Virtuelle Paläontologie

Virtualisation of literature research through the Biodiversity Heritage Library for Europe

Henning Scholz[1)]

Literature research is the base for all scientific work in geology and palaeontology. Therefore, large and well-curated natural history libraries are a very important pre-requisite to carry out scientific projects efficiently. The library work, however, has several serious limitations that slow down the work significantly. The natural history library corpus is highly fragmented and scattered. In particular much of the early published literature is rare or is only available in a very few libraries. A lot of time and effort is involved to find and collect all scientific works that are necessary for a specific project. The virtualisation of literature research facilitates the search and retrieval of publications online and thus improves the efficiency of research. Several options ranging from virtual to digital libraries are realised by various projects and initiatives over the last years in order to support scientists in the natural history domain, including palaeontology.

Since 2009, the eContentplus project Biodiversity Heritage Library for Europe (BHL-Europe) is developing four different access routes to the biodiversity literature digitised by many European and global partners over the last years. With the Global References Index to Biodiversity (GRIB, http://grib.gbv.de/), BHL-Europe provided in collaboration with the EDIT project a union catalogue of library holdings of many European and US libraries. This will facilitate the search for literature, either digitised or not. This tool will also facilitate the management of digitisation projects all over world and collect scan request from the scientific community. For an effective access to already digitised literature, BHL-Europe is building a multilingual portal for the scientific community. This portal will also have functionalities to search for taxonomic names, for example. The backbone of this portal is a preservation and archive system built on a customised storage infrastructure housed by the Natural History Museum in London. We are currently collecting digitised literature from 27 different content providers on our servers, including all the content that is currently available through the BHL portal (http://www.biodiversitylibrary.org). We are also working on mirror solutions to mirror the European content to the global partners of the growing network of a Global BHL. Eventually, all the BHL-Europe will be available through the portals of the nodes in USA, China, Australia, Brazil, and Egypt. In order to serve also a broader audience, the digitised literature available by BHL-Europe is also accessible by Europeana, Europe's digital library, archive and museumEuropeana, the European digital library (http://www.europeana.eu/). Through Europeana, more content related to natural history topics is accessible as well, in particular non-literature items like images or paintings of collection objects.

In this talk I'm going to present the various options described above in more detail and highlight the functionalities of the virtual library solutions. As the BHL-Europe workshop during this conference is restricted to 20 participants only, this talk provide the opportunity for all attendees to get an overview of the BHL-Europe project and its achievements that are valuable for palaeontologists.

[1)] Museum für Naturkunde, Leibniz Institute for Research on Evolution and Biodiversity at the Humboldt University Berlin, Invalidenstraße 43, D-10115 Berlin, e-mail: henning.scholz@mfn-berlin.de

Freies Thema

Bryozoan records from the Little Ice Age (North Sea Shelf)

Joachim Scholz[1)], **Mary Spencer Jones**[2)] **& Franziksa Bitschofsky**[3)]

Until recently, bryozoans have not been used as indicators for changes in bottom communities or climate control in the North Sea Basin, despite a 300-year history of bryozoan collecting. In a previous study, the epizoobiontic bryozoan fauna of *Flustra foliacea* (Linnaeus, 1758) was analysed on 51 sample stations kept in four German museums. The samples cover the entire North Sea and different time periods (1776 – 2008, mainly the period of 1904/1905 compared to 1980 – 87). Cluster analysis shows a differentiation into a northern and a southern North Sea assemblage. The northern assemblage is characterized by *Amphiblestrum flemingii* (Busk, 1854), *Callopora dumerilii* (Audouin, 1826) and *Tricellaria ternata* (Ellis & Solander, 1786), while the southern North Sea is characterized by *Electra pilosa* (Linnaeus, 1767), *Crisia eburnea* (Linnaeus, 1758) and *Plagioecia patina* (Lamarck, 1816). Spatial separation approximately follows the 50 m depth contour. The temporal distribution patterns of bryozoans have been discussed in terms of NAO (North Atlantic Oscillation) and temperature variations.

The bryozoan record at the NHM dates back well into the Little Ice Age and extends the museum records in

German museums by about one hundred years into the past. The earliest specimen was collected by Samuel Dale (1659 – 1739). Once again, most of the early collections are represented by large herbarium specimens of Flustra foliacea, considered to be seaweed at that time. Many flustriids show dense encrustation by other epifaunal species and colonies. This makes older specimens from the 17th to the 19th century a valuable research infrastructure for studies on climate change, local extinctions and neozoan invasions through shipping.

Funding by the Synthesys Project GB-TAF-999 „Changes in the Epifauna of Flustra foliacea from British Coasts during 4 centuries" is gratefully acknowleged. Furthermore, our research is a contribution by the Biodiversity and Climate Research Centre (BiK-F) supported by the Initiative for the Development of Scientific and Economic Excellence (LOEWE) of the Federal State of Hessen, the SenckenbergNature Research Society (SGN), and Goethe University of Frankfurt am Main (GU).

[1] Forschungsinstitut und Naturmuseum Senckenberg, Sektion Marine Evertebraten III (Bryozoologie)Senckenberganlage 25, D-60325 Frankfurt Germany

[2] Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD UK

[3] Universität Rostock, Institute Biological Sciences / Marine Biology, Albert-Einstein-Straße 3, 18059 Rostock, Germany

Funktionmorphologie von Wirbeltiergebissen

Wear pattern analysis and functional morphology in dryolestid molars (Cladotheria, Mammalia)

Julia A. Schultz[1] & Thomas Martin[1]

Dryolestid mastication is characterized by embrasure shearing where the lower molars slide into the interdental spaces of the uppers. Due to the alignment in reversed triangles, the function of the mesio-distally compressed primary trigon and trigonid is mainly shearing. In addition, the sharp pairs of leading edges paracrista/protocristid and metacrista/paracristid act as cutting devices when sliding past. Striation analysis and virtual simulation of the chewing process demonstrated that the wear pattern of dryolestids differs significantly from that of the tribosphenic molars investigated. The lower molars of the dryolestids show distinctive exposure of dentine along the shearing edges protocristid and paracristid due to their thin enamel which is also the case in the uppers. A sloping of the mesial and distal exposed dentine fields that is typical for the dryolestid molars has not been observed in tribosphenic molars with thicker enamel. A correlation between mode of wear and enamel thickness exists, since thinner enamel is easier abraded during mastication. A maximum of occlusal contacts was observed at moderately worn molars. This reflects highest efficiency in this state of wear due to large shearing surfaces combined with long cutting edges for slicing hard exoskeletons of insects. The striae on the mesial and distal flanks of primary trigon and trigonid can be used to reconstruct the path of movement during mastication as they reflect the relative movement of the molars to each other. The lower molars of dryolestids are raised apically at an angle of about 45°, during their movement from buccal to lingual. The first occlusal contact during mastication occurs between the v-shaped shearing edge protocristid and the crescent antagonistic paracrista. Food items are trapped and compressed along the edges, the breakdown occurs when the two shearing edges slide past. The sliced pieces of food are transported in cervical direction. The unicuspid talonid of the lower molars with its buccally sloping hypoflexid groove has a guiding and shearing function. When the paracone slides along the groove, food items are sheared. Due to the direct contact with the paracone, the hypoflexid groove shows strong striations and fast exposure of dentine occurs. The dryolestid hypoflexid groove is homologous to the hypoflexid of the tribosphenic molar. In the studied tribosphenic molars the hypoflexid is variably inclined and less involved in the occlusal contacts. The parastylar wing mesial to the "primary trigon" of the upper dryolestid molars has additional guiding function during mastication. The linguo-bucally oriented striations that are located more apically on the shearing surfaces of the protoconid are more steeply inclined than the guiding groove of the hypoflexid. This indicates that the lower molar moves in two phases into occlusion during the chewing cycle: an initial puncture-crushing phase and a subsequent shearing phase before full centric occlusion. A grinding phase after centric occlusion as typical for tribosphenic molars does not occur in dryolestid molars. During the evolution of the talonid basin, the shearing area of the hypoflexid was displaced buccally and rotated in mesial direction. In combination with the formation of the talonid basin a functional shift in the chewing cycle from shearing to grinding occurred, and the hypoflexid lost its function as a main shearing area.

[1] Universität Bonn, Steinmann-Institut für Geologie, Mineralogie und Paläontologie, Nussallee 8, 53115 Bonn, Germany.