

**The
Palaeontological
Association**

62nd Annual Meeting

**14th–17th December
2018**

University of Bristol

**PROGRAMME,
ABSTRACTS
and AGM papers**





sampling procedures, is backwards compatible with previous statistical methods that use the stratigraphic distribution of fossils, and allows us to model the effects of changing deposition rates on the fossil record. This demonstrates the biasing effect of sequence stratigraphy on the fossil record and emphasizes the importance of a sampling procedure that documents not only the distribution of fossils, but also the depositional environment.

Reversing time averaging and reconstructing extinction rates with approaches from image processing

***Niklas Hohmann**

University of Erlangen–Nuremberg, Germany

Last fossil occurrences and fossil abundance are used to make inferences about ecology in the deep past, be it the success of a taxon in a particular environment or the temporal development of extinction rates throughout a mass extinction. However, the Signor-Lipps effect and time-averaging make this type of data only circumstantial evidence of the ecological process that generated it in the first place. Here I present a model that is based on the idea that empirical data as they are generated by fieldwork is a blurred version of the original ecological signal, which can accordingly be obtained by reversing the blurring effect. Generating and reversing these effects is a common task in image processing, which offers a number of algorithms for these tasks that can be deployed for the proposed model. The presented reconstruction method can also be expanded to incorporate the effects of changing deposition rates.

A digital reconstruction of the nasal cavity of *Riograndia guaibensis* (Eu cynodontia, Ictidosauria) and nasal cavity evolution in nonmammaliaform cynodonts

***Sofia Holpin^{1,2}, Agustin G. Martinelli³, Pamela G. Gill¹, Pablo G. Rodrigues⁴, Marina B. Soares⁴, Cesar L. Schultz⁴ and Emily J. Rayfield¹**

¹*University of Bristol, Bristol, UK*

²*University of Edinburgh, UK*

³*Museo Argentino de Ciencias Naturales 'Bernardino Rivadavia', Argentina*

⁴*Universidade Federal do Rio Grande do Sul, Brazil*

With the aid of modern technologies such as micro-CT scanning and 3D model reconstruction, the internal anatomy of fossilized remains can be easily and non-invasively studied. Here we describe the internal anatomical structures and associated bones of the nasal cavity of *Riograndia guaibensis*, a non-mammaliaform cynodont for the Late Triassic of Brazil. The specimen (UFRG-PV-596-T) is represented by an almost complete skull, articulated right and isolated left hemimandibles that were micro-CT scanned at the University of Bristol in 2016. The 3D reconstruction of the nasal cavity highlights the impression of ridges and canals on the internal surface of the bones that constitute the nasal passage. The presence, dimensions and morphology of these ridges have implications for the possible respiratory patterns, metabolic rate and ecology of this taxon. It is generally accepted that the acquisition of ossified maxilloturbinals is related to the appearance of endothermy in mammaliaforms. However, the presence of cartilaginous maxilloturbinals in *Riograndia*, as indicated by the preserved bony ridges, is very probable. The comparative study of these characteristics in various taxa before and after the appearance of mammals helps to shed light on this much debated moment and is crucial in mammalian evolution.