

Lake Pavin « dream team » - Massif du Sancy, région Auvergne-Rhône Alpes

Biosciences and Biotechnologies

Institute of Aix-Marseille



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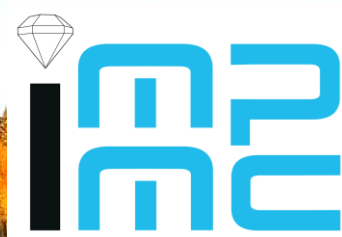
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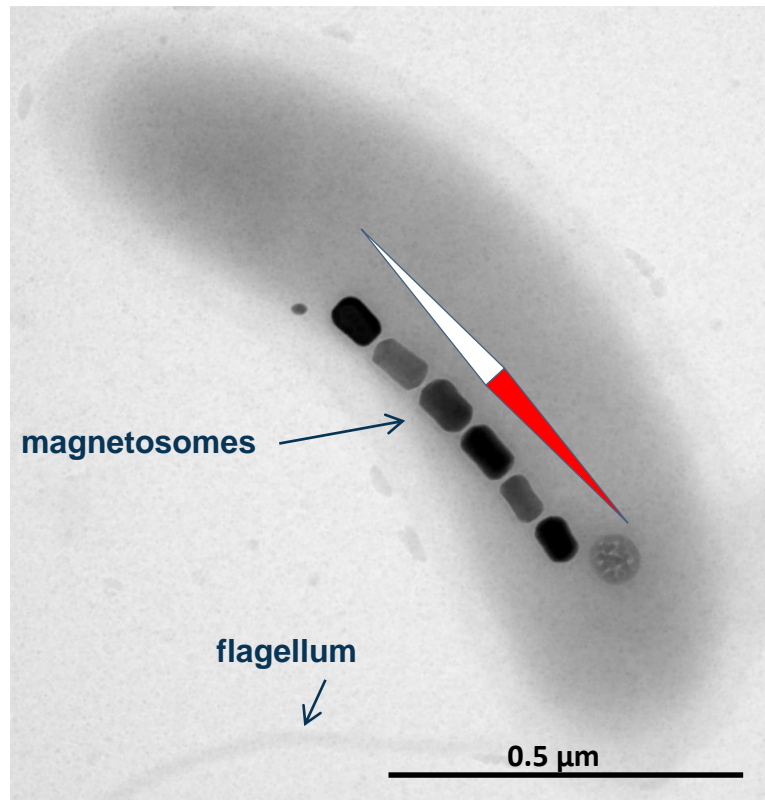
2020



Laboratoire des Sciences du Climat et de l'Environnement
LSCE (UMR 8212)

Magnetotactic bacteria (MTB)

Biomaterialize ferrimagnetic crystals into organelles called magnetosomes

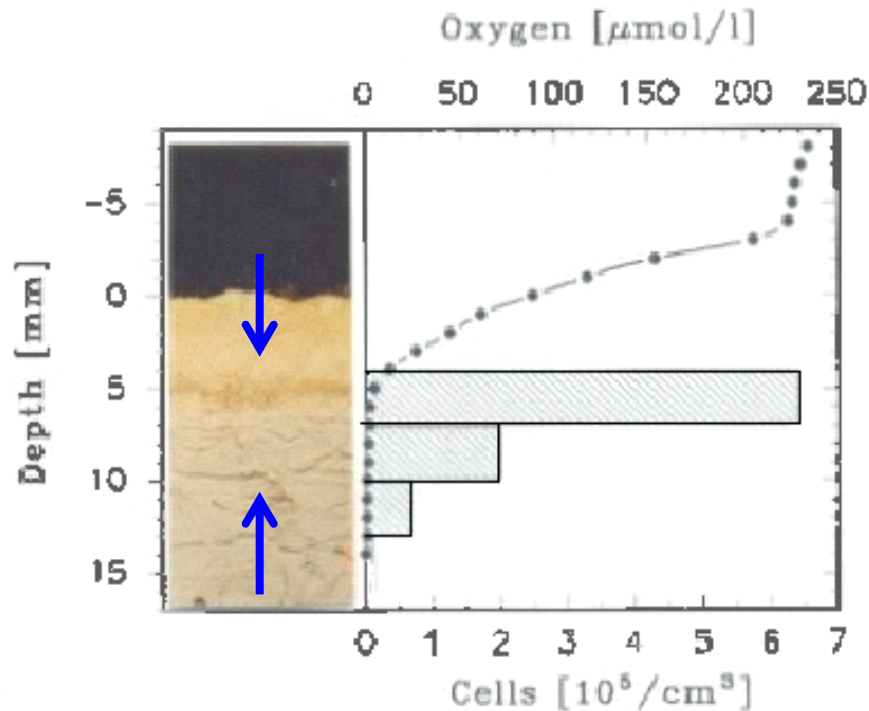


TEM

- Several magnetosomes create a **dipolar magnetic moment**
- The cell is subjected to a **torque** and get parallel to the **geomagnetic field**
- Passive alignment - active motion

MTB are gradient-loving bacteria

Found in chemically stratified aquatic environments at or just below the oxic/anoxic interfaces (OAI)

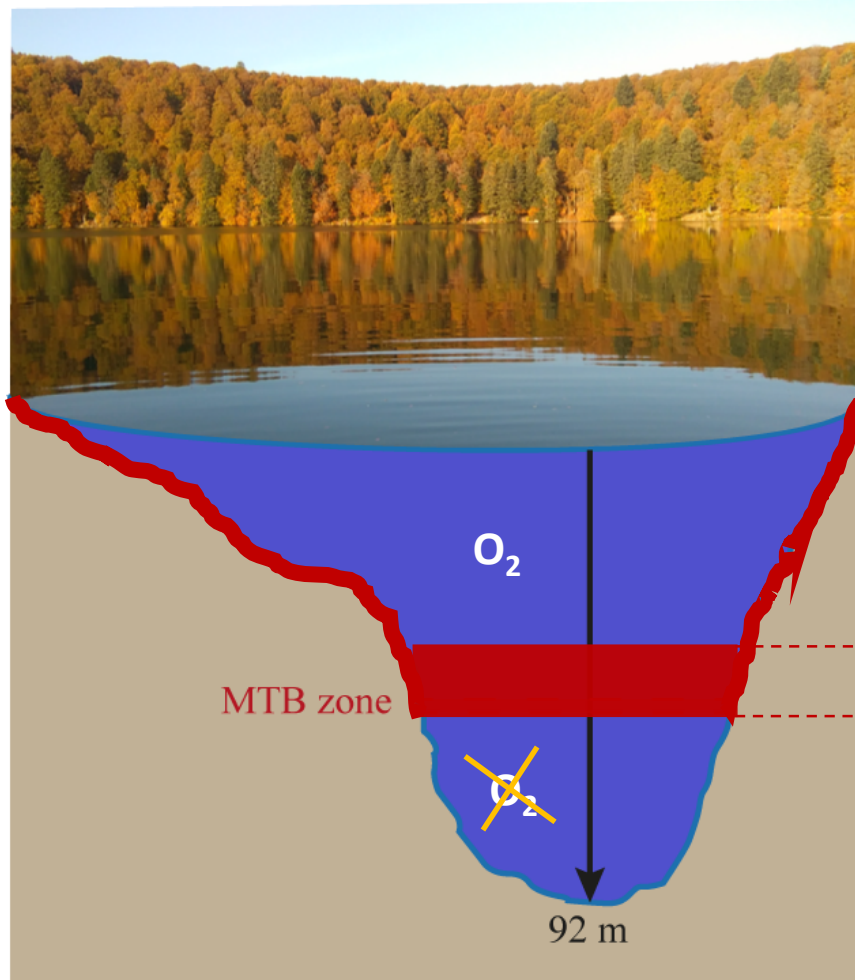


Spring *et al.* (1993) *Appl Environ Microbiol*

Sampling the sediment and the water column



Sediment



Water column



Lake Pavin – a natural laboratory to study MTB

→ Since 2015 and the first observation of MTB populations in this lake:

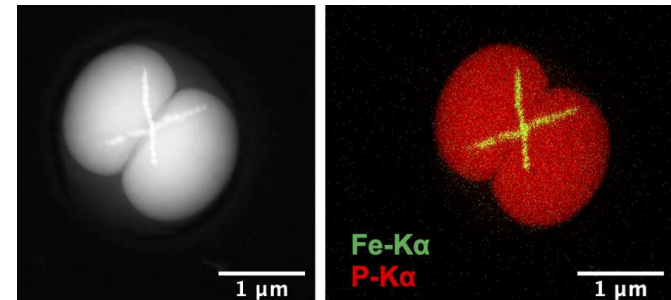
- Several ongoing projects (5 funded ANR grants)

- 6 publications with MTB from Lake Pavin

- **Phosphorus hyperaccumulation:**

Rivas-Lamelo et al. (2017) *Geochemical Perspectives Letters*

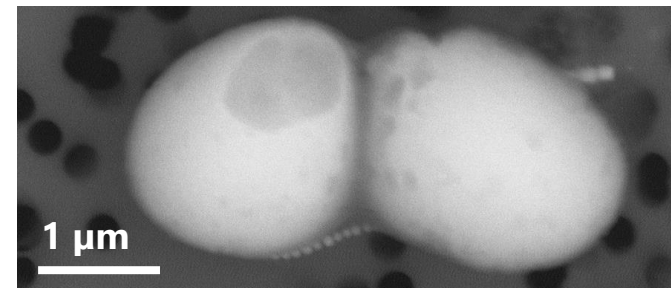
Bidaud et al. (2022) *Frontiers in Microbiology*



- **Intracellular calcium carbonate biomineralization**

Benzerara et al. (2021) *Geobiology*

Monteil et al. (2021) *The ISME Journal*



BIAM

Green Solutions for Tomorrow

Institut de Biosciences et biotechnologies
d'Aix-Marseille

Soutenance de thèse de Camille MANGIN
25 Janvier 2024



Bio-minéralisation intracellulaire de phases carbonatées par les bactéries magnétotactiques du lac Pavin

Réalisée au sein de l'équipe BEAMM, sous la direction de Caroline MONTEIL et Christopher LEFEVRE (2021-2024)

Conclusion and perspectives

- **Lake Pavin : model of precambrian ocean, study site of gaseous eruption hazard, natural lab for anaerobic metabolisms and biomineralizations studies...**
- **...and much more : May 2024, deployment of last generation oxygen sensors (BRGM, IFREMER, LSCE, etc.) in lake Pavin for a national metrology effort.**
- **Discovery of a new diversity of iACC forming bacteria**
- **What are the environmental and molecular determinants involved in iACC formation?**
- **What is the contribution of MTB in the sequestration of inorganic carbon and calcium?**
- **Last week PhD defense of Camille Mangin**
- **Recent discovery of iABaC and iASrC in lake Pavin MTB : a search for iARaC?**