nourishment and they became the main trophic competitors to ochotonids and occupied the most favourable open biotopes.
At the Early Pleistocene all Pliocene ochotonid genera except the genus *Ochotona* which continues to exist. In total 35 extinct species of the genus *Ochotona* and in addition fossil records are known at least for 8 extant species. It is need to stress that during the Late Pleistocene the only one species *Ochotona pusilla* occupied vast plain territory of Eurasia from England, France, Italy in the west to the western shore of Lake Baikal in the east. The modern species of the genus *Ochotona* appeared at least at the end of the Middle – beginning of Late Pleistocene. At present time there are 30 extant species: 28 inhabit Asia, 2 North America and 1 Europe.

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Taphonomie und Paläoökologie

Diversitätsdynamik und Evolutionsmuster devonischer Bryozoen

Andrej Ernst[1]

Bryozoen waren eine wichtige Gruppe in benthischen Vergesellschaftungen des Devons, wobei sie eine nahezu globale Verbreitung in unterschiedlichen Biotopen aufwiesen. Das Ziel des DFG Projekts ER 278/4-1 u. 2 war eine umfassende Bearbeitung der Bryozoen aus Europa und Nordafrika.
Im Laufe dieser Arbeit entstand eine Datenbank über die Verbreitung devonischer Bryozoen im Untersuchungsgebiet, die 273 Arten von 112 Gattungen umfasste, von denen 65 Arten und 11 Gattungen neu sind. Des Weiteren, wurde diese Datenbank durch Literaturdaten ausgeweitet, um die globale Verbreitung und Diversitätsdynamik der Bryozoen im Devon zu untersuchen. Diese globale Datenbank zeigt die regionale und stratigraphische Verbreitung von 209 Gattungen, vorkommend in neun Zeitscheiben des Devons. Die Dauer der Zeitscheiben variiert von 3,5 bis 10,8 Ma, und beträgt im Durchschnitt 6,3 Ma. Die Auswertung dieser Daten zeigt, dass die Bryozoendiversität auf Gattungsniveau zwei deutliche Peaks hatte: im unteren Devon (Emsium) und im mittleren Devon (Eifelium). Im Rheinischen Schiefergebirge nahm die Bryozoendiversität bereits im Givetium erheblich ab, und das Minimum der Diversität ist im Frasnium zu verzeichnen. Das Massensterben im Frasnium wurde anscheinend durch einen Meeresanstieg verursacht. Im Devon erlebten die Bryozoen eine schnelle morphologische Diversifikation, welche die Radiation der Bryozoen im Emsium und Eifelium begünstigt hat. Diese Diversifikation weist zwei deutliche Trends auf: die Entwicklung von diversen Schutzvorrichtungen und die Verstärkung des Skeletts sowie komplexe interne Strukturen. Diese Entwicklungen wurden wahrscheinlich durch zwei Faktoren ausgelöst: Zunehmender Druck durch Räuber (Abgrasen) und Nahrungsknappheit. Gegen Abgrasen schützten sich die Bryozoen mit Entwicklung von unterschiedlichen Schutzstrukturen ihres Skeletts. Als mögliche Räuber könnten Fische und möglicherweise Nudibranchen auftreten. Im Devon wird auch ein Rückgang des Phytoplanktons postuliert („Phytoplankton blackout"), welcher vorwiegend die Nahrung der Bryozoen darstellt. Die Bryozoen reagierten mit Entwicklung von unterschiedlichen internen Strukturen, die möglicherweise einer verbesserten Nahrungsaufnahme dienten.

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Freies Thema

On the fossil record of chondrichthyan egg capsules

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Fossil chondrichthyan egg capsules have been known for more than 180 years, although the early findings were often misinterpreted as various plant organs like inflorescences or fructifications. Since the first discovery of these fossils our knowledge of their morphological and taphonomical variability, geographical and stratigraphical distribution, and potential producers has significantly advanced. Currently, seven morphotypes of fossil chondrichthyan egg capsules are discerned:
(1) *Palaeoxyris* Brongniart, 1828 (also known by its synonym *Spirangium*) has a three-fold division consisting of a fusiform body tapering gradually at one end into a pointed beak and at the other into a long and slender pedicle accompanied by spirally twisted membranous flanges (collarettes). Twenty-six valid species of Early Carboniferous to Late Cretaceous age have been described from predominantly freshwater to brackish deposits of Europe, Russia, Asia, Australia, and the USA. Hybodont sharks are considered to be the most probable producers.
(2) *Vetacapsula* Mackie, 1867 shows a three-fold division

similar to *Palaeoxyris* but is more bulb-shaped with longitudinal ribs on the surface. Twelve species are described from paralic strata of the Namurian–Westphalian B in Europe, Russia, and USA. The producer may belong to the Holocephali but this relationship is uncertain. (3) *Fayolia* Renault & Zeiller, 1884 is spirally twisted like *Palaeoxyris*, but differs due to a more cylindrical 'screw-like' shape and a collarette-parallel scar-line. The fossil record contains 16 species of Late Devonian to Middle Triassic age from predominantly freshwater successions of Europe, Central Asia, and the USA. Xenacanthid sharks are among the most likely producers. (4) *Scapellites* Pruvost, 1922 consists of spindle-shaped forms with roughly textured surfaces like a ball of wool. Two species are known from probable marine deposits of the Westphalian A–B in Belgium and Germany and its producers remain uncertain. (5) *Chimaerotheca* Brown, 1946 resembles Recent chimaeroid capsules and shows a central fusiform body accompanied by a rugose lateral web on the surface. 12 species are recorded from shallow marine strata of Germany, Russia, Iran, USA, and Canada ranging from Early Triassic to Oligocene in age. This type is referred to rhinochimaerids, chimaerids, and callorhynchids. A superficially chimaeroid capsule-like fossil from the Late Devonian of South Africa has been referred to placoderms bringing into question a phylogenetic relationship of the Holocephali to this group. (6) *Rajitheca* Steininger, 1966 is identical to modern batoid capsules with a square body and lateral pairs of horns, and is therefore referred to rays. Fossil capsules are assigned to three well-known and one unnamed species from Late Jurassic to Miocene, shallow marine deposits of France, Switzerland, Germany, and Hungary. (7) Capsules recently found in Late Eocene deep marine sediments of the USA are similar to those of modern scyliorhinids (catsharks).

The fossil record of egg capsules is a valuable data base that enables an analysis of the oviposition strategies of ancient sharks. An increasing number of studies suggest that some reproductive traits seen in modern forms (e.g., the occupation of nurseries) were acquired well before the advent of neoselachians.

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Freies Thema

Vertebrate diversity across the end-Permian extinction – separating biological and geological signals

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The greatest mass extinction in Earth's history at the end of the Permian had a major impact on ecosystem composition in the oceans and on land alike. The current study focuses on diversity patterns of Permian-Triassic terrestrial vertebrates at the regional scales of the South African Karoo Basin and the Russian fore-Ural region. Previous studies clearly established that specifically the diversity of synapsids, the dominant terrestrial tetrapods of their time, is significantly biased by heterogeneity in the Permian-Triassic terrestrial rock record. This has been demonstrated by revealing a positive correlation between taxonomic diversity estimates (TDEs) and varying sampling proxies: (1) number of formations and (2) outcrop area. Recently, these proxies have been criticized to be non-independent variables and (3) number of localities or (4) number of specimens has been suggested as more reliable proxies. In the present study, I tested the relevance of the latter proxies with respect to vertebrate diversity in South Africa and Russia. On these regional scales, log-transformed and generalized differenced TDEs of vertebrates at varying taxonomic levels are not significantly correlated with the number of localities or specimens for the complete time series. To eliminate the impact of the end-Permian extinction event, the earliest Triassic time intervals were excluded from all data series. Thereafter, vertebrate TDEs show statistically significant strong positive correlations with both the number of localities and specimens. Nonetheless, diversity residuals, resulting from modelled diversity estimates, exhibit clade-specific patterns with varying support for a mid-Permian event and strong support for an end-Permian extinction. The results imply that, although vertebrate diversity patterns in South Africa and Russia are at least partially biased by the Permian-Triassic terrestrial rock record, they still preserve genuine biological signals. Thus, despite the obvious bias, the end-Permian extinction maintains a major impact on vertebrate diversity and its role in shaping the composition and structure of terrestrial ecosystems remains unquestioned.

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