REMARKS ON PROBLEMS OF MESOZOIC MICROBIOSTRATIGRAPHY OF THE WESTERN CARPATHIANS

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Abstract: Some of the problems of the Western Carpathians Mesozoic microbiostratigraphy are established. The Triassic, Jurassic and Early Creatacous profiles are predominantly formed by limestones. Their microbiostratigraphy is mainly based on microfacial analysis (MIŠÍK 1966, BORZA 1969). Free foraminifers from limestones should be obtained by their long-term dissolution in weak acetic acid.

In the Late Cretaceous the main problem is the question of solution of Cenomanian-Turonian boundary (not recorded is the occurrence of anoxic event) and Campanian-Maastrichtian boundary and their comparison with these boundaries at the Tunisian profile El Kef (Hammam Mellegue).

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Key words: Mesozoic microbiostratigraphic problems, Cenomanian-Turonian, Campanian-Maastrichtian boundaries, Foraminifera, Western Carpathians and Tunisia.

TRIASSIC

The earliest Triassic, similarly as the Permian, is characterized by continental development. Throughout the Early Triassic (Mendrospira cheni Zone) transgression most probably took place very rapidly in a short section of time. This opinion would be supported by development of underlying lagoonal evaporite sediments known (BYSTRICKY, in SALAJ, BORZA, SAMUEL 1983) from the Slovak Karst (Kečovo-Silická Brezová-Plešivec) and proved by 2 boreholes at Smižany (SM-1, SM-2, MAHEĽ et VOZÁR 1973) from the Northern Gemeride syncline where a huge formation of evaporites obviously represents the passage of the latest Permian-earliest Triassic.

It is very probable that both areas were connected and a relatively large marine lagoon with hypersaline and evaporitie sedimentation was extending from the Silica Karst in direction to the Stratenská hornatina Mts. (probably through Geravy - Matka Božia to Muráň - Drienok and Vernár) as far as the area of Smižany. It is questionable whether dolomitic passages from this formation did not also originally contain marine fauna and/or microfauna, which in case of high

recrystalization could by documented by means cathodoluminiscence, a method, which has not been applied in investigation of carbonates in our country so far.

Another problem, which remains always open, is solution of Late Illyrian stratigraphy. As a consequence of deepening of sea in the time of the Parakellnerites Zone shallow-water Anisian forms of the genera *Meandrospira, Pilammina, Pilamminella* and representatives of the family Involunitidae almost completely vanished. Sporadical occurrences of dasycladal algae as *Diplopora anulatissima* and *Diplopora anulata* do not permit unambiguous stratigraphical attribution of the Late Illyrian, similarly as scarce occurrences of foraminifers.

Not completely solved is also microbiostratigraphy of the Middle Triassic Reifling, Pseudoreifling and Schreyeralm Limestones. The presence of abundant Nodosaroiid foraminifers and ostracodes from thin section material confirms that their sedimentation under condition of though-external, but not deep platform is concerned.

These would be necessary to obtain by dissolution in very diluted acetic acid for precise identification. Methodically it is pretentious (as long as 1 year). The obtained species, already sporadical from several localities (SALAJ, BORZA,SAMUEL 1983, SALAJ et JENDREJÁKOVÁ 1984), provides very good stratigraphic results. The knowledge,on biostratigraphy of obtained free foraminifers from the mentioned Middle Triassic limestones will be necessary to put into relation with conodont stratigraphy , similarly as carried out by SALAJ and PEVNÝ (1987) at the locality Zakázané.

It is also necessary to pay attention to the occurrence of miliolid foraminifers proved in several horizons in the Lunz Member and Hauptdolomit as well as layers of brecciated Megalodon horizons. These are rich in involute foraminifers (SALAJ, BORZA, SAMUEL 1983). Their study would contribute to new information on the paleoenvironment and improve interpretations about paleogeography of Carnian -Norian formations. For this purpose it would be suitable to subject to a detailed study (also by means of dissolution in highly diluted acetic acid) the facies of platform Hallstatt Limestones, relativelly rich in Nodosaroiid foraminifers as well as somewhat more shallower-water, but also platform type Aflenz Limestones. On the contrary the Furmanec and Dešťanky Limestones, which are scarce, have platform type Nodosaroid foraminifers, but mostly contain more shallower-water lagoonal foraminifers. So the common occurrence of the mentioned foraminifers would testify to normal salinity of the lagoonal environment. The existence of several horizons with dasycladal algae indicating sedimentation under condition of internal platform situated relatively near the coast would be testified by the presence of abundant intraclasts.

As to the facies of the Dachstein Limestones and Fatric Formation, so we have very good information on their biostratigraphy and paleogeography (MIŠÍK 1966, BORZA 1969, GAZDZICKI 1974 ; SALAJ, BORZA, SAMUEL 1983, MICHALÍK 1978, 1979) to which we also refer.

JURASSIC

TheTriassic-Jurassic boundary and Hettangian microbiostratigraphy are solved on the basisd of shallow-water miliolid foraminifers typical of the paleoenvironment of internal platform with abundant barrier zones. Rhaetian-Hettangian sediments, mainly of the Fatricum (GAZDZICKI 1978) very poor in foraminifers and often accompanied by hiatuses, originated here.

A distinctly shallow-water sediment from lagoonal marshes is the Hettangian „Gresten“ Formation of the Drietoma Unit with a larger of bony coal and laminae of black coal. These are a reflection of very humid paleoclimate, which obviously persisted more or less throughout the whole Liassic. Deeper Liassic sediments of the external platform in the facies of spotted limestones and marls with sponge spicules and radiolarian contain relatively abundant foraminifers, mainly from the family Nodosariidae. These are also present in layers of turbidity calcareous sandstones. The filling of these foraminifer tests is very often formed by iron oxides (Fe_2O_3). It is interesting that benthic foraminifers, including agglutinated ones, are missing here or scarcely represented only.

An ideal paleoenvironment suitable for rich development of calcareous as well as agglutinated foraminifers and ostracodes was in the Czorsztyn Unit, in the Lotharingian of the zone with Echioceras rarecostatum (BEGAN, HAŠKO, KYSELA, SALAJ , SAMUEL 1983) and in the Opalinum Beds in the area of the Vršatec klippes where they were established by the author. On the contrary, these are missing in the Murchisonae Beds (Czorsztyn Unit) with abundant layers of pelosiderites as well as in the so called „Posidonia“ Beds, for instance, of the Drietoma Unit of the Chotúč klippe. They are mainly formed by dark marls rich in scattered pyrite..

Generally in the facies of filamentous Bajocian-Bathonian limestones relativelly scarcely are also calcareous benthic foraminifers. These, however, including agglutinated ones, are missing in pelagic Callovian-Oxfordian limestones rich in Fe-oxides.

The Kimmeridgian Saccocoma Limestones and Tithonian Calpionella Limestones contain prevailingly only scarcely found foraminifers in thin section material.

CRETACEOUS

In the Berriasian-Barremian, with regard to the presencee of Carbonate facies with prevalence of calpionel biomicrite limestones, the problem of working out the microbiostraphy on the basis of foraminifers arose. Although these are sporadically present in material of thin sections, but free specimens can be obtained by the time-consuming method of slow dissolution in weak, 2-3%, mainly acetic acid.

The Albian - Middle Turonian microbiostratigraphy is worked out on the basis of the Tethyan type of planktic foraminifers. The absence of representatives of the genus *Whiteinella* from the Cenomanian-Turonian boundary as well as the absence of anoxic event, known this boundary in the Tethys realm, resulted is a specific development of the Western Carpathians region. A particular, more or less isolated Northern Tethyan branch (SALAJ and GAŠPARIKOVA 1983) formed, without development of Southern thermophillic benthic foraminifers, moreoverr, from the upper part of the middle Turonian to the end of the Coniacian in foraminifer asociations the influence of Boreal type microfaune was manifested (SALAJ and ŠTEMPROKOVÁ 2002).

Rapid inundation-turbidity sedimentation throughout the Albian-Santonian , as to the number of genera and species, resulted in a restricted and impoverished development of planktic foraminifers.

In the Albian-Early Cenomanian and Coniacian from benthic microfauna calcareous benthos, in the Late Cenomanian, Late Turonian and Santonian agglutinated foraminifers were predominating.

On the contrary, distinctly slowed down inundation-turbidity sedimentation in the Late Campanian and Maastrichtian in the Gosau type Cretaceous and Šebešťanová sequence (Klape Unit) and in the Hoštinná sequence (Drietoma unit) caused again a rich development not only of planktic, but also benthic, mainly calcareous foraminifers. These are essentially identical with type of foraminifers as we know from the Southern Tethyan realm (Tunisia, Libya). The problem is the absence of oceanic index species as *Radotruncana calcarata* (Cushman) and *Archaeoglobitruncana kefiana* (Salaj and Maamouri*).* The last named species together with *Pseudocossmaticera*s *brandti* (Redtenbacher) in Tunisia (SALAJ and WIEDMANN) determines the Maastrichtian base /or from orbitoidal foraminifers in the Western Carpathians *Orbitoides media gruenbachensis,* and/or in the Eastern Alp this species together with *Pseudokossmaticeras brandti* determines the Maastrichtian base.

Similarly it is also in the Northern Caucasus where the last named species together with *Nostoceras hyatti* determines the Maastrichtian base (ATABEKIAN 1995). On the contrary, according to ROBASZYNSKI (1999) these species determine the uppermost Campanian only.

Moreover, according to PREMOLI SILVA and SLITER (1994) and ROBASZYNSKI (1999) the species *Gansserina gansseri* (Bolli), a type species known from the stratotype only, is already found in the uppermost Campanian, below the Nostoceras hyatti Zone. It should be remarked that these species have never been found at the Campanian stratotype and/or hypostratotype.

At the Tunisia profile El Kef (Hammam Mellegue) the uppermost Campanian does not contain mentioned species.

We still complete that the locality Tercis (France) proposed as stratotype locality for the Campanian-Maastrichtian boundary (ODIN 1996). The species *Nostoceras hyatti* is found in the uppermost Campanian as well as lowermost Maastrichtian. Equally the species *Pachydiscus neubergicus* here is not present from the Maastrichtian base, but higher up, in the belemnite zone obtusa only. There are not doubt that *Nostoceras hyatti* is found in the Lower Maastrichtian lanceolata and pseudoobtusa belemnite Zones.

The basis for the microbiostratigraphic subdivision of the Maastrichtian in the Western Carpathians is The Tunisian profile El Kef. At this profile besides a rich planktic foraminifers also a rich benthos represented by calcareous and agglutinated species is found, which is more or less identical with the benthic foraminifers described from the Western Carpathians (SALAJ and SAMUEL 1966).

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