature for fossil plants by the Czech 'Father of Palaeobotany' Caspar Maria Sternberg, who published *Flora der Vorwelt* in that year. Palynology and palaeobotany have a long tradition in the Czech Republic with several eminent pioneers. The scientific programme in 2020 will cover all aspects of palaeo- and actinopalynology and palaeobotany and will be held at the Clarion Congress Hotel Prague. Several congress field-trips will be on offer around parts of Bohemia and Moravia. The International Organisation of Palaeobotany will financially support several postgraduate students, allowing them to participate in the conference and present their research results. Abstract submission and early bird registration close on 31st March.

For more details please see the website: <<http://www.prague2020.cz/index.php>>.

**68th Symposium of Vertebrate Palaeontology and Comparative Anatomy and the 29th Symposium of Palaeontological Preparation and Conservation (SVPCA and SPPC)**

Natural History Museum, London, UK 16 – 18 September 2020

The Symposium of Vertebrate Palaeontology and Comparative Anatomy has been held in the UK, France or Ireland every year since 1953 and is open to anyone with an interest in vertebrate palaeontology or comparative anatomy. In 2020 the conference will be held in the NHM's Flett Lecture Theatre. The morning of the 16th will include workshops on phylogenetic comparative methods and vertebrate fossil preparation; the afternoon will be a symposium on contributions of the British fossil record to palaeobiology. Regular sessions will occur on 17th and 18th September.



There will be a dedicated poster session on the afternoon of the 17th, and the annual auction in the evening in aid of the Jones-Fenleigh Fund. Any presenters with no means of financial support can apply to the fund to help with attendance. The field-trip will be a self-guided trip to Crystal Palace Park accompanied by the Friends of Crystal Palace Dinosaurs.

See the website for more details, at <<https://svpca2020.com/>>.



**XII Congress of the Asociación Paleontológica Argentina (CAPA 2020)**  
Auditorios UCA Puerto Madero, Buenos Aires, Argentina 28 September –  
2 October 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 1 – 10 October 2020

The themes of the conference include evolution and biogeography, genetics, ecology, extinction, conservation, archaeozoology and others, with both oral and poster sessions. Abstract submission is now open at the website. 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. Registration is now open.

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

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

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

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# Meeting REPORTS



**63rd Annual Meeting of the Palaeontological Association**  
University of Valencia, Spain 15 – 21 December 2019

The 63rd PalAss Annual Meeting was hosted in the city of Valencia, the first time an Annual Meeting has been held in Spain. The organizing committee, chaired by Carlos Martínez Pérez, offered a diverse scientific and cultural programme including six workshops, 64 talks, 192 posters, two field-trips and an outstanding social programme. A total of 325 scientists attended, ranging from early career to senior, hailing from 27 different countries around the globe.

In a change to the usual Annual Meeting format, a three-day pre-conference field-trip visited the Palaeozoic of the Iberian Range, including numerous palaeontological sites ranging from the Lower Cambrian to the Middle Devonian in the neighbouring provinces of Teruel and Zaragoza. The trip was led by Samuel Zamora (IGME, Instituto Geológico y Minero de España), leaving Valencia early on Sunday 15th December to observe the invertebrate communities at the Upper Ordovician locality La Rebozilla and the Silurian Bâdenas Formation in the sunshine. On the second day the delegates enjoyed visiting the Cambrian of Purujosa on the northern edge of the eastern Iberian Chain (including spectacular echinoderms) and Murero in the western Iberian Chain (where De Verneuil discovered the 'primordial fauna' in 1862), rounding the day off at a winery in Murero with entertainment from local musicians. The final day of the field-trip concentrated on important Devonian localities, mainly focused on the Nogueras and Mariposas Formations with abundant corals, brachiopods, bryozoans and conodonts, as well as some interesting remains of vertebrates and plants. The trip concluded in the village of Santa Cruz de Nogueras with a visit to the local Palaeozoic Seas Museum. All Annual Meeting delegates received a copy of the excellent field guide covering this trip and the post-conference field-trip, generously produced by IGME.



*The conference attendees. Photo by Arturo Gamonal.*



On Wednesday 18th December, the highly interactive pre-conference workshops led by specialists from Transmitting Science ranged from the application of 3D data visualization software to an introduction to graphic design for scientists to the use of phylogenies and geoinformatics. All workshops were well attended. They were followed by the Annual Symposium, this year focusing on 'Virtual Palaeontology' and highlighting vital fields for the digital era including digitization and simulation techniques. Modern informatics are widely used to preserve museum collections digitally or to reconstruct the function and palaeobiology of extinct organisms. The symposium enlightened the audience on different methods and applications.

The icebreaker took place that evening in the warm atmosphere of the Natural Sciences Museum of Valencia, situated in the beautiful Jardines del Real, and is probably the first Annual Meeting icebreaker to be held in an outdoor courtyard in December! The event gave us the opportunity to catch up with colleagues and collaborators, to make new connections and to enjoy excellent local food and wine. Guided exhibition tours were led through the wonderfully designed Pleistocene mammal exhibition and other areas of the Museum.

The stimulating conference programme of Thursday 19th December comprised two parallel sessions of talks in the morning and a single session in the afternoon. The diverse talks included research on ecological reconstructions of specific fossil deposits using *e.g.* isotopic compositions of fossil faeces. Other fields showcased included aspects of trilobite evolution, fossilization processes and climate change. At lunchtime an informal Diversity in Palaeontology meet-up was held, this year with an invited panel to lead the discussion into how to make the conference, and the palaeontology community, more diverse and more welcoming to everyone.



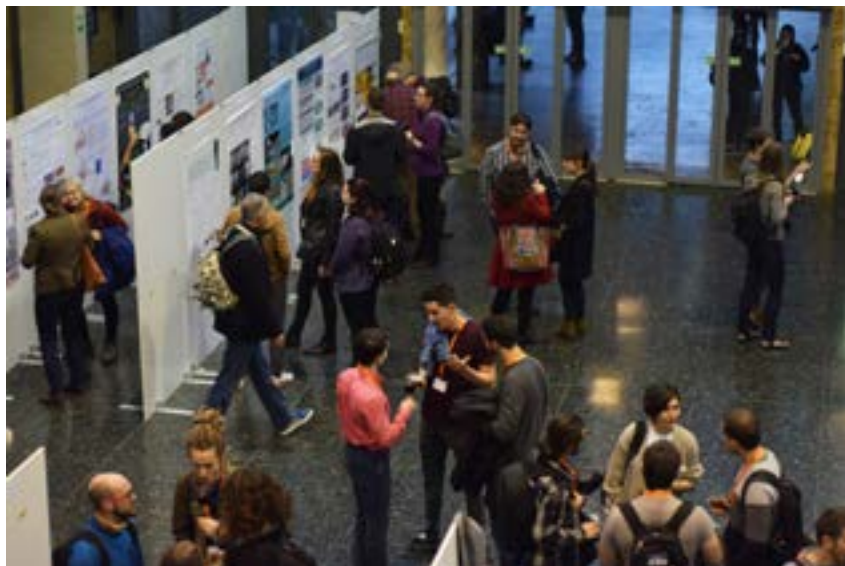
*The lunchtime Diversity in Palaeontology meet-up. Photo by Arturo Gamonal.*

Following the afternoon session, the Annual General Meeting for PalAss members featured discussion of the trustees' Annual Report and accounts, followed by announcements about new members of Council and the awards and grants for this year. With the end of the AGM, Maria McNamara (University College Cork) gave the Annual Address on the current state of fossil soft tissue taphonomic research and experiments, entitled: 'Not just skin deep: probing the secrets of fossil melanin using taphonomic experiments and analytical chemistry'. The informative and entertaining presentation emphasized the existence and importance of colour pigments in the fossil record and how to reveal them.





A dedicated poster session contributed to the exchange of scientific discoveries among scientists of all career levels. This was held at the end of the day – just before our empty stomachs were filled by dinner. The Annual Dinner was held in the stunning area of the Albufera nature reserve and included several cultural highlights such as a live paella cooking show and traditional dancers. The marvellous evening included an awards ceremony with the annual prizes and medals announced by the Association's President, Prof. Charles Wellman, and was rounded off with a disco into the small hours.



*Delegates exchanging ideas at the poster session. Photo by Arturo Gamonal.*

The scientific talks continued on Friday 20th December with parallel sessions in the morning and single sessions in the afternoon. These included a wide range of interesting topics, such as fossil colour, the ecology of marine systems and the record of Ediacaran–Cambrian biota. The talks also covered all aspects of palaeontology, from fossil birds to foraminifera, echinoids to fish, and many speakers discussed new and exciting techniques for carrying out their research including 3D imaging, simulations and machine learning, and chemical and statistical analyses. One speaker who could not travel at the last minute was able to deliver his presentation via Skype, in another first for the Annual Meeting.

The official conference closed with presentations from the organizing committees of next year's Annual Meeting (University of Manchester) and the student conference Progressive Palaeontology (University of Leeds/Yorkshire Museum).

An interesting post-conference field-trip to the province of Alicante took place the following day. The field-trip, led by Hugo Corbí with assistance from Alice Giannetti (University of Alicante), covered two important Cenozoic fossil sites, both part of the Bajo Segura Basin, and a behind-the-scenes museum tour. All three stops demonstrated a high value on geosciences, especially palaeontology. The first outcrop at Cabo de la Huerta revealed Tortonian tempestite deposits unconformably



overlain by different fossil-rich Tyrrhenian marine and terrestrial sediments, containing trace fossils, mussels, bryozoans, gastropods, rhizolites and more. The beautiful weather and charming beach outcrop suddenly seduced three participants for a short swim in the Mediterranean Sea – a brave activity for the end of December and something not previously witnessed on an Annual Meeting field-trip! The second stop was a hilly outcrop at Santa Pola, comprising a Messinian coral reef limestone with interesting sedimentological features and densely packed fossils. Several levels of different coral taxa highlighted similarities to the development and evolution of modern reef systems and made it possible to reconstruct a Neogene atoll type coral reef not far away from the Messinian palaeocoast. After a lavish lunch in Elche, the last stop, at the Palaeontological Museum of Elche (MUPE), gave a rare insight into the enjoyable Museum's exhibitions, pedagogic techniques, international excavations, collection storage rooms and ongoing preparation work on fossil dinosaur bones, thanks to a tour from the Director Ainara Aberasturi. The small Museum offers a variety of amazing invertebrate and vertebrate fossils, minerals and educational activities, and I would highly recommend it.

On behalf of all delegates, I would like to thank the organizing committee of the PalAss Annual Meeting 2019 – in particular Carlos Martínez Pérez and his dedicated student helpers – for a brilliant conference. I'm also grateful for the student travel grant support from the Association that enabled me to attend. The excellent organizing and beautiful setting in Valencia left a lasting impression and certainly warrants a second visit. And, of course, the souvenir conference backpack full of very useful goodies such as a water bottle, notebook and a pen with a hidden screwdriver will be a great reminder! I am now looking forward to the different setting of Manchester this December.

**Daniel Falk**

*University College Cork*



*Cooling off on the field-trip. Photo courtesy of Daniel Falk.*

**18th International Bryozoological Association conference (IBA)**

Liberec, Czech Republic 16 – 22 June 2019

In June 2019 bryozoologists from all over the world converged on the historic city of Liberec in the Czech Republic for this 18th meeting of the International Bryozoological Association. This year's IBA was held at the Technical University of Liberec and was organized by Kamil Zágoršek and his team. The Palaeontological Association generously supported student attendance from as far afield as New Zealand through Grant-in-aid PA-GA201809.

The IBA is a triennial meeting that serves as the pre-eminent conference for the bryozoan research community. It brings together biologists working on living taxa and palaeontologists working on (mostly extinct) orders. The Bryozoa has a rich fossil diversity dating back to the early Paleozoic, as well as ~6,000 living, mostly marine, species. Bryozoans produce calcified colonies in most cases, and are excellent models for evolution over deep time because their skeletal modules – zooids – are character-rich, usually iterated and numerous (reducing taphonomic problems), often polymorphic, and are abundant in the fossil record – to the extent that often they comprise much of limestone matrices in which other fossils occur.

Although considered a 'minor' phylum by some textbooks, bryozoans are ubiquitous members of the marine ecosystem. In many places, particularly in the Southern Hemisphere, they are ecologically important and diverse. For this reason, delegates from South America and Australasia were disproportionately well represented at the IBA, joining a large contingent of European and Russian researchers, a smaller group of Asian and North American bryozoologists and a handful of researchers from other parts of the world. This year's IBA continued the tradition of fusing bryozoans past and present, in part by having a single conference stream attended by all (an advantage made possible by the relatively small size of the conference itself, numbering fewer than a hundred delegates). Sessions tackled topics including: reproduction and development; growth and morphology; bryozoan phylogeny; ecology; Palaeozoic diversity; climate change; and evolution.

The first few days were mostly given over to students' presentations, and the later days saw talks by more established researchers. There were too many talks to list here, but among the highlights was **Katerina Achilleos'** (University of Otago) talk on the biochemical pathways involved in the calcification of *Cellaria immersa*, which won the prize for best student talk.

**Eckart Håkansson** (University of Western Australia) kicked off the IBA with his keynote talk about free-living bryozoans – enigmatic species that form colonies unattached to the substratum and which, in many cases, are motile. **Joachim Scholz** (Senckenberg Forschungsinstitute und Naturmuseum) presented the first EBSD study of bryozoan crystallographic architecture, focused on *Anoteropora latirostris*. **Andrea Waeschenbach** (Natural History Museum, London) reported the results of an extensive molecular phylogeny of cheilostome bryozoans, yielding a time-calibrated family-level phylogeny. **Maria Orellana**, **Juan Cancino** (both Universidad Católica de la Santísima Concepción) and **Tim Wood** (Wright State University) talked about feeding, energy budget and preferred prey of fresh-water bryozoans, while **Judith Winston** (Smithsonian Marine Station) gave us all a much-needed reminder about rigorous use of zoological nomenclature and outlined its role and possible future.

The mid-conference field-trip explored sites of geological interest in the northern region of the Czech Republic. These included the local highpoint Jěstěd Hill, and striking Cenozoic columnar basalts at Panská Skála. The trip was blessed with good weather and was much appreciated.



I greatly enjoyed the opportunity to attend the IBA 2019 in Liberec. It was exciting and useful to meet with other members of the bryozoological community and to gain a sense of current directions in bryozoan research. One of the emerging trends is the closer integration of genes and fossils, as large-scale multi-investigator projects improve understanding of phylogenies within the phylum. I wish to thank the Palaeontological Association for their generous support of myself and other graduate students researching bryozoans.

**Yuta Tamberg**

*University of Otago*



*Group photo of postgraduate students attending the 18th IBA Conference in Liberec, Czech Republic. Photo by Abby Smith, University of Otago.*



*IBA delegates explore Cenozoic columnar basalt at Panská Skála, near Liberec, during the mid-conference field-trip. Photo by Paul Taylor, Natural History Museum, London.*



## —OBITUARY—

# Joseph S. H. (Joe) Collins

## 1927 – 2019

It is with profound regret that we report the death of Joe S. H. Collins in January 2019. Joe was one of Britain's greatest advocates for fossil decapods. He had a formidable publication record, particularly on Brachyura, but also other groups of Crustacea, particularly cirripedes. His interests were not limited geographically and included published works on crustaceans from around the globe. Joe was an extraordinary man; he had no formal training in palaeontology, but he achieved more research, fieldwork and awards than most professionals, even before he retired. A familiar sight at UK fossil festivals, Joe was as keen to impart knowledge to non-specialists as to his research collaborators. Kindly and modest, he was a real inspiration to many generations of palaeontologists. Such was Joe's determination that he worked right up until he died. He will be greatly missed.



*Joe Collins in the field in the Carolinas c. 1999. Image by Don Clements.*

Joe was born and brought up in London. Favourite trips into town as a schoolboy included visits to the British Museum (Natural History) and Geological Museum. A school trip to Lyme Regis in 1939 gave the young naturalist his first taste of collecting fossils. With the outbreak of World War II, Joe was evacuated to a small village near Liphook in Hampshire. This allowed him to further pursue his interests in natural history, mainly in entomology. After the war, Joe was in the Royal Navy for 16 days before being discharged 'visually unfit for naval service', a strange pronouncement for such an observer. He worked for the Wellcome Foundation as an animal technologist in the Immunology and Histopathological departments for 21 years. From 1967 Joe owned a second-hand bookshop, specializing in natural history, from which he retired in 1989. All the while he was developing his interest in palaeontology, and particularly decapod and cirripede crustaceans.

Joe began to specialize in crustaceans after finding his first Cretaceous specimens in 1947. On joining the Geologists' Association in 1953, he was introduced to C. W. (Willie) Wright, with whom he formed a close friendship leading to publication (Wright and Collins 1972). Opportunities to visit fellow workers subsequently arose, and Joe travelled throughout northern and eastern Europe, and the Atlantic USA and Caribbean. He was also pleased to interact with many other specialists during their visits to the UK.

The Freelance Geological Association (FGA) (1948–1967), formerly Society, was a group of amateurs based in south and south-east London; Joe was a founder member (see Donovan and Collins 2016). The original driving interests were caving and fieldwork in Gault Clay pits and the Kent coalfield, as well as chalk quarries which were more openly accessible than they are now.



A particular strength of the group was the stratigraphy and palaeontology of south-east England, particularly the Cretaceous and Tertiary. Members developed specialist interests, such as with Joe and the systematics of fossil crustaceans. The *Proceedings* (later *Journal*) of the FGA was a vehicle for publication of the research and observations from the membership. Joe's early forays into publishing on fossil crustaceans and related topics were in this journal.

Joe Collins made an outstanding contribution to palaeontology. He was the leading expert on fossil crabs and barnacles in the British Isles, a subject on which he published for almost 60 years. He started to publish in the wider scientific literature with a note in *Palaeontology* in 1961. Joe's list of published and 'in press' papers numbers well over 100 titles (Donovan and Mellish 2020), appearing in such respected publications as *Journal of Paleontology*, *Proceedings of the Geologists' Association* and *Monographs of the Palaeontographical Society*. His regular contributions to *Bulletin of the Mizunami Fossil Museum* helped transform an apparently parochial publication into a focus for the international community of palaeocarcinologists.

Joe was as 'at home' describing a new species of crab based on carapace material as he was teasing out the affinities of a fauna composed only of claw fragments. Joe's papers included published works on crustaceans from Antarctica to Denmark, Japan to Nigeria, Jamaica, Pakistan and south-east Asia, amongst others. His fieldwork spanned Europe and the Americas. Joe described over 300 new crab taxa at the subspecies, species and generic level.

Retirement gave Joe ample time to follow his palaeontological research in both the field and the laboratory, which he pursued in collaboration with co-workers on at least three continents. Joe was a scientific associate of the Natural History Museum, London. He was always willing to help, providing expert identification of crabs and barnacles for the Museum and mentoring many people over the years. Joe's research was recognized by the Fullerton Award of the Geologists' Association (1971), the Worth Prize of the Geological Society of London (1987), the Mary Anning Award of the Palaeontological Association (2001), the Marsh Award of the Natural History Museum, London (2008) and the Harrell L. Strimple Award of the Paleontological Society (2010). Yet, he remained an 'unsung hero': quiet, unassuming and always working away tenaciously in the background as one of our leading amateur palaeontologists.

### Acknowledgements

This obituary has been adapted and expanded after Donovan and Mellish (2020) and other relevant documents.

#### **Stephen K. Donovan**

*Naturalis Biodiversity Center*

#### **Claire J.T. Mellish**

*Natural History Museum,  
London*

#### **Don Clements**

*North Carolina Museum of  
Natural Sciences*

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## —OBITUARY—

# Margaret Sudbury (née Walker)

## 1930 – 2019

Margaret Sudbury was a talented palaeontologist. But like many of her generation of women science graduates, she gave up a potential academic career to get married and raise a family. Nevertheless, Margaret, again like many other married female scientists, used her academic skills as a school science teacher. However, she never entirely abandoned her interest in palaeontology and fossil graptolites in particular. Margaret Sudbury was 65 when she produced her last academic paper.

### Getting to Cambridge

Thanks to encouragement from a perceptive teacher, Margaret Walker – as she then was – won a scholarship to Manchester High School for Girls in 1942. There again she was encouraged, sat the Cambridge entrance exams in 1948 and was awarded a Girton scholarship to read Natural Sciences.

At Girton, her Director of Studies, the eminent crystallographer Helen Megaw (1907–2002), suggested that Margaret add geology to chemistry and zoology in her first year. The geology lecturers included W. B. R. King (Woodwardian professor), Oliver Bulman (subsequently Woodwardian professor), Maurice Black and Percy Allen (subsequently Professor of Geology in Reading University). Initially, Margaret was supervised by the eminent graptolite palaeontologist Dr Gertrude Elles (1872–1960).

Although Margaret had fond memories of ‘Gertie’ Elles, who was 77 at the time, Gertie’s supervision was not what Margaret needed. She transferred to Bertie Brighton (1900–1988), Curator of the Sedgwick Museum, and found his supervision a better fit.

Margaret particularly enjoyed the field work that was and still is an essential part of geological training in many universities. She was one of very few women reading geology in the 1950s. But thanks to the decades old initiative of Clara McKenny Hughes and her husband Thomas McKenny Hughes (Woodwardian professor 1873–1917), female undergraduates in Cambridge had been able to attend field classes since the 1880s.

Despite Helen Megaw’s warning that she might find it difficult to get a geological job as ‘women would not be allowed to work on oil-rigs’, Margaret chose Geology with Palaeontology in Part II of the Natural Science Tripos. And Helen Megaw was right, it was another three decades before women began to work offshore on the rigs in the 1980s. Nevertheless, Margaret persisted with geology. She had already decided to stay on and do research if she got a favourable result in the exams, which she did in 1952. With a DSIR grant and a Tucker-Price Studentship from Girton, she then had to decide what to do. Oliver Bulman (1902–1974), whose lectures she had enjoyed, asked “You wouldn’t fancy doing something on Graptolites, would you?” He had spotted her interest in palaeontology and her potential for this kind of work.

### Graptolite research

Even before starting her PhD fieldwork, Bulman gave Margaret some very well preserved, chemically-isolated graptolites to describe. The resulting three papers, published in 1953, helped British graptolite palaeontology reach the level of anatomical understanding pioneered by Swedish



and Polish palaeobiologists. And, it gave Margaret an appreciation and understanding of graptolite morphology and biology, which was important for her subsequent research.

For her PhD, Bulman suggested that Margaret investigate the well-preserved graptolites of the Lower Llandovery strata of Rheidol Gorge in mid-Wales. Margaret collected an impressive suite of graptolites, which needed careful preparation in the lab. Identification and description provided valuable insights into their evolution. This work helped develop the graptolite biozonal scheme developed by Charles Lapworth, Gertie Elles and Ethel Wood, which had proved so useful in the relative dating and correlation of Ordovician and Silurian marine strata around the world.

Meanwhile Margaret Walker became engaged to John Sudbury in 1953. Bulman in his inimitable way grumbled 'I hope it's going to be a long engagement' but also told her to take the day off, so Margaret and her fiancé took a trip to Ely. Her thesis was submitted by August 1955 and she was married in September.



*Margaret Sudbury produced excellent illustrations of graptolites such as these triangulate monograptids for her 1958 Royal Society paper. Reproduced with permission.*

Although marriage brought an end to Margaret's formal research career, she wrote up her work on 'Triangulate monograptids from the *Monograptus gregarious* zone (Lower Llandovery) of the Rheidol Gorge'. It still is an important contribution to our understanding of these graptolites. Whilst living in London with her husband, Margaret did manage to get a palaeontological job in late 1956 working for R. G. S. Hudson at the Iraq Petroleum Company. 'Hud' or rather Professor Hudson FRS (1895–1965) was a very accomplished geologist and WW1 veteran who had a successful career both

in Middle East oil exploration and in academia. Hudson was working on the Permian stratigraphy of South-east Arabia. Margaret did the brachiopod palaeontology and biostratigraphy for him and the results were published in 1959.

From 1959, the birth of three children and a move to Yorkshire in 1960 inevitably took Margaret's attention and energies away from palaeontology.

However, she taught science in various schools where her husband John was employed. It was still fairly 'early days' for school science and she became involved in the planning and building of various science labs.





## **BIG G**

When her children began to leave home, Margaret resurrected her interest in graptolite research through the British and Irish Graptolite Group ('BIG G'). She attended a succession of international graptolite conferences from 1981 to 1998 and, with Sue Rigby, wrote her last paper in 1995 on 'Graptolite ontogeny and the size of the graptolite zooid'.

The Sedgwick Museum holds over 300 of Margaret's fossil specimens, all graptolites from her thesis collections in the Rheidol Gorge. Many are mentioned in publications and 35 are types of new taxa, mostly described by herself.

## **Acknowledgements**

Much of the information above is derived from an autobiographical manuscript and has benefited from her son Roger Sudbury's help with family details.

## **Douglas Palmer**

*Sedgwick Museum*

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## — OBITUARY —

# Keith Allen 1935 – 2018



Photo: Nick Rowe.

It was in the late 1950s and early 1960s that schools in the new discipline of palynology became established in the UK. One of these was started by Norman Hughes at the University of Cambridge and had a number of early students who went on to become very influential in the subject. These included Mary Dettmann, Geoff Playford and Geoff Norris who had all originated from the Commonwealth and came to do PhD degrees in the UK. British research students were somewhat rarer as PhD funding was difficult to obtain. However, Keith had been successful in obtaining a Shell scholarship to study Devonian material from Svalbard. Keith had come to Cambridge from the University of Reading where he had taken a dual degree in Botany and Geology and had been greatly influenced by the inspirational palaeobotanist Tom Harris.

Keith's PhD entailed investigating many of the samples previously collected by Cambridge

Svalbard expeditions led by Brian Harland. As none of these were collected by palynologists they produced rather mediocre assemblages. Keith was then able to go on the 1961 expedition to Svalbard when he mostly worked on the remote north coast. Things were logistically less easy then than now; for example there were no commercial flights to Svalbard. Other aspects were easier or perhaps simpler. Most of their work was done in remote temporary field camps after being dropped in a fjord from a converted trawler. They then travelled between localities in a small open boat (dory) with little protection from the elements and indeed no backup or way of communicating with either the wider world or even the main expedition vessel. A degree of risk that would now be seen as completely unacceptable. At the season's end Keith travelled overland from the head of Wijdefjord to the Russian mining town of Pyramiden together with Mark Moody-Stuart, later to find fame as Managing Director of Shell. The trip involved a number of glacier traverses and during one of these Mark fell through the ice into a crevasse and was only rescued as he was attached to Keith by a rope.

It was during his brief stop in Pyramiden that Keith collected from the sections in Mimerdalen that were to provide most of the material for his thesis. PhD studies in palaeontology were quite different in those early days, being largely taxonomic in nature. Some things were easier, for example the published literature would entirely fit in a briefcase! Keith finished his thesis within



the three years and it was published in its entirety in the journal *Palaeontology*. As Norman Hughes was the editor it was somehow possible to publish longer papers than normally accepted. These first publications included a significant number of new species, including new genera, and are still widely used (*Cymbosporites*) together with the first descriptions of key zonal species (*Dictyotriletes emsiensis*, *Samarisporites triangulatus*). The work made extensive use of microtome cut serial-sections from single spores that pre-dated the application of routine TEM sections.

Keith then went for postdoctoral work to Cornell University with the Devonian palaeobotanist Harlan Banks. Then, following a brief spell at the Nature Conservancy Council back in the UK, Keith became a lecturer in botany at the University of Bristol. At Bristol he joined a community of Devonian workers that included Brian Williams (sedimentology) and Dave Dineley (fish). He continued his work in the Arctic by joining the 1969 Cambridge expedition to the Devonian of East Greenland, where a key discovery was the earliest known seed megaspore (now *Spermasporites allenii*). As Keith was in the Department of Botany he taught plant morphology, palaeobotany and field identification of the modern flora. This teaching pushed him towards more palaeobotanical work, including Devonian megaspores and the first catalogue of Devonian *in situ* spores. He also edited *Palaeontology* from 1978 to 1982.

Keith had a number of research students who included Anne Fletcher and Julie Robson (Devonian megaspores), Richard Thomas (Early Devonian spores, Wales), John Marshall and Ian Perry (Devonian spores and plants, Shetland Islands), Nick Rowe (Drybrook flora, Forest of Dean) and Andrew Leitch on *Chara*. During the contraction of UK botany departments in the 1990s Keith retired early. He was to become a major pillar of his local community and he led botanical and natural history holidays to the Mediterranean and Arctic regions. All those who had the pleasure to hear him teach know that these holidays must have been wonderful events. For his final years Keith was stricken by vascular dementia.

Keith was always an entertaining lecturer with a somewhat booming delivery. He never seemed to own a watch so lectures could overrun. As a supervisor he was always entertainingly mischievous, sometimes announcing things at quite inopportune moments. In many ways he seemed to have research students as much for vicarious entertainment as for the research they delivered.

### **John Marshall**

*University of Southampton*

### **Nick Rowe**

*CNRS Université de Montpellier*

### **Andrew Leitch**

*Queen Mary University of London*



# Engagement Grant REPORT

## *Fossil fact or fiction? Einstein's Garden palaeontology stall at Green Man Festival, 2019*

**Christopher D. Dean**

*School of Geography, Earth and Environmental Sciences, University of Birmingham*

As palaeontologists, we're fortunate that our subject strikes a chord with the general public. However, despite this interest, there are areas of palaeontology that get little exposure to the wider world. One such topic is fossil record bias: that our window onto past life is clouded by geological, geographical and human factors that influence which fossils we find, and which we don't. Few non-palaeontologists have heard of the concept before, despite the fact that it influences our entire field. This issue inspired me to come up with a science communication strategy to highlight this important, but underappreciated, side of palaeontology.

I'm an avid record collector and festival-goer, but that side of my life rarely overlaps with palaeontology (apart from bidding on Richard Butler's pterosaur-themed records at the ProgPal auction). However, one of those rare overlaps exists at Green Man, an independent, 20,000-person capacity, five-day camping festival in the Brecon Beacons in Wales that attracts a diverse crowd



*Fossil fact or fiction? Einstein's Garden palaeontology stall. Photo by Christopher Dean.*



through a wide selection of music, arts and science content. ‘Einstein’s Garden’ is the science engagement area and was the first at a UK music festival. When I attended as a punter in 2018, I was surprised by how much I enjoyed getting lost in Einstein’s Garden, coming across a wide range of inventive and exciting science communication stalls. As a result, I decided to host a science stall at Green Man aimed at introducing the concept of fossil record bias to festival attendees through a series of interactive exhibits, showing how biological, geological and human factors influence our view of the fossil record.

The exhibits consisted of three components: sandpits, particularly for younger kids, to help them discover where fossils are most likely to be preserved; a model of an ecosystem where attendees picked the best place to preserve a fossil; and a physical representation of how the computational technique of ecological niche modelling (ENM) works. I convinced Rob Lowther, curator of Imperial College London’s geology/palaeontology collections and a dab hand at carpentry, to help me construct the models, whilst I finally put my teenage Warhammer skills to good use decorating the ancient landscape model. I also assembled a team of volunteers to help run the stall at the festival, including four palaeontologists from different specialities and three non-palaeontologists who had experience of running similar events. The Festival ran from Thursday 20th August until Sunday 23rd, and we arrived a day early to set up the activities under our Welsh-weather-proof gazebo.

I designed the activities to have different levels of engagement to work as a system for moving attendees through the stall effectively. The first activity was three sandpits, each representing a



*Kids deciding on the habitat that might best preserve fossils on our environmental model, with helpers Cecily and Miranta. Photo by Christopher Dean.*



*Foreground: the sandpits. Background: attendees discuss the Perspex ENM model with volunteers.  
Photo by Christopher Dean.*

different environment (sea, beach and land) and including a different number of fossils. Attendees would guess where they thought the most fossils would be found, then would excavate the sandpits to see if they'd guessed correctly. The sandpits were a huge success, and it was rare to see them unoccupied; they enticed people over to the stall and made it easy to keep a large group of people occupied at once. Most importantly, the message (that fossils are most likely to be preserved under water) was simple enough for even young children to understand but also provided a good background for the other activities.

To older attendees and people who had finished at the sandpits we gave pins and asked that they stick them into the habitat that would best preserve fossils on our environmental model. After what they'd learnt at the sandpits most people picked good environments for preserving fossils. We then pointed out that this meant fossils were unlikely to be preserved on exposed or highland areas, meaning we know more about animals from certain, more preservable environments than others. This approach worked really well; people were surprised and became more engaged when we flipped the script to show how much we don't know about the past. We followed up by introducing the concept of human bias, asking questions like "what's more interesting: a *T. rex* or a shell?", and showing how our own preferences and interests may influence current understanding of past life.

Finally, we had our ENM activity; a model showing how algorithms can predict the spatial distribution of extinct animals. By using Perspex grids with climatic variables represented as coloured squares, we showed how we can combine climate models of the past and locations of fossils to predict areas where extinct species may have lived, and consequently 'fix' some of the biases in the fossil record. Whilst this activity had the fewest engagements, it also had the strongest positive responses. Having a model where you could physically remove and add the environmental layers helped visitors understand a complex computational problem in a simple way.



Over the four days of operation we clocked a total of approximately 1,300 visitors, despite some typically Welsh weather on some of the days. Responses to the stall were overwhelmingly positive, with 78 % of people we surveyed saying their interest in palaeontology increased after visiting the stall. Thanks to friends we made at the campsite, we also ended up talking about palaeontology live on Green Man Radio, an FM station set up for the Festival.

I had not attempted something like this before, and running the stall was a steep, and somewhat exhausting, learning curve. However, it was also an incredible experience, and seeing the enthusiastic reaction to this underappreciated side of palaeontology from a receptive and curious audience was infinitely rewarding. We also got to see some brilliant music with performances that will stay with me for a long time. Einstein's Garden is open for applications every year, and I would strongly recommend it, and similar exhibit areas at other music festivals, to scientists who are looking to share their research in an informal and exciting setting.

### **Acknowledgements**

I'm thankful to the Association for funding this project (Engagement Grant PA-OE201901), and for their help in getting everything up and running with such a short turnaround time. I'd like to thank Rob Lowther for his invaluable help in constructing the activities, and Cecily Nicholls and Miranta Kouvari who were responsible for the stall's fantastic logo and banners. Thanks also go to Victoria Murphy from Imperial College London for her help in putting together the proposal to Green Man and to Sam Durham for inviting us onto his radio show (listen online: <<https://www.mixcloud.com/greenman/fresh-juice-with-sam-durham/>>). I'd also like to thank the staff at Green Man, and in particular Maeve O'Sullivan for her help in ensuring the smooth running of Einstein's Garden over the weekend. Finally, I'd like to thank my team: Lewis Jones, Cecily Nicholl, Miranta Kouvari, Rebecca Walley, Chris Tory, Tom Abbosh and Megan Renoir – your enthusiasm and dedication made running the stall an amazing experience, and I wouldn't have been able to do this without you.



# Small Grant REPORTS

## *Trace fossil insights into Early Devonian terrestrial ecosystems – a case study from Gaspé, Quebec*

**Anthony P. Shillito**

*Department of Earth Sciences, University of Cambridge*

The sedimentary succession of the Gaspé Peninsula is of huge palaeontological significance for our understanding of the Early Devonian epoch. The peninsula is known for a diverse early terrestrial plant flora and a world-renowned fish Lagerstätte which bears fossils crucial for understanding the early stages of tetrapod terrestrialization. Despite the importance of this location, the trace fossils of the succession have largely been overlooked in the past, neglecting a potentially powerful tool for our understanding of the behaviour of animals in the complex and diverse depositional environments of Earth's earliest non-marine biomes. The purpose of this study was to rectify this through a systematic survey of the trace fossil communities and sedimentary logging of the lower Devonian Battery Point Formation, with an explicit emphasis on linking trace fossils to the sedimentary facies in which they occur.

### **Sedimentary background**

The Battery Point Formation is a succession of fine- to very coarse-grained sandstones and varying proportions of mudstones and siltstones. The formation was deposited as late stage infill of the Gaspé Basin, associated with the Catskill Wedge (Griffing *et al.* 2000; Malo 2001), and presently crops out at the eastern end of the Gaspé peninsula in Québec (Figure 1). Most trace fossils occur in the Cap-aux-Os Member, a mixture of thick, trough cross-bedded sandstones with gravel-rich horizons, planar flat-bedded sandstones with ripple marks, climbing ripple-laminated sandstones and flat-bedded mudstones and siltstones of variable thickness. Trough cross-bedded sandstones are thought to record a similar braided fluvial depositional setting, possibly deposited close to the fluvial-tidal transition (Lawrence and Rust 1988; Griffing *et al.* 2000). Thinner sandstone bodies are flat-bedded or exhibit climbing ripple lamination, are very fine- to fine-grained, and often fine upwards (Griffing *et al.* 2000). These are interbedded with thick, blocky siltstones and mudstones, with mottling, slickensides and root traces, indicative of palaeosol development. Diverse assemblages of plant fossils occur within the sandstones and the palaeosols, both as fragmentary material and entire *in situ* specimens (Griffing *et al.* 2000; Pfeiler and Tomescu 2018). These lithofacies are interpreted as flood plain deposits, recording a combination of sandy crevasse splays and permanent soils.



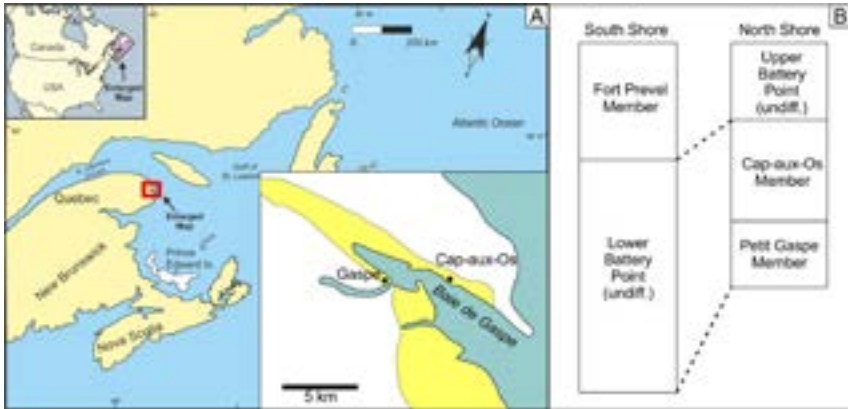


Figure 1. Outcrop map and stratigraphy of the Battery Point Formation. A) Map of exposure of the Battery Point Formation strata (yellow) in the Gaspé area, Canada, following Braddy and Milner 1998. B) Stratigraphy of the Battery Point Formation, following Hotton et al. 2001.

**Ichnofauna of the Battery Point Formation**

Whilst trace fossils have previously been noted (e.g. Griffing et al. 2000; Davies et al. 2011), and individual traces have been described (Braddy and Milner 1998) from the Cap-aux-Os Member of the Battery Point Formation, there has been no dedicated work on the full ichnofauna, or its relationship with the sedimentary environments recorded by the strata. This project has revealed that the assemblage has a moderate diversity (13) and moderate disparity (12), containing: *Arenicolites*, *Asterosoma*, *Chondrites*, *Cylindrichnus*, *Didymaulichnus*, *Diplocraterion*, *Palaeophycus*, *Palmichnium*, *Planolites*, *Skolithos*, *Taenidium*, *Teichichnus*, and *Thalassinoides*.

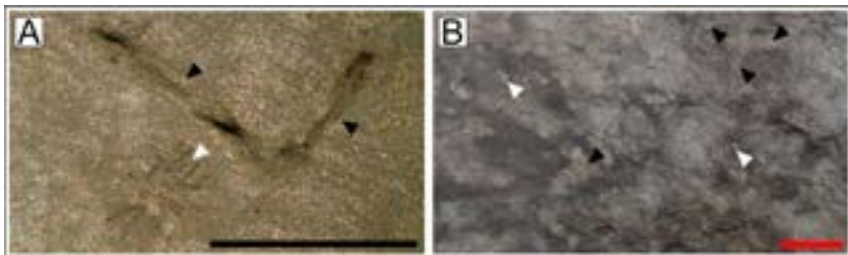


Figure 2. Trace fossil assemblages in the Battery Point Formation. A) *Asterosoma* (white arrow) in association with *Diplocraterion* (black arrows) in a cross-bedded sandstone. Scale bar is 10 cm. B) *Taenidium* (black arrows) in association with *Arenicolites* (white arrows). Scale bar is 1 cm.

The ichnofauna of the Cap-aux-Os Member can be divided into two main associations, and many other solitary traces, occurring within different sedimentary facies. The most abundant of these is an association between *Asterosoma* and *Diplocraterion* (and occasionally *Cylindrichnus* and *Palaeophycus*), which frequently occur together within different lithofacies of the Cap-aux-Os Member (Figure 2). These traces record a mixed deposit feeding/interface feeding assemblage which mostly occurs within the fine sandstone-siltstone of overbank deposits. A single occurrence was observed within trough cross-bedded strata, interpreted as occurring in the fluvial-tidal transition zone (Griffing et al. 2000). The second most recurrent assemblage occurs within the mottled



palaeosol deposits, and contains *Arenicolites*, *Planolites*, and *Taenidium*, with occasional *Skolithos*. This assemblage has a similar ethological makeup to the *Asterosoma-Diplocraterion* association, dominated by deposit feeding and other interface feeding traces. This behaviour reflects the nutrient-dense nature of the depositional setting, where resources are regularly resupplied during flood events, or from decaying organic material from the abundant vegetation.

### Summary

The ichnofauna of the Battery Point Formation is described for the first time, and placed within a stratigraphic and sedimentological framework developed from a combination of primary observations and a review of previous work (e.g. Cant and Walker 1976; Griffing *et al.* 2000). The depositional environment postulated for the trace-bearing strata of the Battery Point Formation is alluvial with extensive palaeosols. The diversity and disparity of the ichnofauna of the Battery Point Formation is greater than that in other similar Siluro–Devonian successions, which may be due to it being slightly younger, reflecting the diversification of different taxa into non-marine niches that occurred in the early Devonian.

### Acknowledgements

I would like to thank the Palaeontological Association for Callomon Award number PA-CA201701.

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# Undergraduate Bursary REPORTS

## *A new Early Cambrian arthropod: a description and phylogenetic analysis*

**Harry Berks**

*School of Earth Sciences, University of Bristol*

### Introduction

The Sirius Passet Lagerstätte is one of a handful of exceptional Cambrian fossil sites around the world and is located in North Greenland. Discovered more recently than other Cambrian Lagerstätten, the Buen Formation holds many discoveries yet to be made. The goal of this project was to describe a new genus of arthropod from Sirius Passet and assess its phylogenetic position. The new taxon was identified as a member of Artiopoda, the clade including the famous Trilobita as well as their relatives, such as *Aglaspis*, *Emeraldella*, *Helmetia* and *Naraoia*.

### Fossil description

With a moderately-sized artiopodan with 20 segments and a small, tapering head shield (Figure 1), the holotype is 53 mm long and 32 mm wide at the 6th tergite.

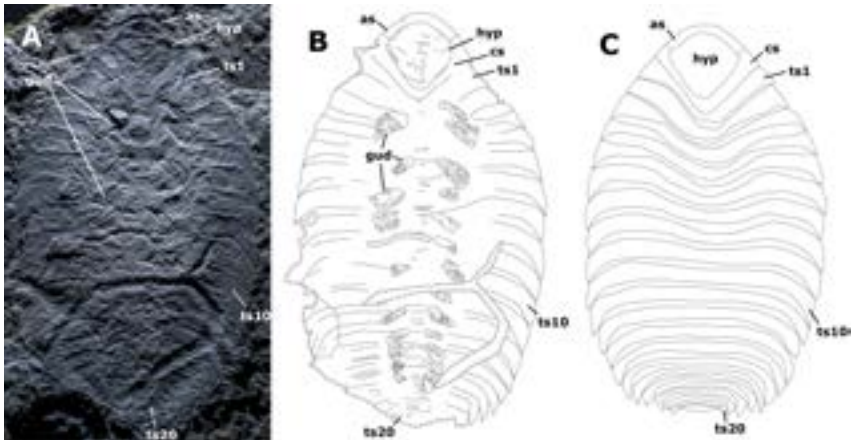


Figure 1. A: New taxon 1 holotype: SPB6. B: Camera lucida drawing. C: Camera lucida drawing with the tergites reconstructed and without gut diverticulae. Abbreviations: as, anterior sclerite; cs, cephalic shield; gud, gut diverticulae; hyp, hypostome; ts1, first trunk segment; ts10, tenth trunk segment; ts20, twentieth trunk segment.

The type specimen is preserved in ventral aspect without well-preserved limbs and is currently the only known specimen. A large shield-shaped hypostome constitutes the majority of the



ventral aspect of the cephalic region and has a wide attachment to the cephalic doublure. A posteriorly reflexed trapezoidal anterior sclerite appears to be present and slightly narrower than the hypostome. The trunk tergites are strongly reflexed anteriorly and have wide overlap with each other across their whole width. The pleurae are strongly curved in the posterior region. The posterior region is obscured in the type specimen making the tail shield obfuscated. A raised axial region appears to be present and is seen in the large-scale relief of the fossil, although any folding around the region is obscured by gut diverticulae. The gut diverticulae are arranged parallel to the axis with a gradual tapering towards the posterior. Each diverticulum is roughly oval in shape but generally they taper toward the midline. The striations in the diverticulae are angled at 30-45° posteriorly from the lateral axis.

### Phylogentic analysis

New taxon 1 was coded into the character matrix used in Du *et al.* (2018) along with another new genus from the Sirius Passet Lagerstätte, new taxon 2, which will be described alongside new taxon 1 in a future publication. Four other previously described common Sirius Passet taxa were coded into the matrix using data from Stein *et al.* (2013) for *Arthroaspis bergströmi*, as well as data from Budd (2011) for *Campanamuta mantonae*, Stein (2010) for *Kiisortoqia soperi* and Lagebro *et al.* (2009) for *Siriocaris trollae*. This brought the number of taxa in the matrix to 69 without changing the previous 87 characters. *Kiisortoqia* was coded as having antennae instead of a raptorial first appendage despite debate in this area because its first appendages are not similar to the raptorial appendages of the other taxa already in the matrix. The character matrix was run in MrBayes and is shown in Figure 2.

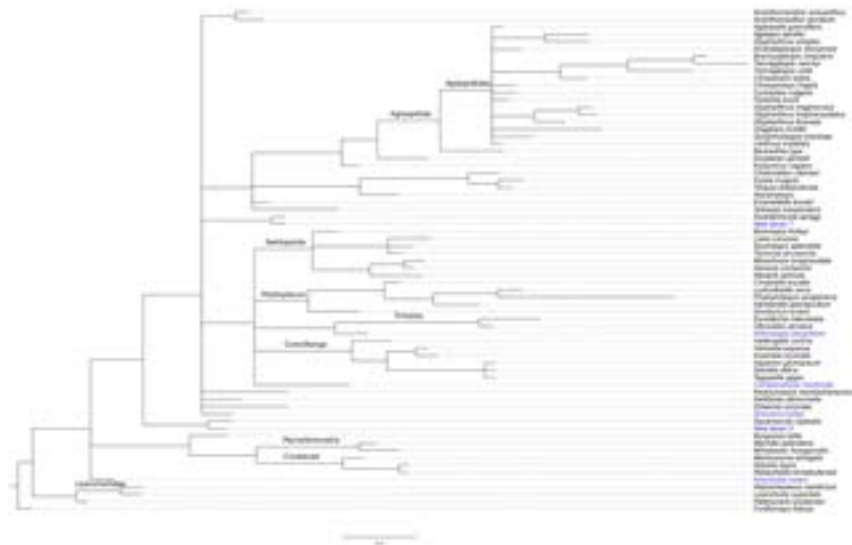


Figure 2. MrBayes phylogenetic tree run over 10 million generations, sampling 1/1000, 2 runs. Blue taxa are those added in this study.

### Phylogenetic results

The phylogeny shows *Arthroaspis* as the sister taxon to the clade Trilobita. This is a similar position to where it has been in previous studies (Stein *et al.* 2013) except *Phytophilaspis* and *Sinoburius*



have moved to within Petalopleura. *Campanamuta* appears in a polytomy with Nektaspidia, Petalopleura, Trilobita (and *Arthroaspis*) and Conciliterga. This is similar to previous phylogenetic positions (Stein *et al.* 2013). The position of *Siriocaris* is unresolved within Artiopoda but is more derived than *Squamacula* and new taxon 2. *Kiisortoqia* is in a polytomy with Artiopoda and the clade including Crustacea and Marrellomorpha. Stein *et al.* (2013) had *Kiisortoqia* as more basal than the Leancoiliidae and *Fortiforceps*. New taxon 2 is positioned as the sister taxon to *Squamacula* at the base of Artiopoda. New taxon 1 is positioned as the sister taxon to *Australimicola* but their position within Artiopoda is unresolved.

### Acknowledgements

I would like to thank Jakob Vinther for giving me this opportunity as well as Morten Lunde Nielson and Joe Flannery Sutherland for helping me throughout this process. Thank you to the University of Bristol for allowing me to use the necessary equipment and lab space. Finally, I would like to thank the Palaeontological Association for the Undergraduate Research Bursary (grant number PA-UB201906) that made this possible.

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## *Anatomy of Hylonomus, the earliest amniote, based on high-resolution synchrotron tomography*

**Tobermory Mackay-Champion**

*Department of Earth Sciences, University of Oxford*

### Introduction

*Hylonomus* appears in many textbooks as the oldest fossil amniote (approx. 315 Ma) and is known from relatively complete specimens, including the holotype. *Hylonomus* was first discovered in the Pennsylvanian of Joggins, Nova Scotia by J. W. Dawson in 1859 (Dawson 1860). It was immediately identified as a new reptilian genus, in which Dawson initially placed three species: *Hylonomus lyelli*,



*Hylonomus acidentatus* and *Hylonomus wymani*. These species formed the basis of a new order called Microsauria. *Hylonomus lyelli*, the type species, is the only species of *Hylonomus* still formally recognized. Although it is known from several relatively complete skeletons, study of *Hylonomus* has been difficult because of the preservation style of the fossils found at Joggins. Carroll (1964) noted that the specimens were “badly disarticulated, even to complete separation of the component bones of the skull”. This has resulted in a poor understanding of *Hylonomus*’ anatomy and despite its status as a ‘textbook’ fossil, it has been the subject of little research. Consequently, the implications of *Hylonomus* for phylogeny and early reptile evolution are not well established. This project aimed to start addressing this by digitally reconstructing the skull of the *Hylonomus* holotype. The skull of *Hylonomus* is incompletely known but is crucial to our understanding of evolutionary splits in early amniotes.

### Methods

The holotype (NHMUK R4168) was imaged using high-resolution, synchrotron X-ray tomography at a resolution of 8.96  $\mu\text{m}$ . Due to the large file size of the scan data, it could not be loaded in one block to segmentation software at full resolution. Therefore, segmentation was completed in two separate phases using image processing software Materialise Mimics 19.0. Phase 1 involved low-resolution (17.9  $\mu\text{m}$ ) segmentation of six roughly equal sub-sections, creating a 3D map of the fossil (Figure 1A). This map was used to locate and examine specific areas of interest in the fossil. As the skull was of primary importance, the area with the highest proportion of skull bones was chosen for focus during Phase 2 – high-resolution segmentation at 8.96  $\mu\text{m}$ . Following image processing, the area was divided into 12 sub-sections. Figure 1 shows the high-resolution segmentation from sub-sections 6, 7, 10 and 11.

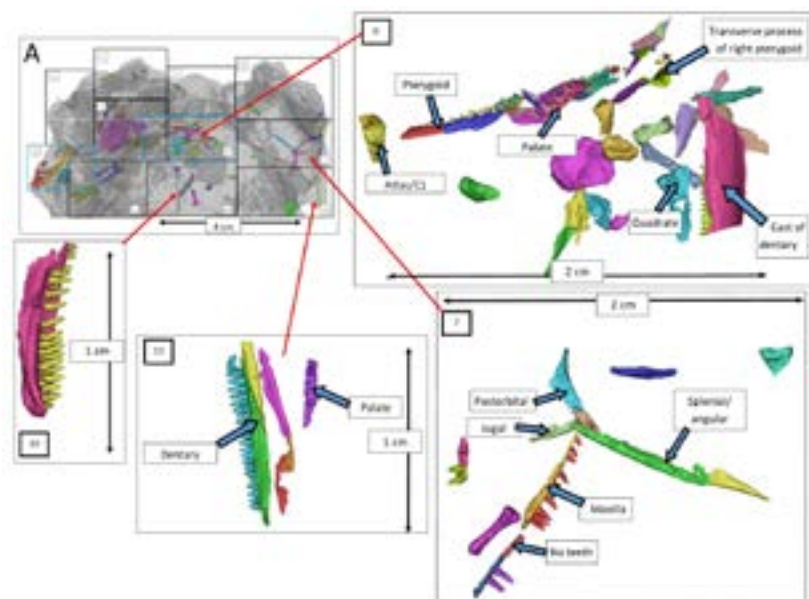


Figure 1. A. 3D map of fossil skull area. Areas 6, 7, 10 and 11 show high-resolution segmentation of individual sub-sections.

### Preliminary results and interpretations

Segmentation allowed the identification of many bones which did not outcrop on the slab surface, including much of the skull, and especially the palate (Figure 1). Two preliminary findings have particular interest:

#### 1) Labyrinthine tooth bases

Cross-sectional images (Figure 2) through the dentary and teeth of *Hylonomus* show a complex infolding pattern in the enamel and dentine of the tooth's pulp cavity wall. This is known as plicidentine, or labyrinthine infolding, and was a trait used to define the archaic subclass of extinct amphibians called Labyrinthodontia (Greek, 'maze-toothed'). Labyrinthodontia is not currently a valid clade name but broadly encompasses early members of many groups of tetrapods, including the ancestor of all terrestrial amniotes. The presence of plicidentine shows that *Hylonomus* displays traits associated predominantly with early terrestrial amphibians. This find demonstrates that plicidentine may be a primitive trait present among amniotes and in Reptilia.

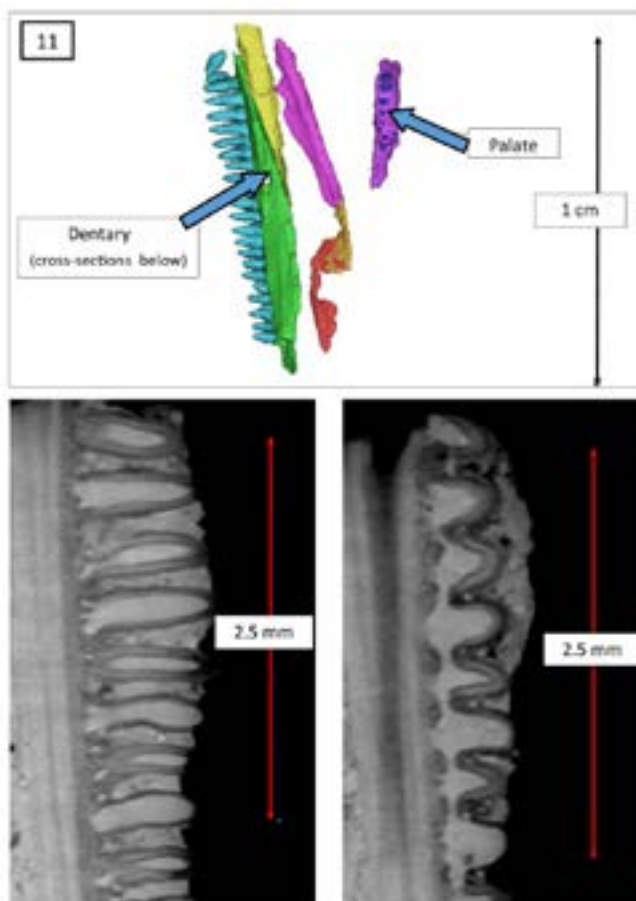


Figure 2. Labyrinthine tooth bases from area 11 of Figure 1A.



## 2) Second horizon of bones

Phase 1 segmentation showed that the slab contains a second individual in a lower horizon of bones. These bones are smaller than those of *Hylonomus* and lie clearly within an organic-rich layer in the rock. The arrangement is the consequence of the mode of preservation. During the mid-Carboniferous, Joggins was covered in forests of *Sigillaria*, a lycopod tree. During times of flooding, the forest floor would be covered in sediment. Once the trees died, their centres would rot, leaving behind a buried tree stump exposed to the surface. Animals would live and die in these stumps, resulting in a concentration of fossils over time (Carroll 1970). In the case of specimen NHMUK R4168, the size difference and clear stratigraphy means there is little chance of confusion between the older, smaller bones and the overlying bones of *Hylonomus*.

### Further work

Despite the high resolution of the X-rays, it was often difficult to distinguish between rock matrix and fossilized bone in the images. Many of the thinner bones were also highly fragmented. This resulted in the segmentation taking longer than anticipated and has made 3D re-articulation and reconstruction of the original morphology quite challenging. Further high-resolution segmentation of other areas of interest is required to allow for a more accurate understanding of bone morphology and the anatomy of *Hylonomus*. Areas of particular interest include the ankle bones and the C1 and C2 vertebrae. With this enhanced anatomical knowledge, we plan to score *Hylonomus* into a comprehensive phylogenetic data matrix for early amniote relationships (matrix from Ford 2018; Ford and Benson 2019). This could provide unique insight into two significant areas: vertebrate terrestrialization and the morphology of the last common ancestor of Mammalia and Reptilia.

### Acknowledgements

Thank you to the Palaeontological Association for funding this project (Undergraduate Research Bursary number PA-UB201901). I am hugely grateful to Prof. Roger Benson and Dr David Ford for their supervision, expertise and avidity throughout this project, and to Elizabeth Griffiths for her guidance in reptilian anatomy and Materialise Mimics software.

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# Book Reviews

## **Extinction: A Very Short Introduction**

Paul B. Wignall. 2019. Oxford University Press, Oxford. 144pp. GBP8.99 paperback, audio and eBooks also available. ISBN: 978-0-198-80728-5.

*Extinction* is the latest palaeontological topic to be covered by the Oxford University Press' "A Very Short Introduction" series, and follows on from other palaeontological topics, such as *Dinosaurs* (David Norman), *Fossils* (Keith Thompson), and *The History of Life* (Michael Benton). *Extinction* is appropriately authored by one of the leading authorities on mass extinction events, Paul Wignall (University of Leeds), and is an easily digestible and concise introduction to the nature of extinction, both across geological time and in the present.

The "A very short introduction series" is aimed at introducing complicated scientific, historical and social topics to a general audience in a straightforward but highly informative manner.

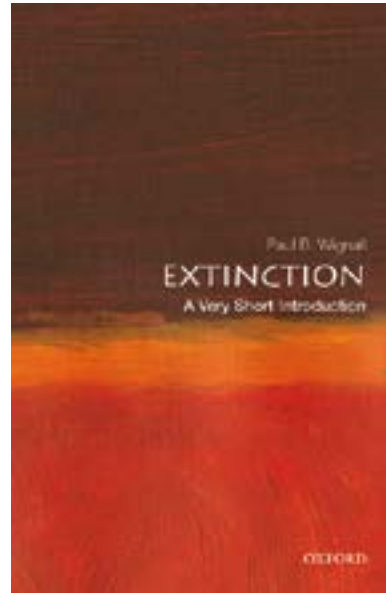
*Extinction* does an excellent job of this by providing a detailed but concise description of the occurrences, causes and consequences of past mass (and not so mass) extinction events which manifests as a handy narrative for undergraduate students, academics and those with a general interest in natural and Earth science alike.

Although the seasoned mass extinction palaeontologist may not learn that much from reading this book, Wignall does a commendable job of articulating the similarities and discrepancies between the nature of past mass extinctions and the current biodiversity crisis, something that even world-leading experts could do with reminding of from time to time. That said, the book also highlights how past extinction patterns remain incredibly relevant to our understanding of the nature of current and future biodiversity decline (the latter of which we still understand desperately little about).

In summary, this book is primarily aimed at a general audience who wish to learn about the history, and likely future, of extinction on planet Earth. Additionally, it is also a fun and informative read, even for those with a background in mass extinction studies like myself. I have already added *Extinction: A Very Short Introduction* to the reading list for my undergraduate students.

**Alex Dunhill**

*University of Leeds*



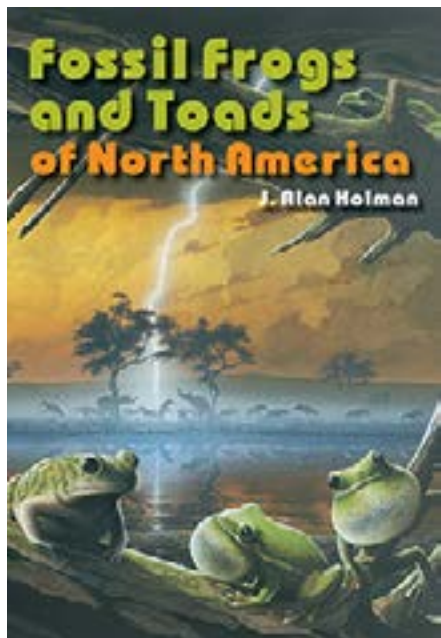


## Fossil Frogs and Toads of North America

J. Alan Holman. 2003 (First Paperback Edition 2018). Indiana University Press, Bloomington. 246pp. USD30.00 paperback, USD29.99 eBook. ISBN 978-0-253-03174-7 (pbk.).

Lissamphibians – the amphibian crown group, *i.e.* caecilians, frogs and salamanders – being neither furry, fluffy or scary are often the forgotten tetrapods, but amongst them frogs probably garner the most popular interest. Unfortunately, their small size and somewhat fragile skeletons make for a mostly less than spectacular fossil record and they rarely receive a book length treatment. (1998's Part 4 of the *Handbuch der Paläoherpetology*, aka the *Encyclopedia of Paleoherpology* series is the only other remotely recent volume I am aware of.)

I somehow missed the original hardback version of this book, for which this is an otherwise unmodified paperback reprint. Do not expect a 2018 updating: this is very much a 2003 work, although as the author sadly passed away in 2006 (only nine years into a still productive retirement) this can be forgiven.



Alan Holman, was both a herpetologist and a palaeoherpetologist – his works include field guides to living amphibian and reptile species, as well as books on fossil snakes – and that holistic perspective is on show here. (It is certainly refreshing to read a book about a fossil group with sections on vocalisation and mating behaviours.) The book boasts a generous 102 figures (mostly line drawings of fossils) as well as 48 full colour plates, which are exclusively photographs of extant species, and is split into just three chapters. First, a general introduction (covering their anatomy, behaviour, fossil record and origins); then the bulk of the book, a systematic account of the North American fossils; and finally, a chronological account. The book finishes with an epilogue, reference list, general, taxonomic and site indices. The latter three particularly help those who wish to treat the volume as a reference work and overall the structure suggests that was always the author's intent.

I have to confess this is exactly what I want from such a work, as I increasingly view systematic publications as data resources to be assimilated into relational, machine-readable formats like *The Paleobiology Database*. The book definitely delivers here, with comprehensive information on fossil localities and source references. I suspect an anatomist would not be disappointed either, with plenty of illustrations, extruding into the wide outer margins that readers of Indiana University Press' (IUP) *Life of the Past* series will already be familiar with. My only misgiving here is a lack of



specimen numbers for the figures – something that may also frustrate those wanting to locate the exact material on a collections visit.

The introduction is also commendable and works to introduce the group to newcomers in an engaging and informative way, clearly showcasing Holman's passion for them, and it does not assume you are already a frog fan. The systematic section certainly gives the impression of being comprehensive, although no doubt more material has been discovered in the seventeen years since this work first appeared. Finally, the chronologic section gives the material a different, but still valuable context.

IUP's *Life of the Past* series has certainly been a prolific source of palaeontological publishing over the last few decades. (They occupy a lot of my shelf space, at least.) However, their quality can be somewhat variable and more typically they are edited works on a locality or clade rather than a complete systematic overview like this. This book would arguably more properly belong in the *Handbuch der Paläoherpetology* series from Verlag Dr Friedrich Pfeil. We can only be grateful that it doesn't – those familiar with the series will know how hard it is to get hold of a volume and the eye-watering prices they retail for. As such, *Fossil Frogs and Toads of North America* sits in an almost perfect niche – providing both the affordability and availability of a *Life of the Past* volume (a quick online search found a copy for less than GBP13) and the style and quality of the type of comprehensive systematic account of a *Handbuch*.

I am not clear why IUP chose to reprint this book – they no longer offer the hardback on their website, although this is still available for the accompanying *Fossil Salamanders of North America* by the same author – and every other work I own by them is in hardback format. Certainly hardback copies still seem to be available online and are not vastly more expensive. (*Life of the Past* volumes have always been relatively affordable.) However, the printing quality is still excellent and the print size is the same, so I would not be put off by owning the paperback version.

In conclusion, it seems pointless to say “if you only buy one book on North American fossil frogs” as this is probably your only option, but this is a really nice volume. If I hadn't gotten a free review copy I would happily splurge on this myself, and if you have any interest in fossil amphibians I recommend you do too.

**Graeme Lloyd**  
*University of Leeds*



# Books available to review

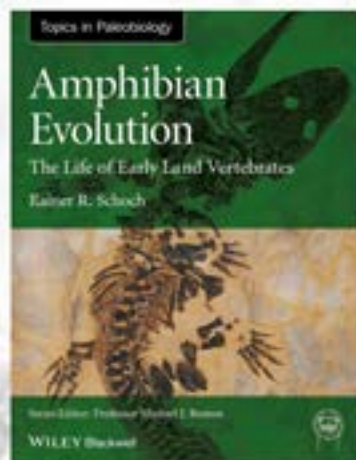
The following books are available to review. Please contact the Book Review Editor, Tom Challands (e-mail <[bookreview@palass.org](mailto:bookreview@palass.org)>), if you are interested in reviewing any of these.

- *The Missing Lynx: The Past and Future of Britain's Lost Mammals*, by Ross Barnett.
- *The Dinosaurs Rediscovered: How A Scientific Revolution Is Rewriting Their Story*, by Michael Benton.
- *History of Life*, 5th Edition, by Richard Cowen.
- *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.
- *Across the Bridge*, by Henry Gee.
- *Beyond Extinction: The Eternal Ocean. Climate Change & the Continuity of Life*, by Wolfgang Grulke.
- *Trilobites of the British Isles*, by Robert Kennedy and Sinclair Stammers.
- *Fossilien im Alpstein: Kreide und Eozän der Nordostschweiz*, by Peter Kürsteiner and Christian Klug.
- *William Smith's Fossils Reunited*, by Peter Wigley (editor) with Jill Darrell, Diana Clements and Hugh Torrens.

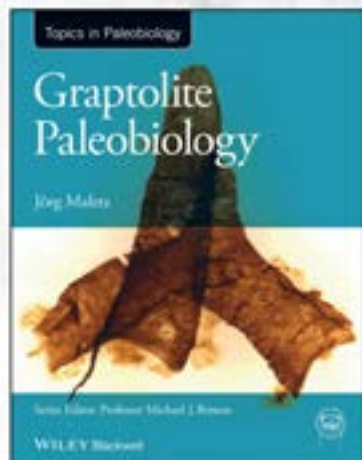
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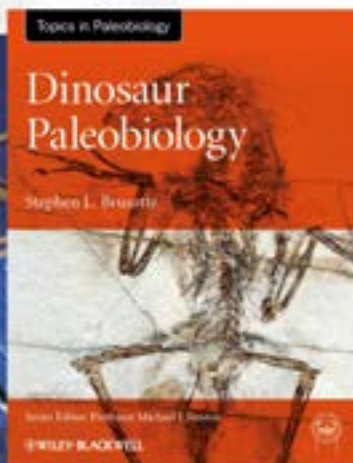
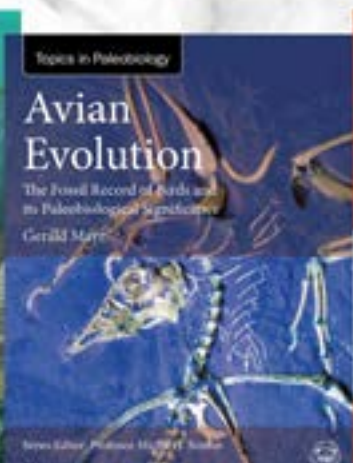


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## Careers Q & A

### *Professional palaeontologists in the wider world*

After doing a PhD at Harvard (2013–2019), Brianna McHorse now works as a Data Scientist at the travel search company KAYAK <<https://www.kayak.com/>>.




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**Q1: When you were a child, what did you want to be when you grew up?**

I'll be honest, I wanted to be a horse trainer as a child! I even did a whole poster board on it in high school as part of a career research project. By the time I went to university, I was thinking more along the lines of being a doctor or scientist, but mostly I was a little frightened by the idea of spending 40 hours a week doing just about any job. By the end of university, I had settled into a palaeontology lab and decided that being a research professor could be the life for me.

**Q2: How did you first get interested in palaeontology?**

I became a palaeontologist entirely by accident. As a member of the Clark Honors College at my university, I was required to complete a senior research thesis. I tried a zebrafish evo-devo lab and a climate-change plant lab, but nothing was sticking. So, since I got along well with my academic advisor, I asked her if I could do a research project with her that was related to horses – I figured the horse part would

keep me interested long enough to finish it. Since she is a palaeontologist and functional morphologist, she told me to go think up a project that involved horses and bones. While my thesis wound up being on skeletal anatomy in modern performance horses, I spent enough time around the lab that eventually curiosity got the better of me and I discovered that palaeontology research was quite interesting when you got to frame your own questions.

**Q3: What is your favourite fossil and why?**

One of my first projects was using linear dimensions of camelid astragali to identify them to genus. Ever since, I've had an unreasonable affection for a nice camel astragalus. They fossilize so well!

**Q4: What made you pursue your current job?**

Despite the many appealing parts of academic careers, some parts – like competing for grants, the pre-tenure period, and not necessarily having a lot of control over where you wound up geographically (especially during the postdoc period) – made that path less attractive to me. Still, I was generally a happy PhD student, and



my favourite parts of the job were analysing data in R and communicating my results in talks and papers. I decided to lean into these favourite parts, build my programming and data analysis skills even more, and pursue a career where I could spend most of my time doing that.

**Q5: What are the main responsibilities of your job?**

I spend most of my time writing code, sometimes more structural (building out the framework for running a model in production, from pulling data to delivering results) and sometimes more analytical (writing or tuning the model itself or exploring data). I also work closely with my team-mates on collaborative projects, communicate and share the results of what I'm working on, and make sure I'm always learning something new.

**Q6: What gives you the most satisfaction in your job?**

I love programming! Much of the time it feels like an advanced version of those fun logic puzzles you do as a kid (you know, Susie lives in the yellow house, the child with the cat is not next to the blue house, *etc.*), mixed together with working in a different language. I enjoy being able to start with an idea and turn it into a working piece of code that does a new thing.

**Q7: What are the worst things about your job?**

I wouldn't call it the worst thing, but the most challenging part has probably been learning the business side of things. Even something as simple as knowing which metrics tend to be more important than others, or which parts of the business represent more of our revenue, can really influence how you approach your work, and I had no previous understanding. Domain knowledge goes a long way towards making intelligent data decisions, so it has been important to ask a lot of questions and have conversations with more experienced people to build as much context as possible.

Additionally, some academic habits I developed during my PhD don't work as well in my

industry – such as going off alone to spend months refining one idea. My role is more applied than research-focused, so it's much more important to communicate and share early versions of my work to get feedback and make sure I'm on the correct track. In contrast to getting everything in place to submit a paper where the final result is fixed and the whole process can take years, in my career now it is usually better to deliver a quality working version that can be implemented on a shorter timeline and then improved through iteration.

**Q8: What has been the best career advice you have received?**

Doing an internship during my PhD was the best advice I received. It took some strong negotiating to pull this off (I did one short winter internship and one full internship over the summer between my 5th and 6th years in graduate school), but I learned a huge amount very quickly, it gave me a great sense of whether I would be happy doing this kind of work in industry, and it made me less of a risky bet to hire than someone coming straight out of a PhD.

**Q9: What skills does it take to be successful in your job?**

Data wrangling first and foremost; learn to love the cleaning. Programming skills are critical – I highly recommend Python, as it's a very common language for data science work. It also helps a lot to have at least some exposure to working at the command line and with version control systems such as git. At risk of repeating a cliché, communication is also extremely important. You need to be able to translate back and forth between plain language and technical detail. Practise explaining your work to people with all levels of background knowledge.

**Q10: Do you have any tips for students who would like to take a similar career path?**

I highly recommend an internship in industry if you can manage it. Other than that, I suggest designing your research projects to use and





improve your programming skills as much as possible, checking out MeetUp or other places for data science groups where you can meet folks in the tech industry, and looking at data scientist resumes/CVs so you don't wind up sending out something that looks too much like an academic CV when you start applying to jobs.

**Q11: Are there any major obstacles to being successful in a career like yours?**

Getting one's first data science job seems to be the hardest; there's a lot of interest in the field these days. Internships can be a huge leg up. Don't be afraid to engage with the community, in person or on social media platforms. It could also be beneficial to begin with more of a data analyst position and move into data science positions as you continue to build skills and work experience.

**Q12: What's the best thing about your job?**

My team is amazing, the work is interesting and challenging, and I am constantly learning new things with direct support from my managers. I spend most of my time on a steep learning curve, but because I'm working in a close-knit team and the projects move very quickly, I still have plenty of opportunity to provide value and feel a sense of achievement.

**Q13: What are your future ambitions?**

For now, I'm interested in staying on the steep part of the learning curve and building up a lot of technical skill so that I can handle increasingly complex and challenging projects. The field of data science goes very deep, and I want to be someone who can deliver those company-changing projects.

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*Find out more about Briana through her personal website (<<http://bmchorse.netlify.com/>>) or at LinkedIn (<<https://www.linkedin.com/in/bmchorse/>>).*

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

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Information – whether copy as such or Newsletter messages, review material, news, emergencies and advertising suggestions – can be sent to Graeme Lloyd, e-mail <[newsletter@palass.org](mailto:newsletter@palass.org)>. The *Newsletter* is prepared by Nick Stroud, and printed by Y Lolfa, Talybont, Ceredigion.

Deadline for copy for Issue No. 104 is 1st June 2020.

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