

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

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

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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 %) whereas 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.

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

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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

boundary only is based on planktic foraminifera. All investigated sediments contain very rich and well preserved calcareous nannoplankton assemblages, dominated by reticulofenestrads. All samples are characterized by low percentages of reworked taxa. Quantitative analyses were used to refine our age model.

Unit 1 (*Assilina*-sand) contains the transition from the uppermost Shallow Benthic Zone (SBZ) 13 (late early Lutetian) to SBZ 14. Accordingly, calcareous Nannoplankton Zone NP15 is indicated by the nannofossils assemblages and the investigated planktonic foraminifera point to zones P10 (E8) to P11 (E9). The micro- and nannofossil assemblages as well as the larger benthic foraminifera fauna of units 2 (*Nummulites*-sand) and 3 (glauconitic sand) indicate a middle Lutetian age (NP15, P11 (E9), and SBZ 14 and 15 p.p.). Unit 4 (*Discocyclina*-marls) is of late Lutetian age, indicated by SBZ 15, NP15, and P12. The planktic foraminifera boundary E10 to E11 was found in the uppermost part of this unit. Unit 5 (brown sand) also belongs to the late Lutetian (SBZ15, NP16, P12 (E11)). The Stockletten (unit 6) did not yield larger foraminifera anymore and spans a wider biostratigraphic range (NP16 to NP20, corresponding to upper P12 (E11) to P15/16 (E15)). However, Zone NP 17 is missing and we therefore assume a stratigraphic gap (at least 3 Ma) in the lower part of the exposed Stockletten. This assumption is supported by the almost complete disappearance of acarinids (planktic foraminifera) in the overlying strata, pointing to a strong change in paleoceanography.

A prominent decrease in bulk rock $\delta^{18}\text{O}$ -values indicates a climatic optimum prior to the Mid-Eocene Climatic Optimum-Event (MECO) around the brown sand (unit 5) and largely confirms our biostratigraphic zonation. The $\delta^{13}\text{C}$ -curve shows characteristic patterns, which could be directly related to the global carbon isotope record and helped to refine our age model. The overall sediment-accumulation rate was at least 1.8 mm/Ky.

Lack of first and last occurrences, evidence of stratigraphic gaps, and reworked planktic foraminifera specimens complicate the construction of a consistent biostratigraphic framework. As reported from other sections elsewhere, planktic foraminifera, calcareous nannoplankton and larger benthic zonations did not always correlate well with established zonal schemes. Application of independent approaches however enabled us to overcome these difficulties.

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Auf den Spuren von Deecke, Jaekel, Weigelt & Co. – „Bestandsaufnahme alter Sammlungen am Beispiel der Paläobotanischen Sammlung des Institutes für Geographie und Geologie der Universität Greifswald“

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Die Sammlungsarbeit wird in die Lehre einbezogen, hierzu liefen schon sehr erfolgreich verschiedene Praktika sowie Bachelor- und Masterarbeiten. Aufgrund des breiten Spektrums an Themengebieten sind die Interessenten zahlreich. In diesem Semester beschäftigten sich die Teilnehmer (Autoren) der Lehrveranstaltung „Laborpraktikum“ mit der Paläobotanischen Sammlung. Das Ziel war eine erste Bestandsaufnahme der völlig brach liegenden Sammlung. Die Sammlung wurde komplett gesichtet, gesäubert, teilweise umsortiert und als Datenbank erfasst. Für die weitere Bearbeitung der Sammlung werden diese