Tiny magnetic crystals in bacteria are a compass, say researchers

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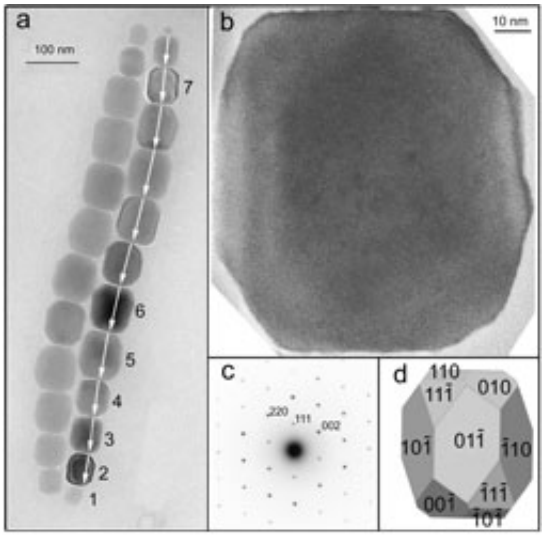

These tiny magnetic crystals (figures a, b,c and d) help the bacteria to navigate.

Scientists have shown that tiny crystals found inside bacteria provide a magnetic compass to help them navigate through sediment to find the best food, in research out today.

Researchers say their study, published in the *Journal of the Royal Society Interface*, could provide fresh clues to explain biomagnetism – a phenomenon in which some birds, insects and marine life navigate using the magnetic field that encompasses the Earth.

The study focuses on magnetotactic bacteria, which contain chains of magnetic crystals, called magnetosomes. They exist all over the globe, living in lake and pond sediments and in ocean coastal regions.

Since the discovery of magnetotactic bacteria in the 1970s, it has not been clear exactly what magnetosomes were for. Previous research suggested that some magnetosome chains would not be useful for navigation because their crystal sizes did not possess the right magnetic qualities.

However, researchers at Imperial College London and the University of Edinburgh have now shown that previous modelling methods were inaccurate. New calculations prove that all known magnetosomes do posses the right magnetic qualities needed to facilitate navigation. Study leader, Dr Adrian Muxworthy, from Imperial's Department of Earth Science and Engineering, explains:

"Magnetosomes align with one another to form a chain inside the bacteria and work like a magnetic compass. We are still not sure how, but this compass interacts with the Earth's magnetic field, helping the bacteria to navigate through sediment to the best feeding grounds."

Dr Muxworthy says the study is a nice example of evolution which demonstrates how a relatively simple organism can develop a highly optimised navigational capability. He says it may provide fresh insights into the evolutionary processes that have helped other animals and aquatic species to become skilled navigators.

Paper: Adrian R. Muxworthy, Wyn Williams, "Critical superparamagnetic/single-domain grain sizes in interacting magnetite particles: implications for magnetosome crystals", *Royal Society Interface*.

Source: Imperial College London