

## LATE ORDOVICIAN CALCIMICROBES AND GREEN-ALGAE FROM SPITI (HIMALAYAS, N-INDIA)

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Late Ordovician to late Early Silurian successions in Northern India are represented by sequences in Spiti at Takche, Gechang, Muth, Leo and in Kinnaur at Manchap. Already in 1912 REED, who studied a lot of paleozoic fossil taxa of the central Himalayas in detail mentioned the occurrence of calcareous green-algae from Spiti area. Further investigations related to carbonate buildups, microbial fabrics and algal remains were carried out by BHARGAVA & BASSI (1986) and KATO et al. (1987). Recently additional samples were collected for stratigraphical and (micro)facial investigations at the Pin section near Muth (SUTTNER, 2003). The Ordovician to Silurian sequence (280 m) is subdivided into 17 lithological units and consists of three main sedimentary cycles. Each cycle starts with siliciclastic deposits and grades into sandy to pure limestones. Due to the occurrence of *Amorphognathus ordovicicus*, the carbonates (units 7 to 13) are referred to the Ashgillian stage.

Cyanobacteria and algae are common constituents in limy parts of the section. Calcimicrobial remains belong the *Girvanella* Group (*Girvanella* cf. *problematicus* and *G. cf. tasmaniaensis*), *Renalcis* Group and the *Rothpletzella* (?) Group. Dasyclad green algae are represented by *Apidium indicum*, *Coelosphaeridium shianense*, *Vermiporella* and others. Fragments of solenoporacean red algae (*Solenopora* sp.) are very rare. Most carbonate beds consist of bioclastic pack- and grainstones grading into rud- and baffle- or framestones towards the top of each cycle. Generally, microfacial analyses point to shallow marine probably outer lagoonal settings of clear water conditions with small patches of bryozoan mounds and coral-stromatoporoid associations.

Abundance rates of Cyanobacteria, solenoporaceans and dasyclad algae point to about 40 to 50% photoautotrophic organisms within units 7, 8 and 11, and about 25% in units 9, 10 and 13. Cyanobacteria are often found as subglobular oncoids or as crusts on brachiopod shell fragments, trilobites, rugose corals or fractured branches of tree-like bryozoans. Representatives of the *Girvanella* Group first appear at the base of unit 7. They are generally quite abundant towards the top of unit 9. Occurrences of microbial clusters decrease from unit 10 to base of 13. *Vermiporella* and other erect algae reach a first maximum within the basal beds of unit 8. A second (subordinate) maximum is observed in unit 13. 'Algal blooms' are restricted to unit 11, a sequence of tempestitic layers with skeletal grains dominated by thalli of *Apidium indicum* and *Coelosphaeridium shianense*.

The upper part of the section (above unit 13) is assumed to be Lower Silurian in age. Probably the total lack of microbes and algae of this part of the section might be interpreted as a result of the major cooling event during the Late Ordovician that had not only affected the marine fauna but also the calcimicrobes and algae. - This abstract is a contribution to IGCP 503.

### References:

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## KOBRA, WARAN UND GECKO – IM BURGENLAND VOR 8,7 MIO JAHREN

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Aus der obermiozänen MN11 Fundstelle Kohfidisch (Pannonisches Becken) im Burgenland, Österreich, sind bereits diverse Wirbellose und Wirbeltiergruppen beschrieben worden.

Nach ihrer Entdeckung im Jahr 1955 durch den Gutsverwalter Sepp Wölfer veranstalteten Dr. Friedrich Bachmayer (Naturhistorisches Museum Wien) und Dr. Helmut Zapfe (Universität Wien) vom Jahr 1955 bis 1984 regelmäßig Grabungen. Die im Depot des Naturhistorischen Museums in Wien angelegte Sammlung wurde von meinen Kollegen und mir bereits in vergangenen Jahren in die einzelnen Gruppen: pflanzliche Reste; Wirbellose; Fische; Amphibia; Reptilia; Gruppen der Kleinsäugetiere; Gruppen der Großsäugetiere sortiert.

Diese Dissertation widmet sich der Herpetofauna mit Ausnahme der Schildkröten, welche sowohl Amphibia als auch Reptilia beinhaltet. Im Gesamten habe ich 55 319 Knochen (=Maximale Individuenzahl) aussortiert, vermessen, zugeordnet und gezählt. Die Minimale Individuenzahl beträgt MNI=2013. Amphibia setzen sich aus den Caudata: *Mioproteus caucasicus* (Proteidae); *Chelotriton paradoxus*, *Triturus (cristatus)* sp., *Triturus (vulgaris)* sp., *Triturus* sp. und Caudata indet. (Salamandridae) und den Anura: *Bombina cf. bombina*, *Latonia gigantea*, *Latonia ragei*, *Latonia* sp. (Discoglossidae); *Pelobates cf. cultripipes* (Pelobatidae); *Bufo bufo* (Bufonidae); *Hyla* sp. (Hylidae); *Rana (ridibunda)* sp. (Ranidae) und Anura indet. zusammen. Reptilia sind durch Lacertilia: Gekkonidae indet. (Gekkonidae); *Lacerta cf. viridis*, *Lacerta* sp. A, *Lacerta* sp. B, *Miolacerta tenuis*, *Edlartetia sansaniensis* (Lacertidae); Scincidae indet. (Scincidae); *Anguis fragilis*, *Pseudopus panonicus* (Anguidae); *Varanus cf. hofmanni* (Varanidae); Lacertilia indet. und die Serpentes: *Typhlops cf. grivensis* (Typhlopidae); *Elaphe kohfidischi*, *Coluber planicarinatus*, *Natrix longivertebra* (Colubridae); *Naja romani* (Elapidae) und *Vipera burgenlandica* (Viperidae) vertreten.

In Kohfidisch finden sich die interessantesten FODs (=first occurrence dates) der Taxa *Triturus (cristatus)* sp., *Bombina cf. bombina* (Amphibia), *Lacerta cf. viridis*, und *Anguis fragilis* (Reptilia). *Latonia ragei* (Amphibia), *Miolacerta tenuis*, *Edlartetia sansaniensis* und *Typhlops cf. grivensis* (Reptilia) zeigen ihre LODs (=last occurrence dates).

Die heutige Verbreitung der vorhandenen Taxa beziehungsweise ihrer engsten Verwandten zeigen gegenüber heute ein trockeneres und wärmeres obermiozänes Klima mit frostfreien Wintern an. In der generellen Klimaentwicklung des Ober Miozän Österreichs wird anhand der Herpetofaunen ein Wechsel zu größerer Trockenheit und höheren Temperaturen zwischen der obersten MN9 und der MN11 deutlich.

Ökologischen Überlegungen zufolge befanden sich die Höhle von Kohfidisch und ihr nahe gelegener, ruhender seichter See inmitten eines lichten und trockenen Waldes.