



equality/participation status of women in palaeontology-related careers, we have analysed the conference participation data for 55 editions of three palaeontological annual meetings held since 1985. We have considered the percentages of women giving contributions, the proportion of women who were featured as keynote speakers, and those who were part of the organization or scientific committee. Our results showed a strong trend in the last four years towards an almost equal representation in ‘first-stage’ conferences. However, for conferences that include a higher percentage of senior researchers, even as recently as 2018, only 21 % of women presented contributions, highlighting that women are still under-represented at palaeontological meetings. Organizing committees should be made aware of the situation and then be able to promote specific actions to solve the gender bias.

Geometric morphometric analysis on fossil cricetids mandibles

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We aimed to quantify and compare the mandibular shape of three extinct genera of cricetids from the Miocene of Europe: *Cricetodon*, *Hispanomys* (tribe Cricetodontini) and *Megacricetodon* (tribe Megacricetodontini). Classically, the description and diagnosis of the mandibles of these cricetids is based on qualitative data that make differentiation and comparison between intermediate morphologies more difficult. To solve that, we digitalized 14 landmarks and seven curves formed by semilandmarks that define the most relevant parts of the mandibles. These landmarks and semilandmarks are equally distributed among the two main parts of the mandible: the alveolar and ramus regions. This equitable distribution avoids any sampling and analysis differentiation between the regions. Then, using geometric morphometric methodologies and analysis (PCA), we obtained summarized information about the total variance of the sample. The scatter plot for the PCA showed a clear difference between the two tribes and established two morphologies: one for *Cricetodon* and *Hispanomys* and another for *Megacricetodon*. Because the mandible is a structure where integration, modularity and biomechanics have been tested, this morphometric analysis will allow us to provide new information about extinct species.

Biochronology of the early Miocene mammal record of the Vallès-Penedès Basin (Catalonia)

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The early Miocene mammal record of the Vallès-Penedès Basin (Catalonia, Spain) had not been systematically studied until high-resolution litho- and magnetostratigraphic studies of the main sections were recently undertaken. The rodent succession shows multiple affinities to that from the Aragonian stage type area in the Calatayud-Montalbán Basin (Aragon, Spain), so that the same detailed local zonation may be used. Nevertheless, there are some



differences between the two records, such as the occurrence of Central European taxa and the significantly later extinction of certain rodent species in Catalonia. The Vallès-Penedès record ranges from zone A (MN3, Ramblian) to C (MN4, early Aragonian), with a minor hiatus corresponding to zone B. Contrary to the Aragonian type area, most of the Vallès-Penedès sites have also yielded large mammals, allowing for the calibration of major dispersal events in Western Europe, such as that of gomphotheres from Africa and the equid *Anchitherium* from North America.

Synchrotron-XRF analysis reveals fossil insect trace element chemistry retains a biological signal

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Extant insects utilize both structural and pigmentary colouration and include some of the most striking and vibrantly coloured organisms on the planet. The fossilization process normally removes visible pigmentary colour from fossil insects, and because of this we have a poor understanding of the evolution of colour in this group. Recent work by our group has identified that different cuticular pigments exhibit distinctive taxonomic and pigment-specific trace element chemistry in some extant insect cuticles. Here we use synchrotron X-ray fluorescence (XRF) to examine the trace element chemistry of key groups of fossil insects (Coleoptera, Diptera and Hymenoptera) from several Lagerstätten. Linear discriminant analyses show that the trace element chemistry in fossil insects is influenced by environment and/or diagenesis. Despite this, different fossil insect groups retain distinct trace element chemistries. These data suggest that despite diagenetic overprint, an original biological signal can survive fossilization. Future work, combining an expanded fossil data set and taphonomic experiments, will confirm the validity of whether the biological signal in the fossils includes a pigmentary component.

Phylogenomics resolves early events in bacterial evolution

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A rooted tree of Bacteria is essential to reconstruct the early evolutionary history of life and the emergence of key geobiological interactions which affect us to this day. Many current ideas pertaining to the nature of bacterial evolution are informed by hypotheses of prokaryotic phylogeny. However, rooting the tree of Bacteria has proven difficult. Recent discoveries of a huge diversity of new uncultured phyla provide new data, but are often difficult to resolve within the bacterial tree, with the relationships between the major bacterial lineages still showing little resolution. We attempt to construct a rooted tree of Bacteria using probabilistic gene tree-species tree reconciliation methods. These hierarchical models integrate horizontal gene transfers (HGTs), gene duplications and gene losses into an overall model of genome evolution using amalgamated likelihood estimation, where patterns of gene family evolution contain information about the root of the tree. This rooting method also allows us to infer ancestral gene content and reconstruct ancestral

**The
Palaeontological
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63rd Annual Meeting

**15th–21st December
2019**

*University of Valencia,
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