Freies Thema

Badenian planktonic foraminifera as climate proxies at the southern margin of the Central Paratethys (Ugljevik, Bosnia and Herzegovina)

Dörte Theobalt[1, 2] & Oleg Mandic[2]

Badenian transgression is well exposed in the open coal pit Bogutovo Selo near Ugljevik in NE Bosnia and Herzegovina, located at the southern margin of the Pannonian Basin. Middle Miocene marine sediments superpose Oligocene lignite bearing lacustrine deposits. The measured succession is about 60 m thick and includes the uppermost part of the lake deposits, comprising clays, sands and coal seams, followed by marine sediments. These consist mainly of gray marls, which show some intercalations of thin, dark clay layers, volcanic ash layers and fossiliferous beds as well as few carbonate bodies of different thicknesses. The presence of *Orbulina suturalis* allows a biostratigraphic correlation of the marine transgression horizon with the upper part of the Lower Badenian.

A quantitative analysis has been carried out on planktonic foraminifera to evaluate the climate conditions and their change during initial marine flooding by the Paratethys Sea. 17 planktonic foraminiferal species were grouped in cool (*Globigerina praebulloides, Globigerina bulloides, Globigerina diplostoma, Globigerina concinna, Globigerina falconensis, Globigerina tarchanensis, Turborotalita quinqueloba*), temperate (*Globorotalia transsylvanica, Globorotalia bykovae, Globoturborotalita woodi, Globoturborotalita druryi*), warm-temperate (*Tenuitellinata angustiumbilicata, Globigerinella regularis*) and warm indices (*Globigerinoides trilobatus, Globigerinoides quadrilobatus, Orbulina suturalis, Globoquadrina* cf. *altispira*). The preliminary results indicating changes in composition of planktonic foraminiferal fauna along the succession make it possible to recognize a climatic change from cooler conditions at the very base of the section over following warmer conditions in its lower part and middle part towards cooler conditions at the top again. Alternatively the changes in faunal compositional could also reflect the sea-level change during initial Badenian marine flooding pulse.

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Freies Thema

Palaeo-wildfires in the Late Jurassic (Kimmeridgian) of Western and Central Europe – Taphonomy and palaeoenvironmental significance

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Although fossil charcoal, as direct evidence of palaeowildfires, occurs in the fossil record at least since the Late Silurian it is not equally distributed in sedimentary rocks from different ages. As the occurrence of wildfires is indeed not only controlled by climatic and environmental parameters, but also by the concentration of atmospheric oxygen, it has been argued by various authors that the fossil record of charcoal must also be influenced by (long term) variations in atmospheric oxygen concentrations. Geochemical models reconstructed low oxygen concentrations during almost the entire Jurassic, resulting, at least theoretically, in very low fire frequencies during this period.

Here we describe new discoveries of fossil charcoals from two Late Jurassic (Kimmeridgian) localities in Western (Boulonnais area in N-France) and Central Europe (Nusplingen limestone Fossil-Lagerstätte in SW-Germany). Combining our new data with the so far known, rather scarce data about the occurrence of charcoals during this particular interval of time demonstrates that all of these occurrences lie either within a Late Jurassic winter-wet climate belt, characterised by a marked seasonality, or within the assumedly drier part of a temperate climate belt, near the boundaries to the winter-wet climate belt. This is somewhat surprising as the preservational potential of charcoal is generally considered to be rather low under comparable climatic conditions, although charcoal production is usually high under seasonally dry climatic conditions. As almost all Kimmeridgian charcoals discovered so far come from marine sediments it seems likely that taphonomic factors may have favoured the preservation of charcoal in such environments.

Considering all data and interpretations it seems possible that on a global scale fire frequencies were low during the Kimmeridgian due to relatively low atmospheric oxygen conditions during this period. Only in areas with a pronounced seasonality (i.e. under a winter-wet climate) fires occurred frequently enough to produce a certain amount of charcoal and this charcoal has only been preserved under favourable conditions in marine sediments or in peat bogs with relatively high fire frequencies.

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Freies Thema

On the origin of manatees: a still speculative history?!

Manja Voss[1]

The genus *Trichechus* known from the Pliocene to Recent is represented by three taxa inhabiting the coastal rivers and estuarines to both sides of the Atlantic. Whereas the West Indian manatee (*Trichechus manatus*) and the West African manatees (*Trichechus senegalensis*) occur in both marine and freshwater environments, the smallest of all Sirenia, the Amazon manatee (*Trichechus inunguis*), is restricted to the freshwater systems of the Amazonian basin. Within the Trichechidae, the manatees belong to the subfamily Trichechinae, whose earliest member is probably *Potamosiren* from the middle Miocene of Columbia. This sea cow still has three molars lacking the continuous horizontal tooth replacement specific for the later Trichechinae. This indicates that aquatic plants belonging to the true grasses and constituting the principal diet of trichechines had not yet become an important part of *Potamosiren*'s diet.
The evolution of supernumerary molars horizontally replaced throughout life appears in *Ribodon* from the Mio-Pliocene of Argentina for the first time. This type of tooth replacement is understood as an adaptation to feed on silicate-rich and therefore abrasive sea grasses in South American rivers caused by the late Miocene uplift of the Andean orogeny. It is assumed that this process has stimulated the growth of aquatic macrophytes and, subsequently, the evolution of the manatees. Whereas the fork-tailed dugongines as seagrass specialists died out in this region, the manatees are more adapted to floating or emergent and submerged aquatic plants.
According to phylogenetic studies, the clade Trichechidae is expanded to include also the members of the previous subfamily Miosireninae, *Anomotherium* from the late Oligocene of Westphalia (Germany), and *Miosiren* from the early Miocene of Belgium. These taxa are supposed to be aberrant in their diet compared to all other Sirenia in possessing heavily reinforced palates possibly adapted to shellfish-crushing. Their diet would be consistent with their comparatively high-latitude occurrence in northwestern Europe, where they might have compensated seasonal deficiencies of nutrients in the available sea-grasses. The closer relationship between the Miosireninae and Trichechinae is also well supported in the cladistic analysis presented here. Differences to hitherto published hypotheses refer to the interrelationships of the manatees indicating a more recent ancestor for the West Indian and Amazon manatee than supporting a sister grouping of the West Indian with the West African manatee. However, the main discrepancies of the herein presented data to previous studies concern the origin of the trichechids. Currently, this clade is assumed either to have been derived from late Eocene or early Oligocene dugongids or from protosirenids. However, this study reveals a more recent origin, which corresponds well with their evolution primarily in South America.

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Paläobotanik und Palynologie

Green food through time

Torsten Wappler[1]

Pflanzen und Insekten haben im Lauf der Evolution eine überaus große Formenvielfalt entwickelt. Älteste Nachweise reichen weit bis in das früheste Erdaltertum zurück. Beide Gruppen bilden hinsichtlich ihrer Artenzahlen zusammen ca. 75% des heute existierenden Artenreichtums. Vor allem die engen biologischen Beziehungen zwischen Pflanzen und Insekten haben sich als wichtiger „Motor" für den enormen Artenreichtum heutiger terrestrischer Ökosysteme herausgestellt. Das Funktionieren von Pflanzen-Insekten Interaktionen ist für die langzeitliche Erhaltung der Biodiversität in jedem Ökosystem von großer Wichtigkeit. Deshalb ist das Verstehen, aber auch die Erfassung der zeitlichen Entwicklung von Pflanzen-