Development of protocols for microbiological control in Altamira Cave
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ABSTRACT
Altamira Cave is threatened by the growth of microorganisms, especially fungi. At the same time, in order to avoid the risks of biodeterioration, control of microbiota in Altamira Cave is necessary. To work on the "Plan de Conservación Preventiva" (FCP) for Altamira Cave, the objectives of the FCP is the systematic control of the microbiota, and measures against biodeterioration will become standard for these purposes.

OBJECTIVES
- Control the risk of biodeterioration of the paintings in Altamira Cave.
- Develop and standardize protocols for systematic control of Altamira Cave microbiota.
- Evaluate different counting techniques for microbial quantification.
- Analyse the culturable microbial diversity in Altamira Cave.

INTRODUCTION
ALTAMIRA CAVE: Longest Cave
1. Most important painted site of Europe with 35,000 paintings.
2. Declared a "World Heritage Site" by UNESCO in 1998.

SOME ADDITIONAL MECANISMS AND PURPOSES
- "Plan de Conservación Preventiva" (Altamira). These improvements (Tanaka et al. 2013)
- Undermines the conservation project for Altamira Cave: the "Plan de Conservación Preventiva" (Altamira) (Cruce Pozo et al. 2013).
- Analyzing the culturable microbial diversity in Altamira Cave.

SAMPLES
AIR
SOIL AND WATER

CONCLUSIONS
1. Culture-dependent methods are selective, therefore are biased and, as a consequence, they have been shown to systematically underestimate numbers of total bacteria.
2. Direct counting procedures (flow cytometry and microscopy) are rapid but have the disadvantage that they do not discriminate between living and dead cells. Additional improvements may be done in our protocols.
3. Depending on the sample, plating efficiency can be less than 1%.
4. Colony sequencing provides a rapid overview of culturable microbial diversity of air, water and soil samples.

REFERENCES