PRELIMINARY DATA ON THE DIAGENESIS OF CRETACEOUS DINOSAUR BONES FROM THE BAKONY MTS., HUNGARY

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Mineralogical and geochemical study of Late Cretaceous Dinosaur bones (femur and rib fragments) from the alluvial Csehbánya Formation (Iharkút, Hungary) were performed by the combination of several analytical techniques (polarised light microscopy, XPD, SEM + EDX, TEM + EDS, INAA). It was demonstrated that, regardless of their age, recrystallisation of bone apatite in the studied specimens was negligible. The original bone structure is almost perfectly preserved. The very fine-grained apatite phase of the studied bones was essentially hydroxylapatite, containing a detectable amount (20–320 μg/g) of U. The size distribution of the apatite crystallites is bimodal: there are isometric crystals 10–40 nm in width and length and larger, oblong-shaped crystals up to 300 nm in length. Their orange stain comes from the presence of 1.17% bone-organic matter (collagen). Early diagenetic pyrite filling the *Haversian channels* and the tiny little *lacunae* in between the osteons shows, that mineralisation in a sulphur-rich environment must be postulated for the early stages of diagenesis. The last cement phase is sparry calcite, filling all the remaining pores.

To check the reasons for the extraordinarily slight diagenetic change, also the vitrinite reflectance of finely dispersed organic matter from the enclosing alluvial sediments was measured. These data gave a maximum burial depth of 600 to 900 m, equivalent to temperatures less than about 80 to 90 degrees Celsius for the bone-bearing beds.

Our observations raised two important questions:

(1) What was the reason for the observed intensity of pyritisation in this supposedly freshwater alluvial environment? Was it perhaps a flat extensive delta plain of a low-gradient river, where marine pore water incursions could be expected already during early diagenesis?

(2) What was the reason for the apparent „freeze-in" of the recrystallisation process of the bone apatite, resulting in the persistence of the small crystal size and in the obviously very slight chemical alteration of the apatite crystallites, as compared to other fossil dinosaur bones (ZOCCO & SCHWARTZ, 1994; HUBERT *et al.,* 1996; PERSON *et al.,* 1996; SAMOILOV *et al.,* 2001; KOLODNY *et al.,* 1996)? Was it the anomalous burial and/or thermal history of the Mesozoic Iharkút block, or rather the efficient sealing of the bones from continued circulation of diagenetic fluids either by the enclosing fine-grained overbank sediments or by early cementation?

Further studies on similar fossil bones from other localities may help to answer these questions.

References

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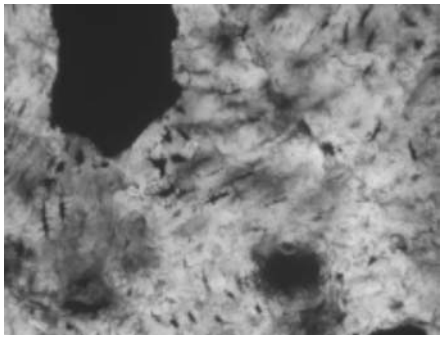

Fig. 1: An osteon identified in thin section made of a Nodosauridae rib. The boundaries of the Haversian system, the Haversian channel and the lacunae show up clearly. (Thin section perpendicular to the longitudinal axis of the rib-bone; transmitted light, crossed nicols.)

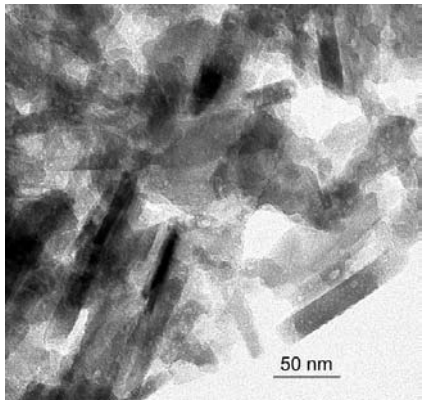

Fig. 2: Elongated apatite crystals.