

**CAVE EXCENTRIQUES FROM BREITSCHEID (NW HESSE, GERMANY):  
UNUSUAL SPELEOTHEMS WITH UNUSUAL CALCITE STRUCTURE AS PROVED BY ELECTRON  
BACKSCATTER DIFFRACTION (EBSD)**

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Excentriques (= helectites) are elongated to vermicular, mostly cm-sized speleothems with a small ( $\approx < 0.5$  mm) central canal growing independently from gravity. Their exact genetical conditions are still mostly not understood (Hill & Forti 1997). In most cases calcite excentriques are composed of single crystals (1) (Kempe & Spaeth 1977) or wedge-shaped crystals (2) (Moore 1954).

Our special interest was focused on the polycrystalline structure of the calcites forming the vermicular excentriques from a tributary branch of the Breitscheid-Erdbach cave system which unfortunately is destroyed by now. In thin sections under crossed polarizers the divergent fibrous structure of these speleothems proves to be quite complex. The modern Electron BackScatter Diffraction (EBSD) method reveals the following structure:

Starting from the central part with the canal where the c-axes of the calcite fibres are oriented parallel to the elongation of the excentrique, the cross section reveals three similar sectors with increasing inclination of the c-axes towards the outer rim. This divergence has a maximum in the central outer part of the sectors and decreases to their lateral sides where the orientation is parallel to the elongation of the excentrique again just like in the central part of the section.

This pattern was observed in the thicker adult portions of the samples. As the terminations of the excentriques are shaped nearly pointed most of the calcitic precipita-

tions must have taken place externally. Calcite formation from biofilms seems to be most probable for the excentriques. Here, microbes could profit from the supply with nutrient through the central canal and additionally contribute to calcite precipitation. These considerations may be a potential field of microbiological investigations which repeatedly arose from genetical interpretations of speleothems (Northup et al. 1997). Besides a possible biogenic influence on the formation of excentriques the three sectors seen in the cross section may reflect the trigonality of calcite. But in respect of an exact understanding of the excentriques more investigations are necessary.

Hill, C. & Forti, P. (1997): Cave minerals of the world. – Second edition, National Speleological Society, 463 p.

Kempe, S. & Spaeth, C. (1977): Eccentrics: Their capillaries and growth rates. – Proceedings of the 7th International Speleological Congress Sheffield 1977, 259–262.

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Moore, G.W. (1954): The Origin of Helectites.- Occasional Paper No1, National Speleological Society, Huntsville/Alabama.