

Biodictyon found in Precambrian and Recent stromatolites

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Stromatolite is defined as 'laminated organo-sedimentary structures produced by trapping and binding and/or precipitating of mineral matter resulting from metabolic activities of microorganisms'(Awramik et al.1976).They have been studied since mid-19Century but have not been studied in detail from mineralogical view point.So,we carried out mineralogical description of the samples of stromatolite.

Five samples of Precambrian stromatolite (they are mostly from China and Brazil; both are Proterozoic,)and one recent stromatolite from Brazil.

They were mineralogically analyzed and described by LM, TEM, SEM, EDS analysis, and ED analysis. Some specimens were dissolved by HCl and the residues were also observed.

1, Carbonate stromatolite from Beijing, China (about 1100Ma)

They are composed of dolomite and calcite, and have dome-like texture and laminar structure. Acid (HCl) treated residue are composed of graphite with unique forms.

2, Carbonate stromatolite / onkolite from Sichuan, China (about 550-590Ma)

They are composed of rhodochrosite, pyrite and quartz, and have dome like/parallel laminar structure and many oncoids. Filament-like structures and framboidal pyrites were observed by SEM.

3, Carbonate stromatolite from Xuanlong, China (about 1000-1300Ma)

They are composed of dolomite, hematite and quartz, and have dome-like laminar structure.

4, Iron stromatolite / onkolite from Xuanlong, China (about 1300Ma)

They are composed of hematite, siderite, and quartz, and have dome-like laminar structure and many oncoids. Filament-like, needle-like and three-dimensional network structures were observed by SEM.

5, Carbonate stromatolite from The Serra do Espinhaco, Brazil (about 700-900Ma)

They are composed of calcite and Iron minerals, and have dome-like structure by arrangement of the iron minerals. Acid (HCl) treated residue are composed of magnetite with unique forms.

6, Carbonate stromatolite from Lagoa Salgada, Brazil (Recent)

They are composed of very fine grains of calcite and amorphous silica, and have dome-like laminar structure. Filamentous bacteria and their colonies, and three-dimensional network structures were observed by SEM and TEM.

Besides these observed results, we could find common feature of wide presence of Biodictyon. It is found widely in these samples. It is said that a biodictyon is a three-dimensional more or less concentric network of filamentous and unicellular micro-organisms which typically is embedded in soil, sediment or rock (Krumbein et al, 2003). Variety of Biodictyon forms was described and its significance was discussed.

So, this study showed that recrystallization of carbonate minerals make bio-signatures unclear. On the contrary, Iron minerals and their textures will remain for a long time. So, Iron minerals and their textures have a large significance for bio-signature of Precambrian life.