

## **Digging for Bacterial Magnetism**

The still waters of the lower Pettaquamscutt River in Rhode Island harbor a remarkable population of bacteria. These microscopic creatures sequester iron from the surrounding water to build up strings of tiny, aligned magnetite crystals in their bodies. Known as magnetotactic bacteria, they may play a significant role in geological process such a as the magnetization of sediments and the cycling of iron in the environment. "These organisms are not just novelties of nature," says biologist John F. Stolz of Duquesne University in Pittsburgh.

Pettaquamscutt River's deep basins provide the kind of stable environment in which various species of free-floating magnetotactic bacteria thrive. They show up at a depth of about 4 meters, where the concentration of dissolved oxygen has declined to zero and iron becomes soluble in water. During their lifetimes, the bacteria process surprising large quantities of iron into magnetite crystals, Stolz says. These crystals form a hefty load. "Imagine going around with a 10- or 15-pound weight hanging around your neck," he remarks.

When the organisms die, their magnetite-laden remains drift to the bottom of the river basins. Normally, the water chemistry at this depth would promote the dissolution of magnetite. However, organic membranes surrounding the crystals seem to preserve them for considerable periods of time, Stolz says. Such easily identifiable, sheathed crystals have been found as far as 1 meter down in the sediments, suggesting that biogenic magnetite stored in sediments may have played a role in recording the Earth's magnetic field in times past.