Characterization of a magnetotactic bacteria-grazing ciliate in sediment from the intertidal zone of Huiquan Bay, China

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Magnetotactic bacteria (MTB) represent a group of microorganisms with the ability to orient and swim along geomagnetic field lines. They can synthesize magnetosomes through the biomineralization processes. Previously studies have reported that some species of protozoa can graze MTB and accumulate magnetosomes in the cells. Here, we characterize a slightly magnetically responsive MTB-grazing ciliate from the intertidal sediment of Huiquan Bay. According to molecular biological information, the ciliate is tentatively identified as Uronemella parafilificum. Using transmission electron microscopy, we observed that two to four different shapes of magnetosomes were randomly distributed within this ciliate. Energy-dispersive X-ray spectroscopy and high-resolution transmission electron microscopy images of them were consistent with magnetite. Although the same shapes and components of magnetosomes were also detected in MTB occurred in the same environment, the size of them was larger than that in ciliates. The results suggest that this ciliate species is capable of grazing and ingesting different types of MTB. These data reveal broad diversity and wide distribution of magnetically responsive protozoa and provide us more possibilities for researching the origin of magnetoreception in eukaryotes.

Keywords: ciliate, magnetotactic bacteria, magnetosome, graze, ingest.