

# Phylogeny and 16s rRNA sequence of *Magnetospirillum* sp. AMB-1, an aerobic magnetic bacterium

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Submitted January 27, 1992

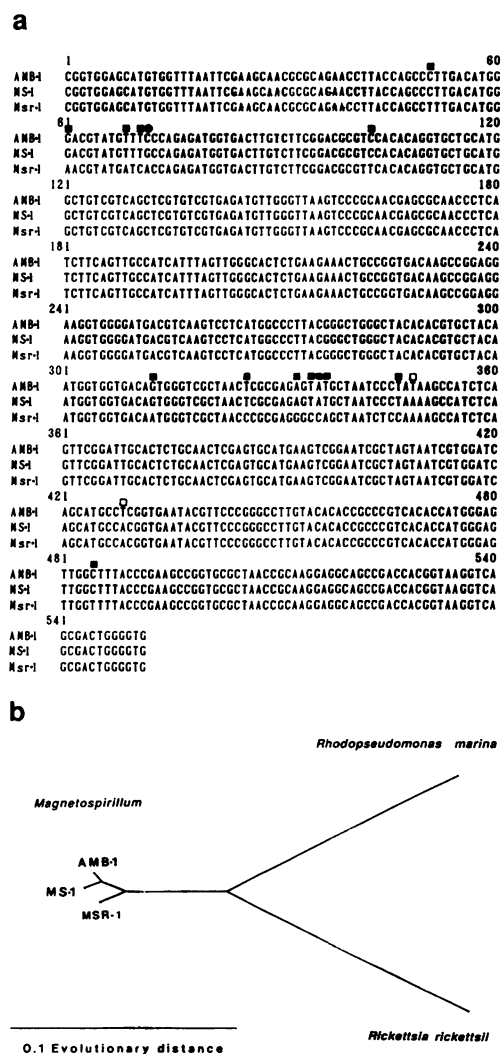
16s ribosomal RNA sequences are useful for the construction of species specific oligonucleotide probes. In addition, because of their high sequence conservation they are also useful for determining phylogenetic relationships.

Since the discovery of magnetic bacteria in 1975 (1) three species of freshwater magnetic bacteria have been described. The first of these was a microaerobic spirillum *Aquaspirillum magnetotacticum* MS-1 (2). A second microaerobic species *Magnetospirillum gryphiswaldense* was also recently reported, and the new genus *Magnetospirillum* proposed (3). *Aq. magnetotacticum* MS-1 is now known as *Magnetospirillum magnetotacticum*. A new magnetic spirillum was recently isolated and cultured axenically in this laboratory (4). This species, *Magnetospirillum* sp. AMB-1 belongs to the  $\alpha$ -proteobacteria and is unusual in that it can grow well under aerobic conditions.

The polymerase chain reaction (PCR) was used to amplify the 16s rRNA gene from the chromosome of *Magnetospirillum* sp. AMB-1 and its nucleotide sequence was determined. Figure 1a shows sequence alignment of conserved regions of the 16s RNA genes from each of the above species. We have used the 16s sequences to show for the first time the phylogenetic relationship between these magnetic bacteria (Figure 1b). Surprisingly, although *Magnetospirillum* sp. AMB-1 is capable of growing aerobically and is oxidase positive, it is more closely related to *M. magnetotacticum* than to the more aerotolerant *Magnetospirillum gryphiswaldense*.

## REFERENCES

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**Figure 1. a:** Sequence comparison of 16s RNA of three species of magnetic bacteria. AMB-1, *Magnetospirillum* sp. AMB-1; MS-1, *Aquaspirillum magnetotacticum* MS-1; MSr-1, *M. gryphiswaldense* MSr-1. Sequence differences; between AMB-1 and MSr-1 are indicated by a filled box; between AMB-1 and MS-1 by an open box; all different by a filled circle. **b:** Phylogenetic relationship (5) between the three *Magnetospirilla* and two additional species which have closely related 16s rRNA sequences. GenBank accession numbers: *Aquaspirillum magnetotacticum*, M58171; *Rhodospseudomonas marina*, M27534; *Rickettsia rickettsii*, M21293.

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