

The microbiome of phosphate-rich deposits in Muierilor Cave, South-Western Carpathians

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Abstract

Muierilor Cave is one of the most important caves in Romania from paleontological, biological, and archaeological points of view. A newly discovered chamber, with unique yellow calcite crystals, fine-grained crusts, and black sediments, is connected to the upper levels that contains fossil bones and a large pile of guano. Samples were taken from this chamber and another passage to investigate the diversity of microorganisms related to the substrates and identify potential pathogenic taxa for humans and animals. Chemical, mineralogical, and whole community 16S rRNA gene-based metabarcoding analyses were undertaken, and the base of the guano deposit was radiocarbon dated. Metabarcoding of the analyzed samples found that ~16% of the identified bacteria are potentially pathogenic to humans. Moreover, more than 87% of the identified genera were not previously reported in caves. We identified bacteria involved in the phosphate cycle that can only originate from the organic deposits inside the cave, such as the bats' guano in the touristic, upper level, or the fossil bones. Our study indicate also the guano deposit as the possible source of potentially pathogenic microorganisms. The results on the microbiome of different deposit types unravel the diversity of microorganisms and indicate the potentially pathogenic taxa for humans and animals.

Keywords

cave microbiology, metabarcoding, bat guano, fossil bones, pathogens

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Author contributions

OTM and CH designed the research, OTM, RNB, CH, ICM, and LF collected the field data, RNB, CH and PB made the extraction, bioinformatics, and interpretation of molecular data, SC and ICM made the geological context and radiocarbon data interpretation, CH, OTM, PB, ICM, and LF wrote the first draft. All authors corrected and approved the final version.

Conflicts of interest