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Microbial Cobalt Liberation from Skutterudite

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Arsenic is a problem in many countries and regions worldwide, but also for Central Europe; a problem which is likely associated with mining activities. Cobalt, however, is highly valuable and regarded as a strategic metal, comparable to platinum group elements. In Skutterudite – a cobalt arsenide containing also nickel – the arsenic ore becomes a valuable resource, which can have a positive economical as well as ecological impact, if exploited biotechnologically.
With the BiCoNi4 we were able to retrieve a mixed acidophilic iron oxidising culture, which was not only able to cope with more than 3.3 g/L As(III), but also to leach Skutterudite microbially; a goal which was achievable with neither Acidithiobacillus ferrooxidans nor Leptospirillum ferriphilum. In leaching experiments we achieved a yield of up to 80% cobalt and nickel after ten days, while the arsenic content remained, due to iron precipitates, at less than 50%. The respective abiotic controls yielded in <5% cobalt and <20% nickel as well as <20% arsenic. Consequently, we are not just able to report a microbial leaching of arsenides for the first time, but also to propose an ecologically friendly procedure to exploit cobalt from European deposits.