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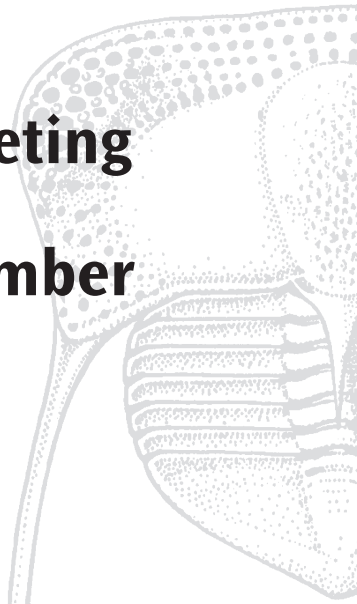

PROGRAMME, ABSTRACTS and AGM papers

the present continental subsurface biomass, based on the latest cell counts and models of crustal groundwater distribution, with implications for biomass distribution through Earth's history; and preliminary results from a new model of H_2 production by mineral radioactivity, an important subsurface energy source.

Phylogeny and origin of Giraffidae based on characters of the bony labyrinth

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The living family Giraffidae with its two genera *Giraffa* and *Okapia* has a long evolutionary history spanning most of the last 15 Ma. The family is known from a plethora of fossil taxa across the whole Old World from Eurasia to Africa. Giraffes are the only ruminants to bear two to five epiphyseal permanent cranial appendages, the ossicones. A further characteristic of the family is the presence of a bilobed lower canine which is widely used to diagnose extinct members. Despite this apparent wealth of data, little is known as to the origin of Giraffidae. A number of taxa bearing ossicone-like cranial appendages, such as the Palaeomerycidae and their North American relatives the Dromomerycinae, or branched or flattened cranial appendages such as the Climacoceratidae, have been variously related to giraffids, but without any consensus. We ran a preliminary cladistics analysis based on the bony labyrinth of Giraffidae and the above-mentioned problematic fossil taxa. It showed that the bony labyrinth is a powerful structure for the phylogeny of ruminants. Some morphological characteristics (cochlear morphology and orientation of the vestibular aqueduct) are unique to Giraffidae among the ruminants and give insights into the phylogeny and origin of this iconic group.

Plesiosaur remains from the Lower Jurassic part of the Kap Stewart Formation, Jameson Land, East Greenland – evidence of the earliest marine incursion

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Two dorsal vertebrae and one dorsal rib were collected at a mountain ridge in the Kap Stewart Formation at Carlsberg Fjord, near Lepidopteris Elv, at Jameson Land, East Greenland, during the 2012 and 2016 Geocenter Møns Klint Dinosaur Expeditions. The Kap Stewart Formation is Rhaetian to Sinemurian in age, and the bones were found in the middle of the Formation, corresponding to the Hettangian part of the Formation. The collected bones show clear plesiosaur affinities: amphicoelous centra, paired ventral nutritive foramina in the centrum, unfused neurocentral sutures and single headed ribs. The diameter of the centra is 2 cm indicating a small-sized individual. Plesiosaurs are exclusively marine animals and this find represents the first undoubtedly marine vertebrate, in contrast to previous records of hybodont sharks and turtles in the synrift Mesozoic

deposits in Greenland, and witnesses the earliest stages of the opening of the North Atlantic at 44° palaeolatitude.

The fish and the Fishclay – an old story revealed

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The famous K-Pg boundary strata at the UNESCO World Heritage Site, Stevns Klint, eastern Denmark is composed of a thin clay layer called the Fishclay. Despite the name, to date only one partly-articulated fish skeleton is known to have been recovered from the Fishclay; however, scales and singular skeletal elements are quite common. The specimen in question consists of a partially-preserved articulated skeleton of a probable Berycoid fish. Unfortunately, the head and tail with the prime diagnostic characters are missing, preventing a more specific identification. This study traces the origins of the Fishclay name and boundary strata from the very first description of Stevns Klint in 1759 by Abilgaard to the first occurrence of the name Fishclay in 1849 by Forchhammer. Interestingly, the same paper that introduced the name Fishclay also very briefly mentioned the existence of a partially preserved articulated skeleton of a small fish, the fish skeleton that has proven to be the only one known to exist from the Fishclay!

Tiering and competition in Mistaken Point Ediacaran communities

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Bedding-plane assemblages of Ediacaran fossils at Mistaken Point, Newfoundland (~565 Ma), are among the oldest known examples of macroscopic communities. These immobile organisms are preserved *in situ*, allowing spatial analyses to shed light on organism ecology. Competition for vertical space has been suggested to be the primary community structuring mechanism resulting in different taxa occupying different parts of the water column, known as tiering. The community structure of the four most diverse Mistaken Point communities ('D', 'E', 'G' and Lower Mistaken Point (LMP) surfaces) was examined using a combination of spatial analyses incorporating morphological variables and tiering metrics. Spatial analyses offer a way to identify inter- and intra-specific segregation, enabling resolution of the magnitude and type of competition. Tiering was quantified in terms of the overlap of specimen height. We found that tiering overlap decreases from the D to G to E to LMP surfaces but instances of large-scale spatial segregation become more frequent, suggesting an increase in the extent of resource competition. Additionally, specimens with larger discs are more strongly segregated than tall specimens despite occupying different vertical tiers. These findings suggest that competition for laterally-distributed resources played a major or even dominant role in structuring these ancient communities.