Insekten Assoziationen von großer Bedeutung, da diese Beziehungen auch einen Schlüssel für ein nachhaltiges Management heutiger Ökosysteme darstellen, insbesondere vor dem Hintergrund der umwälzenden Veränderungen der Geo- und Biosphäre durch menschliche Eingriffe. Nur in ehemaligen, ungestörten Ökosystemen finden sich diese Interaktionen in ihrer weitgehend ursprünglichen Form. Analysen von Insekten-Pflanzen Interaktionen auf der Grundlage von fossilem Pflanzenmaterial wurden bislang kaum in der Erforschung der Biodiversitätsdynamik genutzt. Dies gilt insbesondere für die reichen tertiären Pflanzenvorkommen in Europa, für die bisher nur vereinzelte Untersuchungen vorlagen. Dabei kann die Erfassung derartiger Interaktionen anhand von Fossilmaterial präzise Daten für das Alter und vor allem das Ausmaß der Spezialisierung von koevolutiven Beziehungen zwischen Pflanzen und Insekten liefern und damit wichtige Eckdaten zur Bedeutung der Koevolution für die Entwicklung der Diversität beisteuern. Hierbei ist die quantitative Paläo-Ökosystemrekonstruktion auf qualitativ hochwertige Daten angewiesen und gerade hier bieten die mitteleuropäischen Fossilfundstellen eine hervorragende Grundlage und erlauben einen recht detailierten Einblick in terrestrische Ökosysteme. Sie werden seit Jahren intensiv erforscht und liefern dadurch günstigste Voraussetzungen, um Fragen der Dynamik von Ökosystemen und dem Wandel der Biodiversität nachzugehen. Für alle untersuchten Zeitabschnitte wurden neue, hochwertige Datensätze erstellt.
Die gewählten Fundpunkte decken dabei einen zeitlichen Rahmen von rund 40 Ma und eine geographischen Rahmen von 78° bis 45° nördlicher Breite ab. Zudem erlauben die überlieferten Pflanzenfossilien Einblicke in verschiedenste Vegetationstypen, von polaren Sommerlaubwälder, bis hin zu einer immergrünen Regenwaldvegetation, mit extrem starken subtropisch-tropischen Einflüssen.

Steinmann Institute, University of Bonn, Nussallee 8, 53113 Bonn, Germany, e-mail: twappler@uni-bonn.de

Freies Thema

Unexpected biodiversity –Eocene ants from Grube Messel, Germany, in comparison with ants from Baltic amber

Sonja Wedmann[1] & G.M. Dlussky[2]

With a biodiversity that exceeds 14.000 species, ants (Hymenoptera, Formicidae) are the most successful group of social insects. In spite of many studies which have addressed the evolution, biodiversity and phylogeny of ants, the evolutionary course to today's diversity is still unclear. A study of ants from the fossil site Grube Messel, Germany, 47 myo, is able to shed light on diversification processes during the Eocene. About 75 specimens of poneromorph ants from Grube Messel were analysed, and three poneromorph subfamilies, several new genera and many new species could be detected. Only one extant poneromorph genus, *Pachycondyla*, seems to be present. Compared with the number of investigated fossil specimens, the diversity of poneromorph ants from Messel is unexpectedly high. Especially in comparison with the middle to late Eocene Baltic amber this high biodiversity is very conspicuous. In the amber, a significant lower portion of species could be assigned to poneromorph ants, and even compared in absolute numbers, fewer poneromorph species are known from Baltic amber than from Messel. These findings are discussed in the context of the ecology of poneromorph, formicomorph and myrmicomorph ants. The proportions of ant castes in the Baltic amber indicate that already during the Eocene, poneromorphs preferred to live in litter and soil, whereas formicomorphs probably preferably inhabited the arboreal realm. The "ponerine paradox" of being an old phylogenetic line with global distribution, yet having only a primitive social organization, is discussed with emphasis on the paleontological data basis. The timing and the dynamics of predominance of different subgroups of ants can be interpreted more precisely than before with the new available paleontological data.

[1] Senckenberg Forschungsinstitut und Naturmuseum, Forschungsstation Grube Messel, Markstraße 35, D-64409 Messel, Germany, e-mail: sonja.wedmann@senckenberg.de

[2] M.V. Lomonosov Moscow State University, Biological Faculty, Department of Evolution, Vorobjovy gory, 119992, Moscow, Russia, e-mail: dlusskye@mail.ru

Funktionsmorphologie von Wirbeltiergebissen

Morphologische Veränderungen der Occlusionsfläche in der Gattung *Myotragus*

Daniela E. Winkler[1], Ellen Schulz[2] & Thomas M. Kaiser[3]

The immediate interface between a mammal and its environment are teeth, which therefore are an excellent study object when questions of efficient foraging

strategies and functional optimization are considered. Dental adaptations directly reflect demands of forage and environment. The dwarf bovid genus *Myotragus* forms a plio-holocene chronospecies which is endemic to Majorca island (Mediterranean Sea). *Myotragus* is comprised of six successively dwarfing species (*M. palomboi, M. pepgonellae, M. antiquus, M. kopperi, M. batei* and *M. balearicus*) with unknown continental ancestor. We apply 3D dental occlusal topography and microtexture analysis (Scale-Sensitive Fractal Analysis (SSFA) and Dental Areal Surface Texture Analysis (DASTA)) on the upper second molar to reconstruct the diet and quantify small scale morphological adaptations. Furthermore we test for geographical dietary segregation in separated populations of the youngest species, *M. balearicus*. Occlusal surface models and high resolution surface texture models of dental facets are generated and analysed. The older *Myotragus* species, *M. pepgonellae*, *M. kopperi* and *M. batei* have significantly higher enamel/dentin ratios than the younger *M. balearicus*. This suggests a gradual evolutionary decrease of the dentin/enamel ratio. The length and surface of inner enamel ridges decreases within the *Myotragus* lineage. SSFA revealed decreasing surface complexity from *M. pepgonellae* over *M. kopperi* and *M. batei* to the younger *M. balearicus*. This is interpreted as to reflect the dietary shift from graze-dominated to browse-dominated diets. The maximum height of surface textures as well as the material volume (DASTA) decreases within the succession. This signature is indicating a dominance of soft and tough food items like browse in *M. balearicus*, while brittle and hard forage maintains a more elevated profile in the three older species. Within the two local populations of *M. balearicus*, no difference in occlusal topography or microtexture was found. Our results reflect an adaptation to energetic restrictions of an insular environment and reveal that either a dietary shift took place in the lineage or *Myotragus* successively adapted to increased intraspecific competition and expanded its dietary range.

[1] University of Hamburg, Biocenter Grindel and Zoological Museum, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany. E-mail: daniela.winkler@yahoo.co.uk

[2] University of Hamburg, Biocenter Grindel and Zoological Museum, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany. E-mail: ellen.schulz@uni-hamburg.de

[3] University of Hamburg, Biocenter Grindel and Zoological Museum, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany. E-mail: thomas.kaiser@uni-hamburg.de

Freies Thema

The murines of Kohfidisch (Burgenland, Austria) at a second glance – a comparative morphological study

Julia Wöger[1]

The Upper Miocene fossil locality of Kohfidisch, situated in the south of Burgenland, Austria was discovered in the mid 1950's. From this time onwards the cave and fissure system has been grubbed out in annual excavations for almost 30 years until the mid 1980's by two of the great palaeontologists of that time, Friedrich Bachmayer and Helmuth Zapfe. The fossil site yielded a multitude of different vertebrate and invertebrate taxa, for some of which it is the documented type locality. Among the most abundant forms where the murines, whose fossils amount to an estimated 1800 mandible and maxilla fragments and about 5500 isolated teeth. With the revision of these murine remains the occurrence of a third species *Progonomys* aff. *cathalai?* could be revealed in addition to the two already established ones, *Progonomys woelferi* and *Apodemus lugdunensis* c. *Progonomys* aff. *cathalai?* has not been documented for the site of Kohfidisch prior to this study and it is so far the only locality in Austria yielding this species. A morphological character analysis in combination with multivariate statistical methods was used to test for age differences in the different finding points within the cave and fissure system. Furthermore the stratigraphic position of Kohfidisch, compared to other Austrian Miocene vertebrate localities is discussed, using the concept of "stage-in-evolution" after de Bruijn et al. 1992 of the occurring murine species. Ultimately the provenance and evolution of the genera *Progonomys* and *Apodemus* in Austria is reviewed.

[1] Institut für Paläontologie, Universität Wien, Althahnstraße 14, 1090 Wien; email: julia.woeger@univie.ac.at