64th Palaeontological Association Annual Meeting

16–18 December 2020

Oxford University Museum of Natural History

The Palaeontological Association

2020

Virtual Annual Meeting

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PROGRAMME
ABSTRACTS
AGM papers

The Palaeontological Association
64th Annual Meeting
16 –18 December 2020
Hosted online by
Oxford University Museum of Natural History

The programme and abstracts for the 64th Annual Meeting of the Palaeontological Association are provided after the following information and summary of the meeting.

Platforms

The Annual Meeting will take place online, hosted by the Oxford University Museum of Natural History, UK. All talks will be broadcast via the WebinarJam platform. We recommend using Google Chrome when attending WebinarJam events. The poster sessions will take place on the Discord platform, which you will be able to access via your web browser, or by downloading the Discord application. Delegates will be e-mailed a set of personal links to access all content, as well as guidance on how to access the conference sessions. Fringe events should be registered for separately.

Presentation formats

The Organizing Committee would like to emphasize that all presentation formats – standard talks, flash talks and posters – have equal importance. The three different presentation styles offer varied ways to present research and discuss it with colleagues. In all cases presenting authors will be able to deliver their research and debate the content with delegates at the Annual Meeting.

Oral Presentations

Presenters giving standard talks have been allocated 15 minutes; these talks should last for no more than 12 minutes to allow time for questions and switching between presenters. Speakers giving flash talks have been allocated five minutes and may only present a maximum of three slides. Questions and a short panel discussion will take place at the end of each flash talk session, rather than after each talk. Unless there are extenuating circumstances, presentations will be given live over the WebinarJam system, with attendees able to ask questions via the chat function, which will then be put to the speakers by the Session Chair. All presentations should be in PowerPoint or PDF format and should not contain animations, although videos can be accommodated. All presentation files should be less than 80 MB and must be submitted in the week prior to the Annual Meeting, including any URLs for videos. Having presentations securely pre-loaded into the presentation system 'cloud' eliminates the need to use bandwidth-consuming screen-sharing, and in so doing makes the meeting more accessible to those with varying levels of Internet connection.

Poster presentations

Posters may be portrait or landscape and presenters should consider designs that will work well when viewed on a typical screen. Posters will be submitted and be available to view through a password-protected portal on the PalAss website. Posters should be submitted in PDF format. Online, interactive poster sessions will take place on Discord to promote live debate and discussion between presenters and attendees.

Illustrations

This year the Organizing Committee have arranged for a number of illustrators to attend the Annual Meeting. Inspired by the presentations being made, they will make their illustrations available online using the conference hashtag #PalAss20. Keep an eye on social media to catch your favourite talks in artistic form.

Virtual field-trips

Throughout the Annual Meeting Dr Hilary Ketchum of the Oxford University Museum of Natural History will be running a number of virtual field-trips, using material from the collections to guide delegates around a number of otherwise inaccessible localities from around the world. Each 'trip' will be presented live from the Museum, with opportunities to ask questions. These events will be advertised to all delegates and will not require separate registration.

Discord channels

As well as the poster sessions, numerous channels will be available on Discord during the meeting. For example a PhD student meet-up channel will be available for the duration of the conference, and an LGBTQ+ meet-up will be operational from 12.20 until 18.45 on Wednesday 16th December. Several meeting rooms will be available on Discord for any delegates to use during the conference.

Oxford University Museum of Natural History

Oxford University Museum of Natural History was established in 1860 to draw together scientific studies from across the University of Oxford. Today, the award-winning Museum continues to be a place of scientific research, collecting and fieldwork, and plays host to a programme of events, exhibitions and activities for the public and school students of all ages. The palaeontology collections include one of the world's most important collections of Middle Jurassic dinosaurs, exceptionally-preserved specimens with intact soft tissues and enigmatic fossils representing the earliest complex multicellular organisms. They feature around 400,000 fossils, ranging from the Archaean at around 2.7 billion years ago to the end of the Pleistocene 11,700 years ago. Highlights in the collections include the world's first scientifically described dinosaur – *Megalosaurus bucklandii* – and the world-famous Oxford Dodo, the only soft tissue remains of the extinct dodo.

Logo

For the virtual Annual Meeting it seemed appropriate that the logo should feature a virtual fossil. This model of a trilobite, an enrolled *Bailiaspis ? glabrata*, is based on CT scans and 3D reconstructions by Imran Rahman, Deputy Head of Research at the Oxford University Museum of Natural History and member of the Organizing Committee. The model is part of 3D computer simulations associated with a paper in *Palaeontology* by Jorge Esteve and colleagues on modelling enrolment in Cambrian trilobites.

The Palaeontological Association wishes to thank the Organizing Committee:

Chair:

- Dr Jack J. Matthews

Organizing committee:

- Dr Frankie S. Dunn
- Dr Duncan J. E. Murdock
- Dr Elsa Panciroli
- Dr Ricardo Pérez-de la Fuente
- Dr Imran A. Rahman
- Prof. M. Paul Smith
- Dr Lauren H. Sumner-Rooney

Science committee:

- Dr Ross P. Anderson
- Dr Neil Brocklehurst
- Dr Richard P. Dearden
- Dr Frankie S. Dunn
- Dr Isabel S. Fenton
- Hiu Wai Lee
- Dr Jack J. Matthews
- Dr Duncan J. E. Murdock
- Dr Elsa Panciroli
- Dr Ricardo Pérez-de la Fuente
- Dr Imran A. Rahman
- Prof. M. Paul Smith
- Dr Lauren H. Sumner-Rooney
- Dr James D. Witts
- Dr Thomas Wong Hearing

Sponsors

The organizers of the Annual Meeting gratefully acknowledge the support of the sponsors:

- Cambridge University Press
- Combined Academic Publishers
- The Geological Society Publishing House
- John Wiley & Sons Ltd
- Nikon Metrology
- The Paleontological Institute
- Royal Society Publishing

Summary of Schedule

Please note: all times given are in GMT.

Tuesday 15th December: Pre-conference fringe events

A number of fringe events associated with the Annual Meeting are available to book separately online. These include a Palaeoethics Workshop to discuss ethical issues in palaeontology from fieldwork to collections and publication, and the launch of a new field guide.

Wednesday 16th December: Conference and Symposium

The conference will begin with opening remarks at 09.00 on the morning of 18th December. The morning features single sessions of standard and flash talks, with the first poster session from 11.20 to 12.20. The conference continues after lunch with two parallel sessions of standard talks.

The afternoon will conclude with the Symposium entitled "New Ideas on Old Fossils: A Symposium of Early Career Palaeontologists from Around the World", featuring five speakers.

Thursday 17th December: Conference, AGM and Annual Address

The conference will start at 09.00 with single and parallel sessions of standard and flash talks throughout the morning. The conference continues in the afternoon with talks followed by the second poster session from 15.15 to 16.15.

The Annual General Meeting will begin at 16.30. The results of the recent election of new Council members will be announced, as well as the outcome of grant applications and the Association's annual medals and awards. All members are strongly encouraged to attend the AGM, and non-members are also free to view the event. We suggest non-members join from around 17.00 for the announcements of the 2020 medals and awards.

The Annual Address will be given at 19:00 by Prof. Rachel Wood of the University of Edinburgh and is entitled "Tales from the Cambrian Explosion". This is a public event and all are welcome.

Friday 18th December: Conference, prizes and social events

The conference will start at 09.00 with single and parallel sessions of standard and flash talks continuing throughout the day. Talks will end at 16.45, followed by an update from the Association's Diversity Officer and presentations by the organizing committees of upcoming meetings. The main conference will then close with the award of the President's Prize, the Council Flash Talk Prize and the Council Poster Prize, followed by concluding remarks.

This year's Annual Meeting will end with 'The Palaeovision Fossil Contest', an online, interactive, international competition to decide the Annual Meeting's favourite fossil for 2020, starting at 19:30.

The Palaeontological Association

Registered Charity Number: 1168330

Code of Conduct for Palaeontological Association meetings

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

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

Behavioural expectations: It is the expectation of the Palaeontological Association that meeting attendees behave in a courteous, collegial and respectful fashion to each other, volunteers, exhibitors and meeting facility staff. Attendees should respect commonsense 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, in either 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.

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

Anyone experiencing or witnessing behaviour that constitutes an immediate or serious threat to public safety, or a criminal act is expected to contact the appropriate law enforcement agency. Those witnessing a potential criminal act should also take actions necessary to maintain their own personal safety.

of relative positions dependant on gait and/or behaviour of the track-maker. Manus and pes impressions are similar in size, tridactyl, with subcircular digits and short, blunt hoof impressions. They have been identified as *Rhoncoceripeda voconcense* comb. nov. One trackway of a possible juvenile animal has been identified. The Saignon ichnoassemblage includes one of the earliest rhinocerotid records in Europe associated with endemic pre-Grande Coupure forms of ungulate.

Ostracods of the Ponto-Caspian region at the late Pleistocene–Holocene transition

Alina Berdnikova[1], Maria A. Zenina[2], Tamara A. Yanina[1] and Valentin M. Sorokin[1]

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[2]*P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Russia*

The Ponto-Caspian region is a system of inland basins and adjacent territories. The entire region's evolution reflects both global and regional climatic rhythms. The study area includes the North Caspian region, the Bulgarian part of the Black Sea (WBS), and the East Black Sea (EBS) near Anapa. Most of the studied ostracod species are Caspian. Thus, the ostracods of the Neweuxinian basin are common with the Khvalynian. This is probably a consequence of the unilateral water discharge from the Caspian. In the Caspian cores, Girkanian deposits abounded of *Paracyprideis* sp., *C. gracilis*, *C.* cf. *bogatschovi* and *B. dorsoarcuata*, while Khvalynian deposits contain 30 species of Caspian origin. In the EBS 57 species were identified, 52 of them having a Caspian origin, and five are Mediterranean. A smaller number – 25 species – were found in the sediments in the WBS, eight of the species are represented by Mediterranean migrants and 17 species have a Caspian origin. The most common are *Loxoconcha lepida*, *Loxocaspia sublepida*, *Amnicythere martha*, *Euxinocythere relicta*, *Amnicythere stepanaitysae* and *Candona schweyeri*. Approaching the Late Pleistocene–Holocene border, the species diversity in both the Caspian and Black seas decreased.

Integrated multi-proxy approach reviews ecosystem dynamics during Holocene transgression in the northwest Adriatic Sea

Michaela Berensmeier[1], Adam Tomašových[2] and Martin Zuschin[1]

[1]*University of Vienna, Austria*

[2]*Slovak Academy of Sciences, Slovakia*

Holocene marine sediments preserve important information about environmental and ecological changes, often due to anthropogenic impact, which can be easily age-dated – a distinct advantage over deep time records. Our study approach combines sedimentology and palaeoecology to determine major environmental changes along a 3-m-long gravity core taken at 31 m water depth, off the Po River Delta in the late Holocene of the northern Adriatic Sea. Different age-dating techniques were used to define core chronology and to improve palaeoenvironmental reconstructions. Age-dating has been performed on shells of the bivalve *Corbula gibba* (by C14-calibrated amino acid racemization), bulk-sediment (210Pb isotope analysis) and plant remains (radiocarbon isotopes) to gain information about time-averaging, sedimentation rates and the complete core chronology. Different facies types have been identified, changing from laminated, lagoonal silts (transgressive system tract) to fully marine, bioclastic clayey silts (highstand system tract). A major environmental change has been identified in the highstand sediments. Geochemical and palaeoecological proxy

landscapes show mandible morphologies of fast-swimming pelagic predatory taxa are poorly functionally optimized but strongly optimized for hydrodynamic performance. Conversely, shallow-water durophagous taxa were highly optimized for jaw strength, but poorly for hydrodynamics. A phylomorphospace was also constructed that showed a possible phylogenetic constraint, possibly reflecting niche partitioning or other factors. The results suggest hydrodynamics are a prime constraint on functional jaw morphology for fast-swimming taxa while the opposite is true for slow-swimming durophagous organisms, a trend that may apply to other secondarily aquatic tetrapod clades.

Evaluation of substrate affinities among phacopid trilobites in a phylogenetic framework

***Namiko Machida and James C.Lamsdell**
West Virginia University, USA

Trilobites are an ecologically and morphologically diverse arthropod group occurring throughout the Palaeozoic with an excellent fossil record. This study focuses on a relationship between ecological affinity and species evolution among the trilobite family Phacopidae from the Ordovician–Devonian periods. Environmental factors are important as external regulations on morphological evolution; however, few studies have quantitatively tested their association within a phylogenetic framework. To see the distribution of substrate affinities (*i.e.* calcareous *vs* siliciclastic) along with phacopid evolutionary history, a phylogenetic analysis was conducted by compiling existing phacopid character matrices, which was followed by an overlaying of quantified affinity values at a species level. The data of substrate affinities are compiled from the primary literature and online databases such as the Paleobiology Database, Fossilworks and iDigBio, then a ratio of substrate types was taken for each species to calculate the affinity. The preliminary result suggests that the substrate affinities are dominated by carbonate settings, while a few species with strong siliciclastic affinities are seen in the Devonian period among phacopid trilobites. This study will be used to evaluate environmental constraints on the trend of morphological transitions such as heterochrony in future studies, which will contribute to our understanding of fundamental evolutionary processes.

Early Khvalynian ostracods in the northern Caspian region

Radik Makshaev and Alina Berdnikova
Lomonosov Moscow State University, Russia

The northern Caspian region (Middle and Lower Volga sections particularly) is unique for our understanding of Caspian history and correlation of palaeogeographic events with the glacial–interglacial rhythm and global/regional climate changes. We carried out microfaunal analyses on chocolate clay deposits and found representatives of several ostracod families – widely represented were Candonidae, Cyprididae, Leptocytheridae and Loxoconchidae. Sand sediments rarely contain a great variety of ostracods. Only *Leptocythere pirsagatica* (Liv.) is distinguished. According to Yakhimovich *et al.* (1986) and Sedaykin *et al.* (1987), more than 80 species of ostracods were described in the Lower Khvalynian deposits. The dominant ostracod species are *Caspiolla gracilis* (Liv.), *Cyprideis torosa* (Jones), *Leptocythere bacuana* (Liv.), *L. marta* (Liv.), *L. quinquetuberculata* (Schw.), *Loxoconcha unodensa* (Mand.), *L. lepida* (Step.), *L. gibboida* (Liv.) and *Paracyprideis enucleata* (Karm.). The ecological conditions of these species are diverse. In general,

the formation of the observed complex fauna took place under unstable hydrological conditions in a shallow basin. According to our data, Early Khvalynian basin salinity could have varied from brackish water (2–10 ‰) to slightly brackish water (0.5–3 ‰) conditions; typical marine species would be unable to live here because of insufficient salinity and freshwater ones.

A new approach to the step method for fractal ontogenies

***Katherine Marriott**

Brooklyn College, The City University of New York, USA

Fractal complexity is the number and configuration of self-similar subdivisions within a geometric entity. True fractals cannot exist in three dimensions; ammonite sutures sufficiently mimic fractals to be quantified geometrically via a method based on fractals. The step method, gleaned from the measurement of irregular coastlines, has historically been used to measure complexity of ammonite sutures. By generalizing the suture into its finite measurement intervals (steps), value is determined for the fractal dimension, D(f), of that suture. However, a smaller interval, or step length, yields greater accuracy: over ontogeny, length, as well as further subdivision is added to the suture line of ammonites. Using the old step method, measuring ammonites (or coastline) over an ontogenetic sequence, plottable values that do not accurately depict the absolute rate of ontogenetic change in complexity. This is due to an inconstant step length that decreases proportionally to the subject it is measuring as size increases during ontogeny. I circumvent the dimensional aspect of step-method measurement instead by fractal complexity, C(f), and demonstrate its greater accuracy in measuring ontogenetic change. The new method is proportional rather than dimensional, allowing it to remain constant relative to the stage of growth, and demonstrating the true rate of change.

UV-B radiation was the Devonian–Carboniferous boundary terrestrial extinction kill mechanism

John E. A. Marshall[1], Jon Lakin[1], Ian Troth[1] and Sarah Wallace-Johnson[2]

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[2]*Sedgwick Museum, University of Cambridge, UK*

There is an unexplained terrestrial mass extinction at the Devonian–Carboniferous boundary (359 million years ago). The discovery in East Greenland of malformed land plant spores shows that the extinction was coincident with elevated UV-B radiation demonstrating ozone layer reduction. Mercury data through the extinction level proves that, unlike other mass extinctions, there were no planetary-scale volcanic eruptions. Significantly, the Devonian–Carboniferous boundary terrestrial mass extinction was coincident with a major climatic warming that ended the intense final glacial cycle of the latest Devonian ice age. A mechanism for ozone layer reduction during rapid warming is increased convective transport of naturally produced ozone destroying compounds. Hence, ozone loss during rapid warming is a possible process that is inherent to the Earth system. This leads us to the unavoidable conclusion that we should be alert for such an eventuality in the future warming world. Other suggested and now restated causes include a cosmic ray blast from an exploding star, *i.e.* a supernova.