CALCAREOUS MICROPLANKTON AND NANNOPLANKTON ASSEMBLAGES RECORDED IN THE WEST CARPATHIAN LATE JURASSIC/EARLY CRETACEOUS SEDIMENTARY SEQUENCES – TOOLS FOR BIOSTRATIGRAPHY AND PALEOENVIRONMENTAL RECONSTRUCTION

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This contribution discusses the results of an integrated study of three microplankton groups (calpionellids, calcareous dinoflagellates and calcareous nannofossils) and partialy with the stable isotope data ($\delta^{18}O$, $\delta^{13}C$) as well, in the Late Jurassic and Early Cretaceous pelagic sedimentary sequences. Generaly, in the Western Carpathians these sequences are lack of ammonite fauna. At that time, calpionellids, calcareous dinoflagellates and nannofossils were the most important constituents of tropical and subtropical calcareous microplankton and calcareous nannoplankton. Calpionellids rarely dominated over the phytoplankton associations and they were always eliminated in environments in which radiolarians prevailed in abundance. The bio-events investigated emphasises the potential of these planktonic groups as proxies in biostratigraphy, palaeoecology and palaeoceanography. The stable isotope data underline environmental changes. Correlation of the calcareous microplankton distribution and stable isotope analyses was used in the characterization of the J/K boundary interval and also the Aptian anoxy called there as Koňhora event (Michalík et al. in print).

The biostratigraphical study based on the distribution of calpionellids and nannofossils allowed us to distinguish nine calpionellid zones with their fifteen subzones and ten nannofossils zones with ten subzones (Reháková, Michalík 1997, Halásová 2004). A distribution patterns of the cysts studied permit a rough selection of diagnostic bioevents suitable for a definition of the cyst zones. Nine cyst zones and seven ecological event zones were distinguished (Reháková, 2000).

The high-resolution quantitative analysis of calpionellids, dinoflagellates and calcareous nannofossil assemblages indicates major variations in relative abundance of species, species variability and assemblage diversity and also in the structural composition of their tests. In the West Carpathian sequences studied, the mass abundance of these microfossils was closely connected predominantly with shallow intrashelf basins and its elevated ridges. These environments were characterized by the permanent current regime positively influencing the nutrient input. The high nutrient potential (in accordance to the composition) activated the explosion waves in evolution of specific planktonic association and also selected forms. Such relatively dense environment invoked the feedback pressure on the planktonic organisms. It seems that small usually less calcite calpionellid forms coincided with the environments rich in nutrients and they occured with higher fertility-related

nannofossils. On the other hand, the big elongated calpionelid forms with composed collars (created usually diversified associations) were bind directly with the food specialization. Diversified calpionelid associations are linked with blooms of k-selected highly calcified coccoliths/nannoliths. It is worth of mentioned, that the abundance and size of calpionellid loricas decrease also towards to open marine environments.

During calpionellid evolution the lorica composition changed several times, probably in connection with changes in sea-water temperature and chemistry. Two distinct overturn events (change of microgranular lorica into the hyaline one) recorded in the Middle Tithonian and during the Middle Aptian were synchroneous with investigated peaks in nannoplankton abundance. Microgranular calpionellids were replaced by hyaline forms. The increase of water temperature (result of enhanced ? volcanic activity) and contemporaneous climate change could influence the depletion of microgranullar forms or could lead to cessation of their loricas production. The rests of ? cysts/bags visible localy in microgranular loricas could be signalize the stress in environmental conditions. On the other hand, the increase of water temperature and high concentration of $CaCO_3$ influenced the flourishing of nannoplankton. Ciliate protozoans feeding on calcareous phytoplankton started to agglutinate their loricas with the rests of nannofossils. It seems that the nannoplankton diversity influenced strictly calpionellid diversification. The radiation and diversification of hyaline calpionellids coincided with diversification of calcareous nannoplankton. Intervals in which small hyaline calpionellid forms were dominated coincided with the abundance radiations of nannoconids. Salinity variations should have been also responsible for thinning of calpionellid loricas observed during the Late Tithonian, Latest Berriasian and Early Valanginian. Valanginian episode of greenhouse climate associated with increased evolutionary rates in competetive planktonic communities (foraminiferas, calcareous nannoplankton, radiolarians) could led to total calpionellid decimation.

The ecological calcdinocyst events caused by the blooming of one single species characterized by composed oblique wall structure combined with nannofossil indicators of warm water condition could be a proxy of increasing sea surface temperature. Cooling trends is correlable with onset of tabulated cyst species. If compare their distribution with eustatic pulses, calpionellid and dinoflagellate asoociations are dominated during transgressive and highstand interval, in the frame of which their acme accumulation, radiation and diversification events were identified.

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