Evening Lecture: A journey from Lilliput to Brobdingnag: Bivalve mollusc body size trends across the end-Triassic mass extinction and recovery

9th April 2021

By: Dr Jed W. Atkinson School of Earth and Environment, University of Leeds

Lemuel Gulliver (Gulliver's Travels, Jonathan Swift) encountered lands of both the extremely small (Lilliput) and the gigantic (Brobdingnag). His fictional travels gave their name to the Lilliput Effect, a phenomenon encountered in the wake of mass extinction when a great many of the organisms are small, just as though we were studying the fossilised inhabitants of Lilliput. The Effect, in its original and strictest sense, is a temporary reduction in body size following a mass extinction, but expressly in a species that survived from before the extinction event. This is therefore a rare occurrence yet populations of small individuals are common after many of the worst ecological crises throughout Earth's history. There are several possible causes behind these observations, including preferential loss of large species during the extinction or origination of small species in the immediate post-extinction interval. An organism's environment can impart a control on body size - factors such as temperature and oxygen availability are known to do this and are major players in many extinction events.

Figure 1: *Plagiostoma*; size variation

The end-Triassic mass extinction event (c. 201 million years ago) left behind a "Lilliput World" although within a few million years the Lilliputians had been overtaken by Brobdingnagians. Comparative giants of the same species that evolved to fill the vacated early Jurassic seas. Here I shall discuss the journey many species took from Lilliput to Brobdingnag and explore the possible reasons behind such dramatic changes in body size.

Presidential Address: Shallow geohazards and environmental change

7th May 2021

By: Dr. Vanessa Banks British Geological Survey

Later this year, the 26th United Nations Climate Change Conference will be hosted in Glasgow. It is, therefore, timely to consider research on shallow geohazards, e.g. landslides, sinkholes and problem materials, which are susceptible to climate change. Whilst some of these hazards are a consequence of Quaternary climatic conditions and processes imposing a natural meta-stability in the landscape, comparable states of metastablility can also result from human modification to the landscape. Other natural shallow geohazards are related to material properties and changing hydrological or moisture conditions. As well as being sensitive to climate change impacts, they are susceptible to human-induced environmental change as a consequence of urban development, changing land-use and demands on resources. Shallow geohazards are globally extensive with impacts that are measureable in terms of loss of life and or insurance value. Their research is important for human resilience.

This talk will address the classification and distribution of shallow geohazards, as well as their relative significance in terms of impact. It will describe the way in which their assessment requires the integration of contributions from a range of geoscience specialisations that reflects their diversity. Consideration will also be given to the application of new technologies to shallow geohazard characterisation and monitoring for the development of forecasting capability.

Figure 1: The A83 at *Rest and Be Thankful*, 2018

Evening Lecture: Pterodactyls of the Sahara Desert

4th June 2021

By: Prof David Martill School of the Environment, Geography & Geosciences, University of Portsmouth

This talk examines the pterosaur assemblage of an ancient river system represented by the famous Kem Kem Group strata of south eastern Morocco, and summarises the discoveries of an international team of scientists working for more than a decade in the Tafilalt border regions of Morocco and Algeria. Achievements of the team include the discovery of eight genera of pterosaurs and they have excavated the most complete skeleton of the aquatic dinosaur *Spinosaurus*.

The Cretaceous Kem Kem Group strata have become famous for the iconic theropod dinosaur *Spinosaurus*, victim of World War II and star of Jurassic Park 3!, as well as giant sauropods, crocodiles, turtles, saw sharks and bony fishes. The huge size of much of the assemblage has led to the Kem Kem Group being named the River of Giants. The abundance of fossils, especially the teeth of dinosaur has resulted in a thriving fossil trade and a proliferation of fossil mines spread across more than 200km of outcrop from Zguilma in the south to Tadighoust at the foot of the Atlas Mountains in the north, with vertebrate fossils plentiful along the entire outcrop.

Figure 1: A fossil mine in the Kem Kem Group at Begaa, SE Morocco

Figure 2: A typical tagine-hill landscape of Kem Kem Group capped by Akrabou Formation (Turonian) limestone.

Pterosaur remains in the Kem Kem have revealed a diverse assemblage of forms, from tiny juvenile individuals to considerable giants with wingspans of 6 or more metres. Both toothed forms and edentulous pterosaurs are present, with isolated teeth of ornithocheirids being the most frequently occurring remains. Skeletal remains are dominated by the toothless azhdarchids and more rarely tapejarids and possible chaoyangopterids. The ornithocheirids share similarities with pterosaurs from the Cambridge Greensand of the UK, and include forms such as *Coloborhynchus*, *Anhanguera* and *Ornithocheirus*, but endemic forms, such as *Siroccopteryx* also occur. Presently, the edentulous pterosaurs all seem to be endemic, and include A*frotapejara, Alanqa, Apatorhamphus, Leptostomia*, and *Xericeps*.

The nature of the pterosaur assemblage is highly unusual. Skeletal remains of edentulous pterosaurs are considerably more common than those of the tooth-bearing ornithocheirids. Of these skeletal remains, by far the commonest elements are the tips of the jaws of both the edentulous and tooth-bearing forms. Not a single specimen has been found of the rear of the skull, and neither have any wrist bones been found… the latter likely the strongest element of the entire skeleton. Reasons for the strange bias of skeletal elements are unknown, but I will speculate why this might be.

The Kem Kem pterosaur fauna is unique in Africa, and has the highest diversity of any pterosaur locality for the entire continent. Despite the fragmentary nature of the material, its three-dimensional preservation makes it some of the best preserved material known.

Figure 3: Palaeoartist Davida Bonadonna's restoration of *Alanqa saharica* flying overs an abandoned channel of the Kem Kem river system