OBSERVATIONS Re DOLOMITE as LIMESTONE INTERBEDS

The Jenolan Limestone is a grey marble, low enough in metamorphic grade to have retained valuable recognisable fossil detail. The limestone is inter-bedded with a variety of sediments, including clay- sized particles of a reddish coloured dolomite. Other fine sediments include silica, illite and kaolinite . Often, the fossils are replaced by dolomite and very commonly fossils occur as moulded dolomite…TM

The presence of dolomite, magnesite, huntite, silica, kaolinite… is explained by J.C. Deelman in a study on irreversible geochemical reactions , namely …

" Low temperature nucleation of magnesite and dolomite ", published .N Jb . Miner . Mh., **1999** (7)pp 289-302, Stuttgart 1999.

According to Deelman, "irreversible geochemical reactions such as for example the low temperature nucleation of magnesite, huntite and dolomite require alternation in pH conditions that can be found in natural settings at different frequencies (*as with, for example*,..)

- Seasonal changes in water chemistry;
- Daily changes caused by photosynthesis of for example algae
- Tidal flooding by water rich in CO2…

The present theory explains at the same time why up to now no (reproducible) syntheses of magnesite and dolomite under conditions of room temperature and atmospheric pressure have become known. Only in dynamic experiments involving the required fluctuations, these stable phases can be synthesised. In static experiments invariably the metastable equivalents are formed."…JCD

The Limestone at Jenolan is not unique with reference to dolomite inter-beds. A not dissimilar presentation of a grey dolomite has been measured in the Mole Creek Limestone, Tas. and again for the Gunn's Plains Caves limestone , Tas.,1000 km or so from Jenolan Caves NSW….TM

Individual experiments by J.C.Deelman (each of which may take up to **42 days** to complete) involve cyclic dissolution/re-precipitation phases (up to 14 in all) whereby the metastable product of a static experiment eg. magnesium calcite, is converted to the the stable product, dolomite .

"The dissolution phases appear to form an essential element in the low temperature formation of magnesite, dolomite and huntite. In the case of dolomite the role of dissolution has long been recognised, and has given rise to a theory of "replacement" of pre-existing limestones.(Bischoff,1855)"…JCD

"All too often the low temperature formation of dolomite is explained by way of conversion of pre- existing calcium carbonate deposits (= "dolomitisation" according to Von Morlot 1847)"…JCD

" better to forget about the "dolomitisation" and the "de-dolomitisation" concepts, because there is no supposed "dolomitisation" reaction taking place between pre-existing limestones and magnesium in solution. Not now, not to-morrow, not ever."….J.C.Deelman , pers .com ,14 Nov. 2007

CONCLUSION

The dolomite then, and its related continuous sediments are clearly contemporaneous with the fossil reef materials. We observe that the inter-bedded sediments continue within the limestone in three dimensions as they surround the fossils, and it is these deposits which may outcrop reddish-brown (at Jenolan) into the cave-space, their being less soluble than the calcite of the limestone walls.

(This is the material we have called "Central River Gunk" as it was first noted in that location of Mammoth Cave, Jenolan during a caving trip in 2003)…TM

Ted Matthews
Jenolan Caves 30 Nov. 2007