IRON BACTERIA AND THEIR ROLE IN REE CYCLE AND RED BED'S HEMATITE PIGMENT FORMATION

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Deposition of iron hydroxides in bacterial mats from iron-rich springs (Fe^{2+} >3mg/l) of the North-Eastern part of the East European platform is mainly led by so-called iron bacteria (such as *Arthrobacter russicus, Arthrobacter nicotinovorans, Rhodococcus erythropolis, Arthrobacter chlorophenolicus, Gallionella ferruginea, Leptothrix ochracea, Thiobacillus ferrooxidans).*

The study of Q-R iron hydroxides of various origins from the area showed that:

-REE spectra, trace element's content, and isotopic composition of Nd and Sr in iron hydroxides are matching those characteristics of the spring waters, where the oxides were precipitated from;

-iron hydroxides of bacterial origin are accumulating REEs (up to 0.12 wt.%) due to the high sorption capacity of ferryhydrite – the precursor of iron oxides and hydroxides in bacterial communities;

- iron hydroxides from natural environments without iron bacteria contain up to10 times fewer REEs, than those with iron bacteria;

The study of hematite pigment from Paleozoic and Proterozoic sediments from the area (Givetian D2 red beds near riv.Oredezh, arkose sandstones of Terskaya fm (1.2 MA, Kola peninsula), Shoksha quartzites of 1.8 MA, secondary quartzites of B.Tjuters island in the Gulf of Finland) showed that:

-hematite pigment with the remnants of iron bacteria, similar to modern-day bacteria (PIN RAS data) contains elevated REE concentrations (up to 0.15 wt.%), samples without iron bacteria show twice lower REE concentrations than the first ones;

-all studied samples of Paleozoic and Proterozoic hematite pigments have a negative Y anomaly, which witnesses for fresh\slightly salty, rather than truly salty water, they were deposited from.

Summarizing the obtained data we can conclude:

1. Iron hydroxides of bacterial origin play a significant role in the REEs cycle when they are transported from the continents to the sedimentation basins. As red beds are traditionally believed to be deposited in a near continental sedimentation environment, fast deposition of the clastic material with bacterial pigment might have led to the extraction of a significant amount of soluted REEs from the cycle.

2. Geochemical and paleontological study of Paleozoic and Proterozoic hematite pigment allows proposing that large red bed's provinces had been deposited when the environments there were suitable for iron bacteria proliferation.