科研人员发现一种新的海洋多细胞趋磁原核生物

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日前，中科院海洋所肖天研究员课题组与法国科学院吴龙飞教授课题组合作开展海洋趋磁微生物多样性及系统进化研究，在我国黄海潮间带沉积物中发现一种新的多细胞趋磁原核生物——菠萝型多细胞趋磁原核生物（pineapple-like MMPs）。

科研人员通过对该多细胞趋磁原核生物运动行为、分离繁殖和整体结构等方面研究发现其多细胞性更加显著，通过16S rDNA系统进化分析确定一个新种属，定名为Candidatus Magnetananas tsingtaoensis。

趋磁细菌形态多样，有球形、杆形、弧形、螺旋形以及多细胞聚集体等。其中以多细胞聚集体——多细胞趋磁原核生物（multicellular magnetotactic prokaryotes，MMPs）最为特殊。MMPs是一类由多个含磁小体的原核细胞有序排列形成的趋磁生物，在细胞结构、生态分布与分类地位等方面有其特殊性，目前仅在海洋环境发现。研究者对该生物是单细胞形成的聚集体，还是多细胞生命体各持己见，其进化位置尚不明确，该发现为多细胞趋磁原核生物进化位置确定提供了新证据。

趋磁细菌（magnetotactic bacteria）是一类可以沿着地磁场方向运动的特殊细菌，其体内含有被磷脂膜包被的单磁畴颗粒—磁小体（magnetosome）。趋磁细菌是探索细胞器官起源、生物矿化及其分子机理、研究地磁场对生命影响机制不可替代的模式系统，具有重要的生物学研究意义。同时，磁小体为生物纳米磁性材料在生物医药和材料领域的应用提供广阔的前景。

上述研究成果论文发表在近期的Environmental Microbiology。
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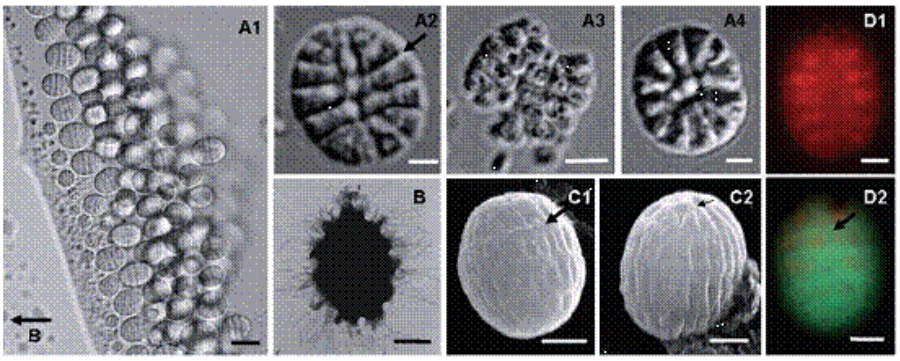

Fig. 1. Morphology and cellular structure of the ellipsoidal MMPs. Panel A shows the morphology of ellipsoidal MMPs by DIC microscopy. The MMPs aligned along magnetic field lines (whose direction was indicated on the left bottom) and accumulated at the north pole in a droplet (A1). Note that few spherical MMPs were present despite the dominant feature of ellipsoidal MMPs. The ellipsoidal microorganisms had grooves perpendicular to the long axis of the MMPs (A2, arrow). The square shape of cells was observed from a partially disaggregated MMP (A3). Top view of an ellipsoidal MMP showed a similar shape of spherical MMPs (A4). TEM study revealed the peritrichous flagella (B). SEM images showed 4–6 interlaced circles of cells within individual MMPs (C1, C2), and the joint areas between circles (C1, arrow) were related to the grooves observed by DIC microscopy (A2, arrow). On the pole of ellipsoidal MMPs, there was only one cell and its shape was different from the others (C2, arrow). After staining with DAPI and Nile red, lipid granules and an outer layer were observed when the MMPs were exposed to light of 510–550 nm (D1). A net-like structure (D2) was observed at the grooves (A2, arrow) when the MMPs were exposed to light of 400–410 nm. Bars = 10 μm in (A1), 4 μm in (A3), and 2 μm in the others.