Geomicrobiology of Parys mine, Wales: Influence of mineralogy on the development, composition and functioning of microbial communities

Results in Brief

Effect of mineralogy on the development, composition and functioning of microbial communities

The presence and activities of microorganisms on and within minerals have profound environmental and economic consequences. Therefore, an EU-funded initiative has investigated the influence of mineralogy on the development, composition and functioning of microbial communities in a disused copper mine.

CLIMATE CHANGE AND ENVIRONMENT

FUNDAMENTAL RESEARCH

© Jeremy Alan Baxter, Shutterstock

Over the last decade scientific evidence has shown that the chemical composition of rocks plays a crucial role in shaping the structure of the microbial communities that inhabit them. To date, most of this work has been conducted on soil minerals and on minerals of volcanic origin such as lava deposits.

The PARMIN project was the first study to consider the potential effects of minerology on the structure of mineral-associated microbial

communities in an acid mine environment. Such an environment represents extreme conditions for microbial life due to limited organic compounds, extreme acidity, and often high concentrations of elements that can prove toxic to microorganisms, like copper and lead.

Microbiological studies of acid mines have revealed the presence of the bacterial genera Leptospirillum, Acidithiobacillus, Ferrovum and Acidiphilium, and the archaea genera Ferroplasma. These microorganisms are adapted to and prefer the acidic conditions, resulting in their classification as acidophiles.

The project addressed the question of the effect of mineralogy on the composition of microbial communities by focusing on the minerals found in the disused copper mine at Mynydd Parys in north Wales, the United Kingdom. Once the largest supplier of copper in the world, Mynydd Parys is representative of many similar abandoned copper mines in the United Kingdom and further afield.

Researchers characterised the structure of established bacteria and archaea communities inhabiting a range of minerals and monitored their development and activities on two primary minerals, chalcopyrite and sphalerite. Scientists also isolated archaea in pure culture from Mynydd Parys.

PARMIN showed that even within an extreme acidic environment, mineral chemistry has an influence on the structure of microbial communities. It also revealed that such mineral environments are home to unexpectedly high microbial diversity and also novel microorganisms.

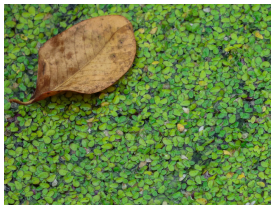
Keywords

Mineralogy | microbial communities | copper mine | PARMIN | acidophiles | Mynydd Parys

Discover other articles in the same domain of application

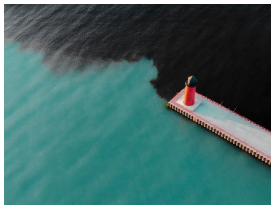
Rapid detection of multi-drug-resistant bacteria

9 May 2018



Fighting environmental pollution with microbes

29 May 2025



How microorganisms degrade oil droplets in the marine environment

26 June 2020

Learning from worms for the plastic management of the future

21 November 2022

Project Information

PARMIN

Funded under

Grant agreement ID: 623914

Project closed

Start date
1 April 2015

End date
31 May 2017

Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 221 606,40

EU contribution
€ 221 606,40

Coordinated by
BANGOR UNIVERSITY
United Kingdom

Last update: 14 December 2017

Permalink: https://cordis.europa.eu/article/id/211402-effect-of-mineralogy-on-the-development-composition-and-functioning-of-microbial-communities