Characterisation of the microbial diversity in the abandoned uranium mine Königstein.

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The uranium mine Königstein near Dresden has a depth of about 200 m at a territory of about 4.5 km^2. The uranium production was mainly achieved by an in situ leaching on the sandstone with sulphuric acid. Another sulphuric acid release is caused by pyrite oxidation in the mine. These reactions change the geochemical nature of the deposit increasing the level of pollution mainly with sulphate, heavy metals and radionuclides. The polluted mine water is a potential hazard for the adjacent groundwater and thus the discharge of the pollutants has to be to minimized. In the following project the autochthonous microbial community had to be characterized and analysed in respect to their bioremediation potential of those inorganic pollutants.

Cultivation-independent methods, like fluorescence *in situ* hybridisation (FISH) and terminal restriction fragment length polymorphism (T-RFLP) were used to screen various water and sludge samples for a first overview. Three samples were investigated in more detail by bacterial diversity analyses (16S rDNA clone libraries): water from an open drainage canal, sandstone and anoxic sludge.

The water sample showed a dominance of acidophilic, autotrophic, iron oxidizing bacteria belonging to the *Betaproteobacteria*. These bacteria are associated with heterotrophic acidophiles, like *Alicyclobacillus* sp. and *Acidobacteria* sp. In contrast, the bacterial communities of the sandstone and sludge sample were more diverse. Most of the sequences were closely related to uncultivated bacteria obtained from diversity analyses of various environmental samples. Major sequence groups belong to the *Deltaproteobacteria* class, like *Desulfovibrio*, *Desulfobacca*, *Desulfomonile* and *Synthrophobacter* species, and to the *Firmicutes* class, like *Desulfosporosinus* and *Desulfitobacterium* species. Thus, autochthonous sulphate reducing bacteria were detected in the mine. Stimulating the growth of these microorganisms can be helpful to maintain a bioremediation process and inhibit the discharge of the pollutants by the flooding of the mine.