BCCM/ULC: a Public Culture Collection to conserve *ex situ* the polar cyanobacterial diversity and taxonomic reference strains

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OVERVIEW

The **BCCM/ULC** public collection (https://bccm.belspo.be/about-us/bccm-ulc) aims to gather a representative portion of terrestrial, freshwater and marine cyanobacterial strains from different ecosystems with a focus on the polar diversity (140/272 strains). The collection's aim is to preserve the deposited biological material, to valorize it by performing research, to provide it to interested users for fundamental and applied research, and to provide services linked to the identification of the Cyanobacteria. An ISO 9001 certification covers the public deposition and distribution of strains, as part of the multi-site certification for the BCCM consortium.

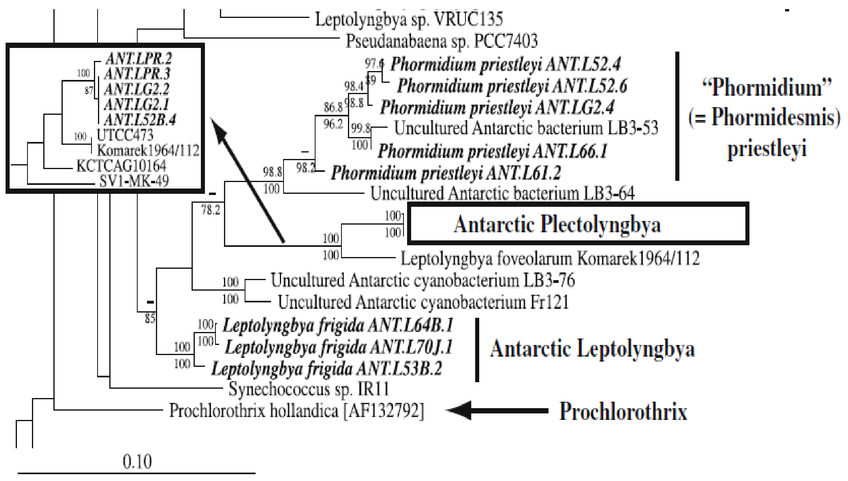
Amongst the **273 strains**, several are the reference (or 'type') for newly described taxa, including ***Plectolyngbya hodgsonii* ULC009** and ***Shackletoniella antarctica* ULC037**, which were isolated from Antarctic samples. Soon, the reference strains for *Argonema galeatum* and *A. antarcticum* will be added (Skoupý et al., 2022).

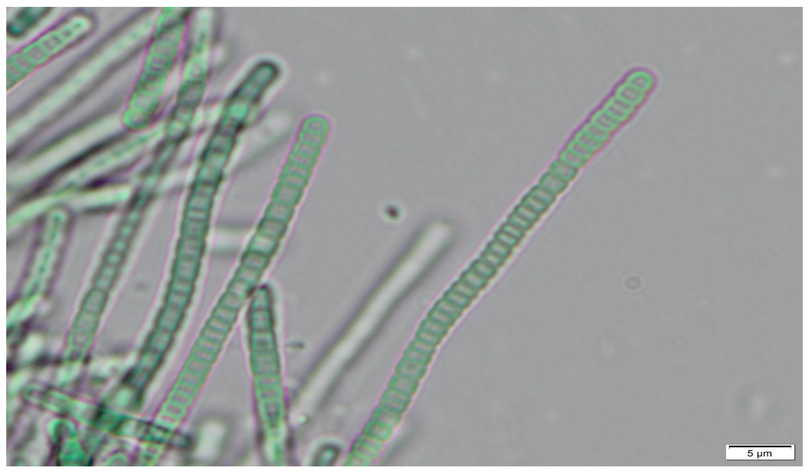
At the applied side, bioassays were performed for antifungal activities and methanolic extracts obtained from Antarctic strains showed bioactivity against the yeast *Candida* and the phytopathogenic fungus *Cercospor*a sp.

Whole genomes of ULC strains have also been sequenced. For the **FRIA project BI-HABITAT**, genomes were sequenced and have been assembled, representing Antarctic cyanobacterial strains of different morphotypes.

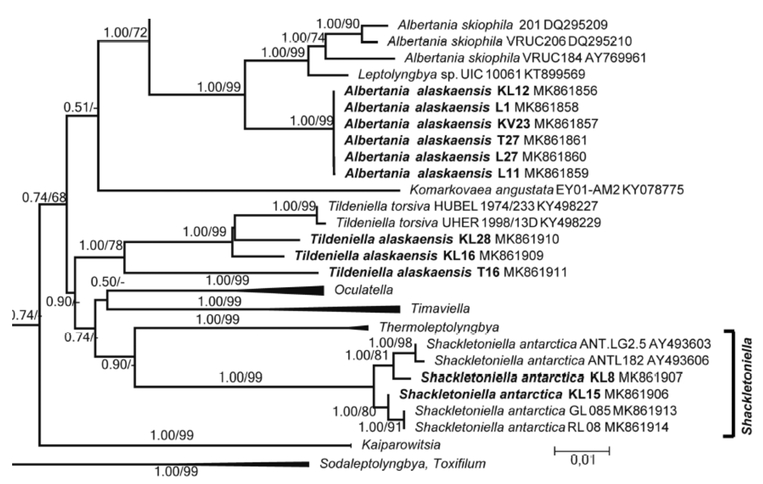
REFERENCE STRAINS – BCCM/ULC

Plectolyngbya hodgsonii ULC009^T (Antarctic origin) Taton *et al.*, 2011

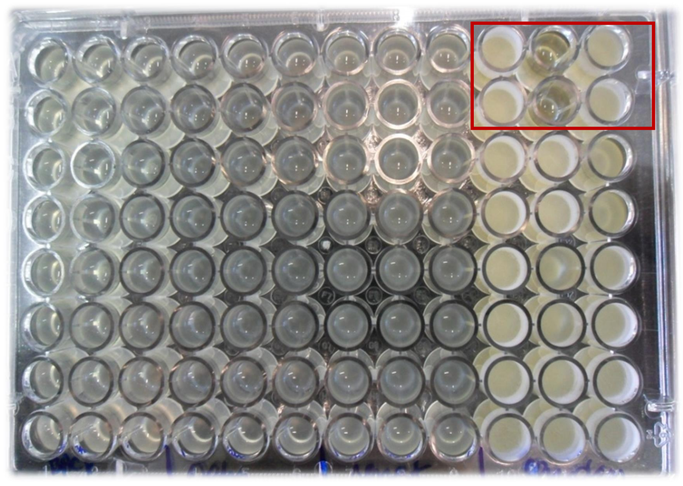




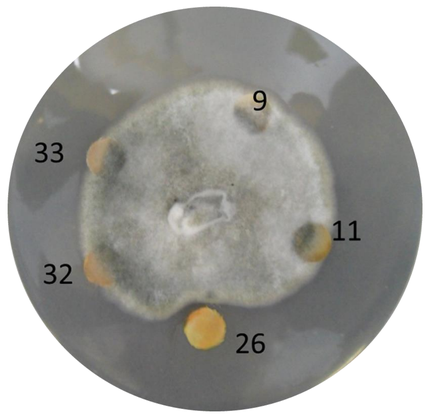
Shackletoniella antarctica ULC037^T (Antarctic origin) Strunecky *et al.*, 2019



BIOACTIVITY EVALUATION



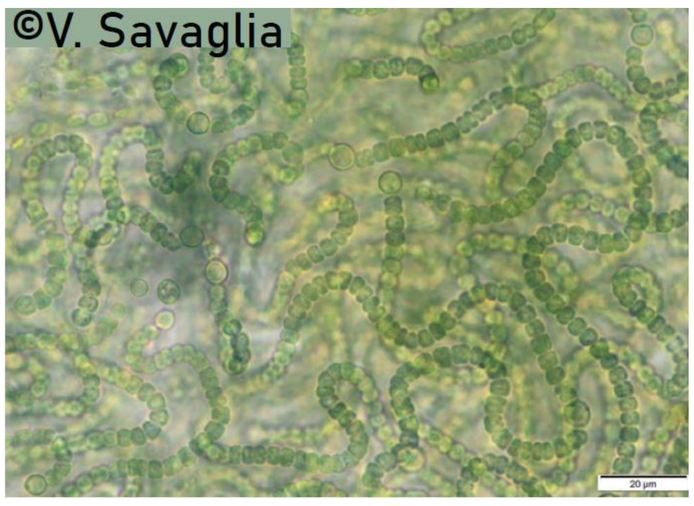
Bioassay experiment. Picture showing the growth inhibition of *Candida* by the secondary metabolites extracted from *Plectolyngbya hodgsonii* ULC009 (red frame in right upper corner).



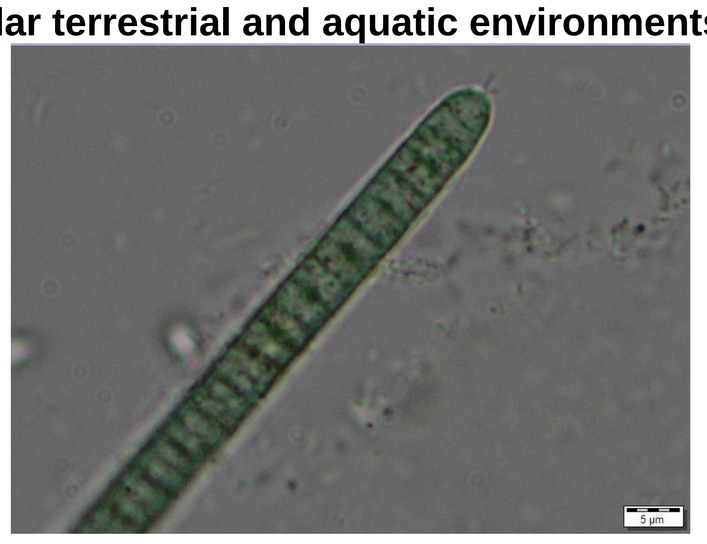
Disk diffusion assay. Extracts of 5 BCCM/ULC strains were evaluated. The bioactivity of *Phormidesmis priestleyi* ULC026 against the fungus *Cercospora* sp. is clearly visible (number 26).

GENOMES – ANTARCTIC STRAINS

Comparative genome analysis to unveil resistance mechanisms to extreme condition of non-axenic cyanobacterial strains isolated from Polar terrestrial and aquatic environments.



***Nostoc* sp. ULC180: Coverage: 99.04 %, Assembly: ~6.3 Mb.**



***Phormidium autumnale* (*Microcoleus favosus*) ULC128: Coverage: 99.71 %, Assembly: ~7.1 Mb.**

***Nostoc* sp. ULC008: Coverage: 98.11 %, Assembly: ~6.1 Mb).**

REFERENCES

Skoupý, S., Stanojković, A., Pavlíková, M. et al. 2022. New cyanobacterial genus *Argonem*a is hiding in soil crusts around the world. Sci Rep 12, 7203

Strunecky, O., Raabova, L., Bernardova, A., Ivanova, A.P., Semanova, A., Crossley, J. & Kaftan, D. 2019. Diversity of cyanobacteria at the Alaska North Slope with description of two new genera: *Gibliniella* and *Shackletoniella*. *FEMS Microbiol. Ecol.* 96:fiz189.

Taton, A., Wilmotte, A., Šmarda, J., Elster, J. & Komárek, J. 2011. *Plectolyngbya hodgsonii*: A novel filamentous cyanobacterium from Antarctic lakes. *Polar Biol.* 34:181–91.