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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-

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.

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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.

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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