

TITLE: MAGNETOTACTIC BACTERIA IN CONTINENTAL SHELF SEDIMENTS FROM SACO DO MAMANGUÁ, PARATY, RJ.

AUTHORS: SIDCLEY SILVA DE LYRA¹, PEDRO LEÃO¹, MARINA CHAO¹, JEFFERSON CYPRIANO¹, DANIEL GONÇALVES¹, FERNANDA ABREU¹, LUIGI JOVANE², VIVIAN PELLIZARI² E ULYSSES GARCIA CASADO LINS¹.

INSTITUTION:

¹LABORATÓRIO DE BIOLOGIA CELULAR E MAGNETOTAXIA, INSTITUTO DE MICROBIOLOGIA PAULO DE GÓES, UNIVERSIDADE FEDERAL DO RIO DE JANEIRO (CCS - BLOCO I. CIDADE UNIVERSITÁRIA. RIO DE JANEIRO, RJ - BRASIL)

²INSTITUTO OCEANOGRÁFICO, UNIVERSIDADE DE SÃO PAULO (PRACA DO OCEANOGRÁFICO, 191. CIDADE UNIVERSITÁRIA, SÃO PAULO, SP - BRASIL)

ABSTRACT:

Magnetotactic bacteria (MTB) are characterized by the ability to synthesize magnetosomes. This organelle consists of a nano-sized magnetic crystal, composed of magnetite (Fe_3O_4) or greigite (Fe_3S_4), enveloped by a membrane. Magnetosomes are organized in chains imparting the cell with a magnetic moment, resulting in passive cell body orientation to magnetic field lines while the cell actively swims propelled by flagella. This ability to sense and migrate along magnetic field lines is called magnetotaxis. MTB are found in freshwater, brackish and marine sediments. However, exist few relates of MB on deep sediments as continental shelves. Thus, our knowledge about distribution and diversity of MB in the deep sediments remains limited. Here, we investigated the presence and morphological characteristics of MTB in sediments from the continental shelf at Saco do Mamanguá in Paraty, RJ. The sediment samples were collected at five points, varying in the extent of the water column and proximity to the open sea, on the continental shelf using a gravity corer sampler. Sediment samples were collected from the water/sediment interface to 40 cm depth in the sediment at 10 cm intervals. The sediment from each depth was transferred to 1 liter plastic vessels for storage and magnetic concentration. Sample analysis immediately after sampling showed the presence of MTB at 30-40 cm deep at a point corresponding to a shallow area, suggesting the presence of MTB with anaerobic metabolism. After 10 days of incubation at room temperature, the presence of few MTB at all sampling points at 10 to 40 cm depth fractions was confirmed, indicating that the oxygen availability in the microcosms promoted the enrichment of MTB in layers where they were initially undetected. Two morphotypes were identified by transmission electron microscopy. Magnetotactic spirilla were more abundant compared to magnetotactic cocci, suggesting that they are better adapted to this environment. The magnetosomes of spirilla and cocci were prismatic and cuboctahedral, respectively. High-resolution electron microscopy and energy-dispersive X-ray analysis showed that the magnetotactic spirilla and magnetotactic cocci magnetosomes consist of magnetite (Fe_3O_4). Electron tomography using STEM/HAADF from the magnetosome chain of magnetotactic spirilla showed that the crystals are coplanar within the cell.

Keywords: Magnetotactic bacteria, magnetosomes, magnetotaxis, ultrastructure, continental shelf.

Development Agency: CAPES, CNPq, FAPERJ, FAPESP.