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CAVITY OR FISSURE DWELLING STROMATOLITES (ENDOSTROMATOLITES) FROM BELGIAN DEVONIAN MUD MOUNDS (Extended abstract) [1]

by

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A variety of stromatolitic and dendritic tufa-like microbial accretions, ranging from mm-sized structures to cm and decimeter sized stromatolites are found in the grey ("F_2h") as well as in the red ("F_2j") Frasnian mud mounds of Southern Belgium. Many of them have been misinterpreted up to now in terms of physico-chemical marine or karstic cements, or yet in terms of photosynthetic algal communities (Tsien, 1977), (mainly the *Renalcis-Epiphyton* component of these accretions) thriving on the surface of the build-ups.

Petrographical studies revealed that sparitic (among which radiaxial), micritic and hematitic accretions are of microorganic origin (cyanobacteria, bacteria and possibly fungi). Girvanelloid filaments, micritic threads and calcitic growths of *Renalcis* and *Epiphyton* of the grey mounds are generally replaced by hematitic threads, cells and arborescences associated with iron stained renalcids in the red mud mounds where plainly calcitic stromatolitic growths can also however be found.

Field and microscope studies showed that the bulk of these accretions thrived and actively grew in caverns and cavities as well as in fissures or fractures cutting across the mounds prior to the burial of these by terrigenous muds. From this, it can be concluded that most of these microorganic communities that lived in the dark (attested by growth in closed cavities) were not, a not obligatory, photosynthetizers and displayed particular metabolical pathways relying on degradation of organic compounds, on the metabolisation of iron or other unknown systems.

Conventional and electron microscopy revealed the close association in endostromatolites from the red mounds of hematitic crystals with the filaments, the cells and the fructifications which it permineralized; very similar patterns were found in personnal studies of recent and histologically fixed ferro-manganese nodules where iron oxydes accumulated in the bacterial sheaths. Accordingly the hematite is not detrital in origin.

Interestingly enough, the hematitic microbial growth patterns are very reminiscent of the ones found in Proterozoic banded iron formations where similar hematitic threads, cells and buddings are also associated with *Tubiphytes* (the equivalent of *Epiphyton*). As in the Proterozoic examples, the Devonian hematitic stromatolites are not unfrequently associated with silicification : this coagulation of silica could have originated from pH. lowerings resulting from bacterial processes of sulfate reduction or/and in the breakdown of phyllosilicates by bacteria aiming at the iron radicals. This remains to be tested.

It should be noted yet that hematitic microorganic growths, laminated or not, are also found plastering the wall of fractures cutting across the grey F_2h mounds, fractures which are normally filled here by calcitic endostromatolites.

Petrographical studies also revealed the intergrowths of *Renalcis* and *Epiphyton (Tubiphytes)* patterns or yet all the transition between one and the other ; they can furthermore be calcitic or hematitic ; it is accordingly believed that these are variations on a common theme designed by microbial communities that occupied the chasmolitic (cavity dwelling) habitat or adapted to poorly illuminated waters since early Paleozoic time at least, as recorded in the litterature.

The intense colonisation of cavity and fractures by sometimes thick microbial tufa-like accretions and endostromatolites growing upward, downward, and sidewise

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strengthens the very early cohesivity and probably lithification of these mud mounds as proposed elsewhere (Monty, Bernet & Maurin, 1982).

A detailled study of these Frasnian calcitic and hematitic stromatolites will be presented in a forthcoming paper.

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