

TITLE: BACTERIAL AND ARCHAEAL AMMONIA MONOOXYGENASE GENE QUANTIFICATION ALONG LIMESTONE AND METASANDSTONE CAVES IN CHAPADA DIAMANTINA, BAHIA, BRAZIL

AUTHORS: MARQUES, E.L.S.¹, DIAS, J.C.T.¹, GROSS, E.¹, PIROVANI, C.P.¹, REZENDE, R.P.¹

INSTITUTION: ¹UESC – UNIVERSIDADE ESTADUAL DE SANTA CRUZ (RODOVIA JORGE AMADO KM 16 CEP 45662-900 ILHEUS-BA, BRAZIL)

ABSTRACT:

Ammonia oxidizing archaea (AOA) and ammonia oxidizing bacteria (AOB) plays a central role in the global nitrogen process with the nitrification. This process is poorly studied in caves specially in the ones formed in non-limestone rocks. External nitrogenous compound inputs are limited because of the cave isolation from the surface made by the rock itself whereas it could represent different nitrification communities while external influence decrease. This work aimed to quantify the number of copies of bacterial and archaeal amoA genes along caves formed in sandstone and limestone rocks to compare. We collected sediment samples in Gruta do Lapão (12°32'25.44"S; 41°24'9.72" W), a metasandstone (metamorphized sandstone) cave in Lençóis, Bahia, Brazil and Gruta de Manoel Ioiô ((12°20'9.96" S, 41°33'50.04" W), a limestone cave in Iraquara, Brazil. Samples were collected in the entrance, and in three points along the cave (approximately 150, 250 and 600 m from the entrance) from entrance in sterile plastic bags and transported to the laboratory on ice. DNA was extracted from microbial community in sediment samples and bacterial and archaeal amoA genes were quantified in triplicate using amoA-specific primers specific for bacteria and for archaea. The amount of amoA genes quantification decreased along caves and entrance samples had at least 100-folds more copies per gram of sediment than the inner caves sample indicating that a 200m inside those caves represent a major change in the external nutrient influence. Archaea dominated the ammonia oxidizer community along the caves, except in the last sample of Gruta do Lapão collected in a temporary river area and It wasn't detected amplification of the bacterial amoA gene in another sample of this cave. In general, AOA/AOB ratio showed a top of 5-fold for the metasandstone cave and a 5 to 10-folds ratio to limestone cave except for the first sample inside the limestone cave whereas 470-fold more AOA were observed and the sample were AOB dominated in the sandstone cave (AOA/AOB ratio of 0.8). The present work showed that AOA may dominate AOB in sediments of two different lithologies.

Keywords: amoA, AOA, AOB, qPCR

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