Dinosaurierfährten (Ornithopoda) der norddeutschen Wealden-Fazies (Berriasium, Bückeberg-Formation) von Obernkirchen (Niedersachsen)

Annina Böhme[1, 2], T. van der Lubbe[3], A. Richter[3], M. Wiggenhagen[4] & U. Stratmann[3]

Vor kurzem (2009) berichteten wir von neuartigen parallel verlaufenden Dinosaurierfährten von fakultativ bipeden Ornithopoden eines noch unbeschriebenen Morphotyps in *Iguanodontipus*- bzw. *Caririchnium*-ähnlicher Ausprägung aus dem obersten Bereich (der sogenannten „oberen Sohle") der Obernkirchener Sandsteinbrüche. Der dort aufgeschlossene Dinosaurierfährten führende Obernkirchen-Sandstein repräsentiert einen limnisch-deltaischen Faziesbereich am Südrand des Niedersächsischen Beckens vor etwa 143 Mio. Jahren.

Nach einer Fährtenflächenerweiterung in 2010 konnten letztendlich an die 4500 m² der o.g. „oberen Sohle" für die Öffentlichkeit erschlossen werden. Davon sind zwar noch etwa 1200 m² von gering mächtigen Sandsteinlagen bedeckt, die ebenfalls Dinosaurierfährten führen, diese sollen aber ggf. nach erfolgter wissenschaftlicher Dokumentation sukzessive abgetragen werden. Bisher wurde für etwa 2000 m² der "oberen Sohle" mittels hochauflösender Digitalphotos und entsprechender photogrammetrischer Methoden eine referenzierte Fährtenkarte erstellt und 175 Trittsiegel vermessen.

Für die ersten 2000 m² der „oberen Sohle" lassen sich bezüglich des o.g. neuen Fährtentyps im Wesentlichen folgende Aussagen treffen: Etwa 30 Individuen hinterließen Fährtenzüge mit insgesamt über 400 Trittsiegeln. Zwei Gruppen von Tieren mit jeweils über 10 Individuen liefen in Richtung NW/N bzw. SE/S und zwei Individuen querten in Richtung NE bzw. E. Der längste Fährtenzug besteht aus 41 Trittsiegeln. Die Größe der Hinterfuß-Abdrücke variiert von 30 bis 60 cm in der Breite und von 34 bis 61 cm in der Länge (n = 152), die Größe der Vorderfuß-Abdrücke reicht von 7 bis 14 cm in der Breite und von 11 bis 21 cm in der Länge (n = 15) Die einfache Schrittlänge beträgt 52 bis 129 cm (n = 149), die doppelte Schrittlänge 132 bis 250 cm (n = 137).

Insgesamt konnten auf den bisher dokumentierten 2000 m² mehr als 700 Trittsiegel gezählt werden, die neben Ornithopoden-Fährten vom neuen Fährtentyp auch Ornithopoden-Fährten vom Typ „*Iguanodontipus*" und einige wenige Theropoden-Fährten beinhalten.

[1] Geowissenschaftliches Zentrum, Abt. Geobiologie, Georg-August-Universität Göttingen, Goldschmidtstr. 3, D-37077 Göttingen

[2] Geowissenschaftliches Museum, Georg-August-Universität Göttingen, Goldschmidtstr. 1-5, D-37077 Göttingen, e-mail: aboehme@gwdg.de

[3] Niedersächsisches Landesmuseum Hannover, Willy-Brandt-Allee 5, D-30169 Hannover

[4] Institut für Photogrammetrie und GeoInformation, Gottfried Wilhelm Leibniz Universität Hannover, Nienburger Str. 1, D-30167 Hannover

Paleogene fish otoliths (Teleostei) from the Sub-Silesian and Ždánice units in Moravia

Rostislav Brzobohatý[1] & M. Bubík[2]

Oligocene otolith assemblages from the deposits of the Subsilesian Unit are reported for the first time. The otoliths representing 12 teleostean taxa were obtained from the Dynów Marlstone (Hluchová section) of the Menilite Formation and from the Ženklava Formation („Na Pasekách" section) in vicinity of Bystřice nad Olší. Otoliths from the Hluchová section are well preserved. Except the presence of extinct genus *Palaeogadus,* the assemblage consists solely of deep-water taxa. It is interpreted as in-situ assemblage of mesopelagial habitat. The similarity with a deep-water component of the Pouzdřany Marl and the presence of the „g. *Phosichthyidarum*" *triquetrus* allow the correlation with the Lower Oligocene. Moreover, 50 % of the taxa from the Hluchová section occur also in the Lower Oligocene Ranzano Formation (North Italy), with more diversified deep-water teleostean fauna. The paleobathymetric nature of the Hluchová otoliths corresponds with the IPM 1 ecostratigraphic Zone (skeletons of fishes) of the Polish Outer Carpathians including Jamna Dolina, Kotów and Dynów members (= Zone NP 22 and lowermost NP 23). Besides the otoliths, the sandy mudstone of this section contains deep-water bivalves, gastropods and foraminifers redeposited perhaps from the shallower habitats of the outer shelf.

Otoliths of the „Na Pasekách" section are poorly preserved, corroded, possibly reworked from older deposits (?Eocene). No Late Oligocene-Early Miocene taxa were found what indicates older age of the Ženklava Formation erroneously described as an analogue of the Krosno Formation in the Sub-Silesian Unit. Foraminiferal fauna is Late Eocene-Early Oligocene in age, containing reworked Early and Middle Eocene taxa. Also small macrofauna indicates massive reworking from shelf to upper slope depths. A paleomediterranean deep-water fish fauna with an oceanic character, strictly different at generic or higher levels from the present-day Mediterranean, lived in the Ždánice and Subsilesian sedimentary area. Cutthroat eels

(Synaphobranchidae) found in the Ženklava Formation (Na Pasekách Section, Subsilesian Unit) are the first fossil finds of this family.

[1] Department of Geological Sciences, Masaryk University, Kotlářská 2, 61137 Brno, Czech Republic; e-mail: rosta@sci.muni.cz

[2] Czech Geological Survey, Leitnerova 22, 60200 Brno, Czech Republic; e-mail: miroslav.bubik@geology.cz

A record of drilling predation and other biotic traces from larger benthic foraminifera of Eocene strata of Kutch, Western India

Devapriya Chattopadhyay[1], Deepjay Sarkar[2], Subhendu Bardhan[3], Sumanta Mallick[3] & Shiladri Das[4]

Biotic traces in invertebrate fossils are of special interest to paleontologists since it provides important clue to understand the evolution of biotic interaction through time. The two main types of biotic interaction that has a negative effect on one of the participating group are predation and parasitism. While record of predation is rare, record of drilling predation often get preserved in the fossils and therefore studied by paleobiologists. The most common reports of occurrence of such predation are from Recent and fossil molluscs. It has been claimed that during Cenozoic, molluscs became the main targeted prey and hence other invertebrate taxa virtually escaped the drilling predation. However, the incidence of drilling predation in other non-molluscan prey taxa from Cenozoic is critical to evaluate this claim. Here we are reporting various biotic traces including predatory drillholes from a non-molluscan group, foraminifera of Eocene time.

We have observed various biotic traces in the larger benthic foraminifera of Eocene age from Kutch, Western India. The biotic traces found in the foraminifera population are mainly of two types, predatory drill holes and substrate boring. Both of the traces are highly non-random in terms of species and size selectivity. Out of six main foraminifera species found in that Eocene strata, two are particularly common, namely *Nummulites obtusus* and *Discocyclina sowerbyi*. Out of these two predominant groups, *N. obtusus* is quite heavily preyed upon (18 %) where as the other group is virtually unaffected (1.1%) by predation. Among *N. obtusus* population the larger size class has the highest incidence of predation. The position of the predatory drill holes is distributed non-randomly and indicative of stereotypic behavior of the predator. After observing drilled pattern, we suggest that the drilling predator is probably juvenile naticid gastropods. The reason behind the prey preference is most likely the relative difficulty in handling the saddle shaped *Discocyclina sowerbyi* prior to drilling. In contrast, *N. obtusus* has a very smooth disc shape that makes it easy victim of drilling attacks. Similar preference is observed for substrate borings, where its presence is nonexistent in *D. sowerbyi* in contrast to a 28% occurrence in *N. obtusus*. This difference, although hard to explain, could be related to the difference in available symbiotic algae in the surface of the tests of different species. Often the substrate borers target the symbiotic algae of the foraminifera test and preferential abundance of these algal populations in some groups could make them more attractive for the substrate borers.

[1] IISER-Kolkata, India

[2] ISM-Dhanbad, India

[3] Jadavpur University, Kolkata, India

[4] ISI-Kolkata, India

An age model for the Lutetian to Priabonian beds of Adelholzen (Helvetic Unit, Bavaria, Germany)

Stjepan Ćorić[1], Holger Gebhardt[1], Antonino Briguglio[2], Robert Darga[3], Nils Andersen[4], Bettina Schenk[1], Erik Wolfgring[2] & Winfried Werner[5]

The 18 m thick Adelholzen Section, located southwest of Siegsdorf in southern Bavaria, Germany is part of the Helvetic (tectonic) Unit and comprises six lithologic units: 1) marly, glauconitic sands with predominantly *Assilina*, 2) marly bioclastic sands with predominantly *Nummulites*, 3) glauconitic sands, 4) marls with *Discocyclina*, 5) marly brown sand (units 1-5 „Adelholzener Schichten" or Kressenberg Formation), and 6) Stockletten (marls without established formal name).

The Adelholzen-Section is rich in planktic foraminifera. Reworked specimens from older deposits commonly occur, whereas most zonal markers were not found within the investigated samples; other potential index species show a rather sporadic occurrence instead of a continuous record. Consequently, our age model is based mainly on calcareous nannofossils and nummulitids and one zonal