



## **Seasonal variations in the population of freshwater magnetococci, and the spatial arrangement of magnetosomes in cells**

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The abundance and morphotype distribution of magnetotactic bacteria in lake Balaton were studied from spring to autumn 2004. By observing magnetically purified drops using an optical microscope, it was established that fast-swimming magnetotactic cocci appeared in March and dominated until November, when smaller spirilla became abundant.

Both whole mounts and stained thin sections containing bacteria were examined using energyselected imaging in a transmission electron microscope, in order to study the sizes, shapes, spatial arrangements and chemical environments of the magnetosomes within the cells. Three distinct cocci, containing either two double chains, two single chains, or partial chains and clusters of magnetite crystals were identified. Although care is required with the interpretation of our results from the stained thin sections because of the possibility of modification to the internal structures of the cells during preparation for electron microscopy, the magnetite crystals appeared to be anchored to the inner membrane of each cell and to be enveloped by stained material that was indicative of the presence of a magnetosome membrane. No iron was detected outside the magnetosomes. The cells typically contained P- and Ca-rich electron-dense material, both in the form of granules and dispersed throughout the cell. Owing to their high P content, these bacteria may play an important role in the geochemical cycling of nutrients in the sediments of lake Balaton.