Selection and modification of psychro and xerophilic microorganisms for extra-terrestrial environments and their relationship with extra-terrestrial atmospheres.

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PhD fellow at Microbiology

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2013-2017

Bachelor’s degree in Biology

- Thesis on aquatic macroinvertebrates at the National Museum of Natural Sciences

2018-2020

Master´s degree in Industrial and Environmental Biotechnology

- Thesis at the Astrobiology Centre

2020

JAE Intro ICU grant at the Astrobiology Centre

2021-2024

PhD in Astrobiology

- Centre for Exolife Sciences

Astrobiology Centre

CENTRO DE ASTROBIOLOGÍA
ASOCIADO AL NASA ASTROBIOLOGY INSTITUTE
CSIC INTA

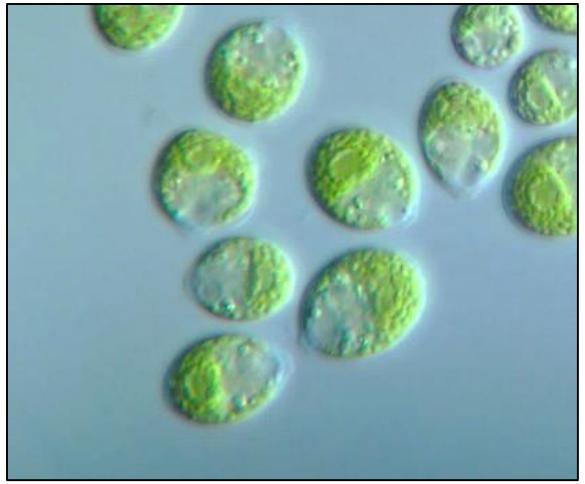
- Mixed research centre: Physicists, chemists, biologists, engineers…
- Laboratory of Microbial Evolution -> Extremophile Laboratory

Master’s thesis

Extremophiles: Tinto River (SW Spain)

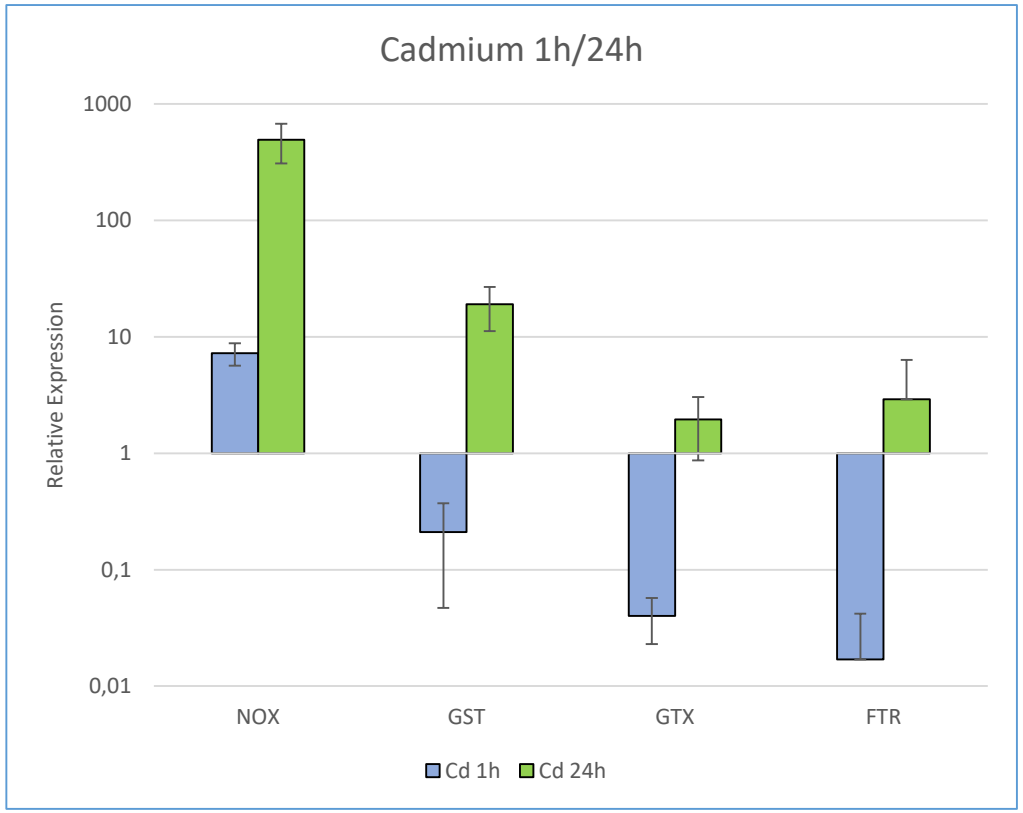
Master's thesis

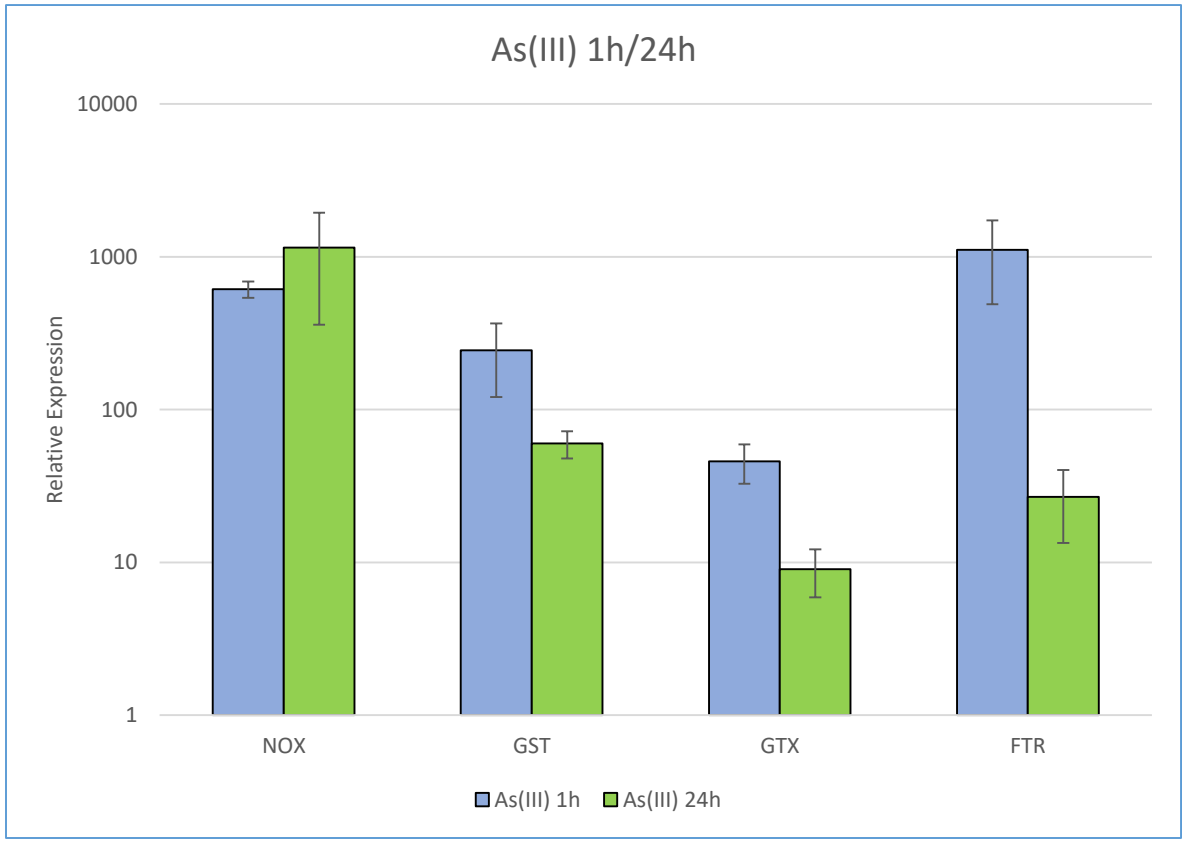
- *Expression of oxidative stress response genes in the presence of heavy metals in* Chlamydomonas acidophila.
- Toxicity of heavy metals:
  - Specific mechanisms
  - Non specific mechanisms: ROS production, oxidative stress



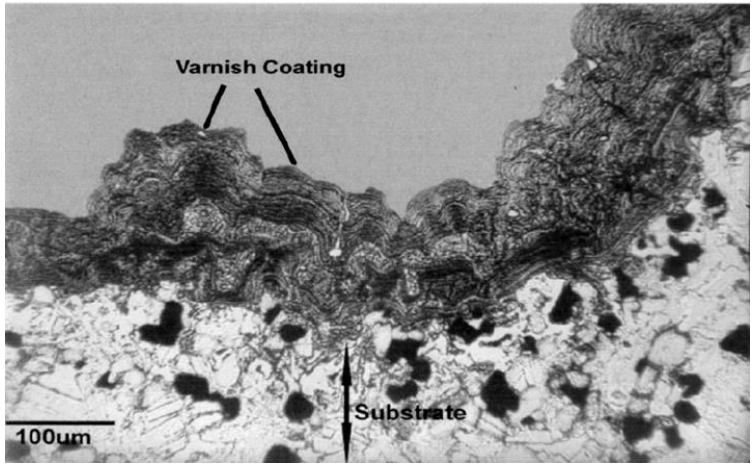
Resistance mechanisms: Exclusion, sequestration, antioxidants

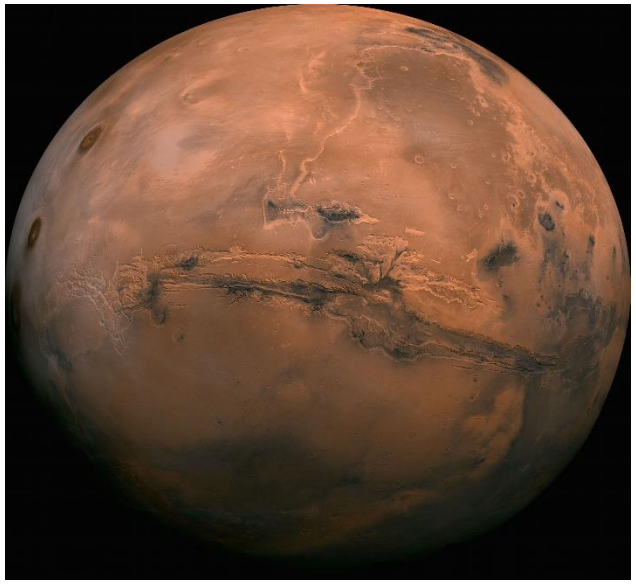
- Results:
  - The expression of each gene depends on heavy metal and exposure time.
  - There is an early and late response.
  - Different isoforms for different metals?





JAE Intro ICU Grant



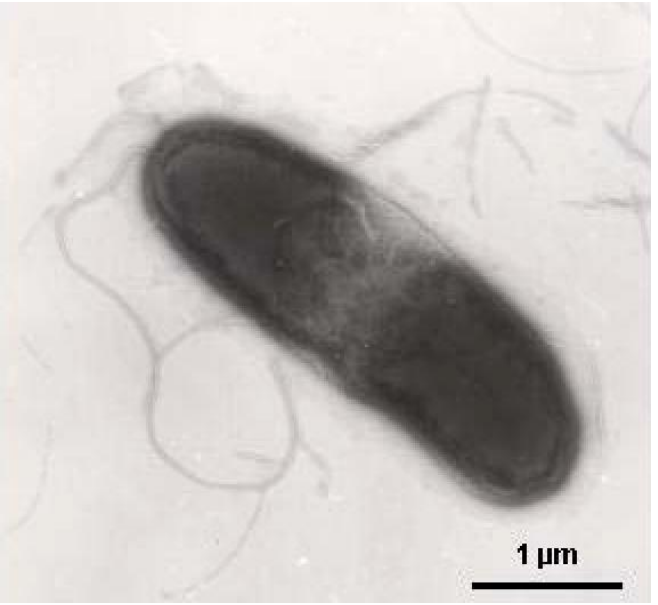


?

Rock varnishes
Mn, Fe oxides

Centre for Exolife Sciences

- Current project with *P. syringae*: Transcriptomics under cold conditions/phage infection. Also could be a good model to get started with OVs FBA.
  - What genes are upregulated under cold stress?
  - Does it make different OVs under different conditions?
  - Differences with *D. radiodurans*?
  - When do they make Ice Nucleation Proteins?



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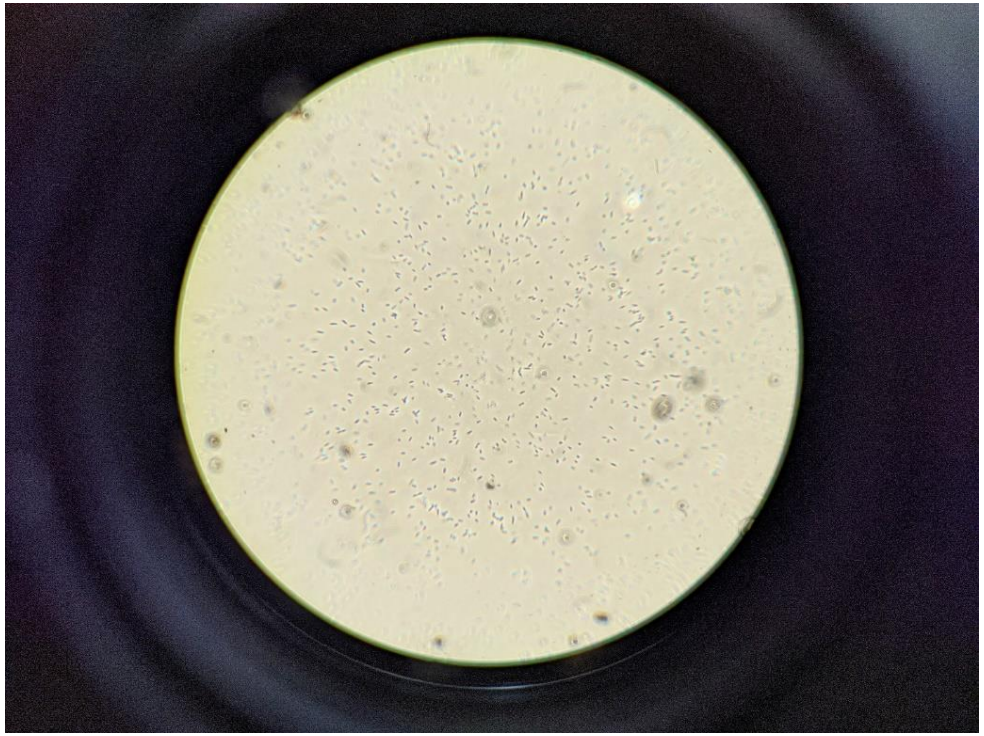
- Isolation of halophiles and psychrophiles: Greenlandish permafrost, dry crust (Mars-like).



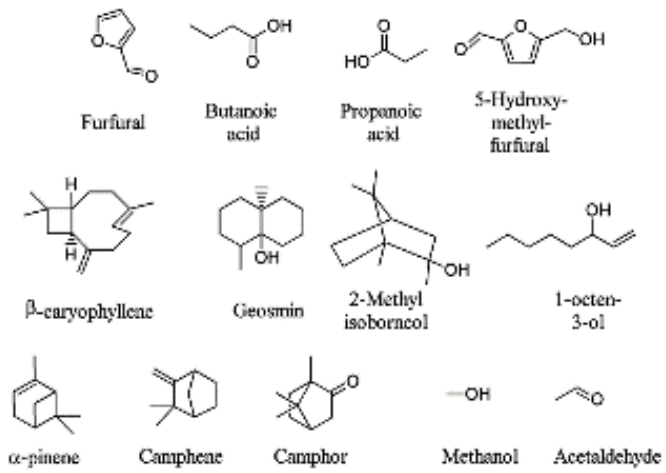
- Volatile Organic Compounds (VOCs) as a means of communication
  - Many organisms use them to communicate with one another
  - Could we use them to measure the “mood” of the extremophilic microbiome?

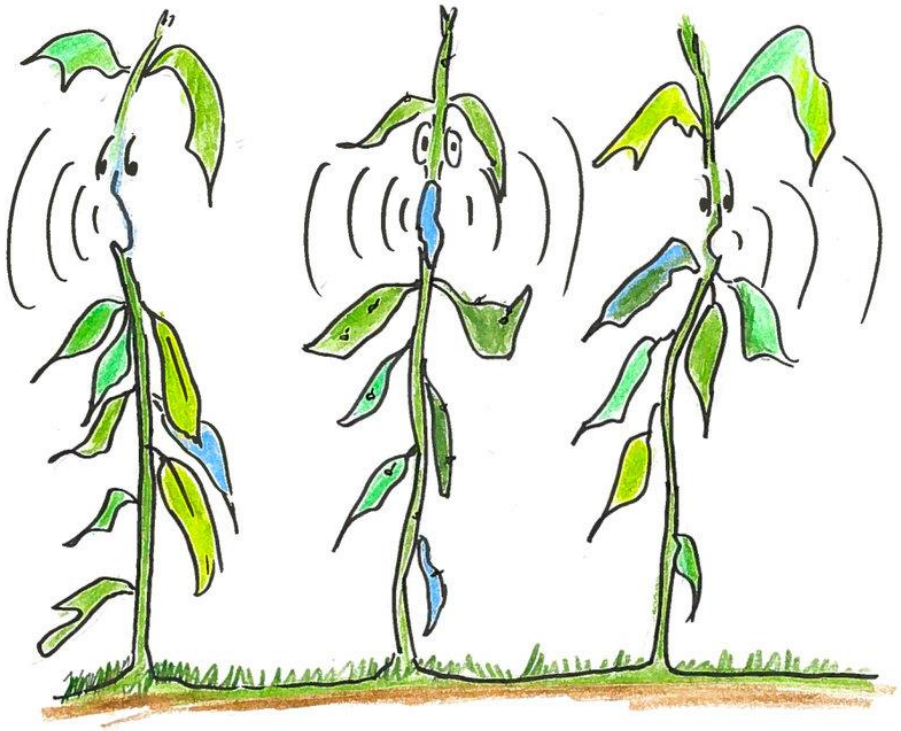
Review Article | Published: 01 February 2021

Microbial volatile organic compounds in intra-kingdom and inter-kingdom interactions

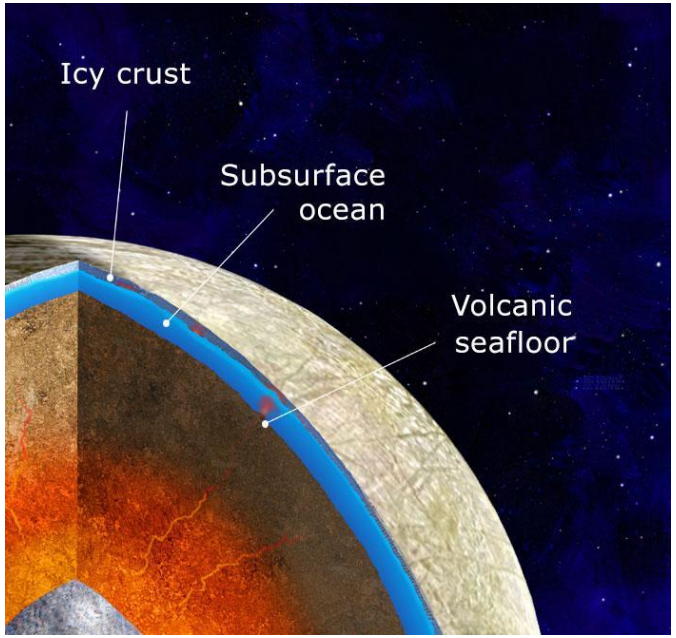
Laure Weisskopf, Stefan Schulz & Paolina Garbeva

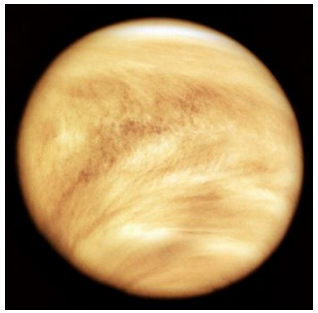
Nature Reviews Microbiology **19**, 391–404 (2021) | Cite this article

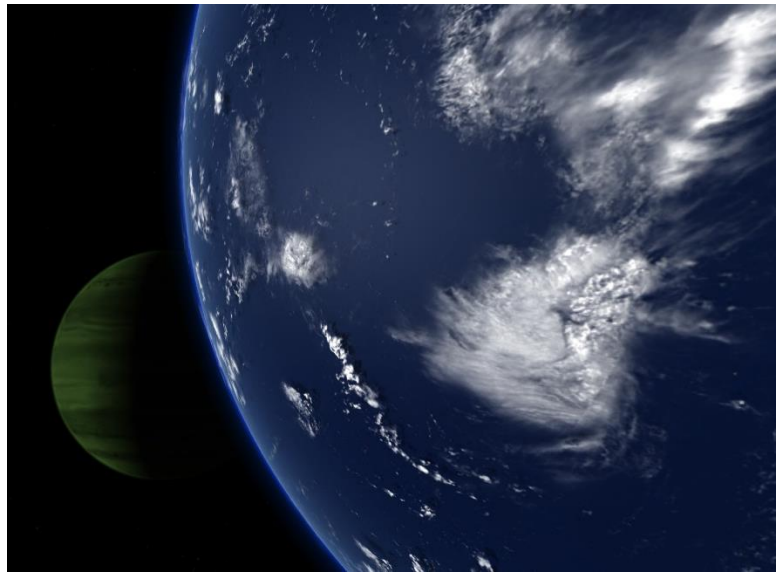




- Alien environment simulation experiments: I’m hoping to see (or make) a microbe grow under Martian conditions -> Potential use for future terraforming! Testing the limits of life?
  - Cold deserts (Mars), subsurface oceans, maybe even temperate gas giants or their moons! We shouldn’t limit our imagination.







Thank you for your attention!