Different resistance mechanisms to dehydration of a pair of Nostoc sp. strains from aquatic and terrestrial habitats of Antarctica

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INTRODUCTION

Biological soil crusts (BSCs) and biofilms are characterized autotrophic, heterotrophic, and saprotrophic (micro) by organisms developing in terrestrial and aquatic environments, these communities the polar regions, respectively. In ecological functions such have essential as primary production, nitrogen fixation, and ecosystem engineering conditions while with environmental extreme coping (temperature, desiccation, irradiation). The cyanobacteria *Nostoc* sp. is commonly found in BSCs and biofilms from polar environments. The ecophysiological resilience of *Nostoc* species to desiccation and other stresses is however not very well understood yet. We investigated the desiccation and rewetting response on pigments, trehalose, sucrose and gene replication of two closely related *Nostoc* strains, isolated from two Antarctic terrestrial and aquatic environments.

METHODS



Fig. 1 Location of the origin of the two *Nostoc* sp. pair used in this study. Colors refer to the terrestrial (brown) or aquatic (blue)

original habitat.

ULC008 ULC180 BCCM/ Nostoc strains and from Sp. the ULC Cyanobacterial Collection were isolated from lake mat а in Larseman Hills (Prydz Bay region, East Antarctica; Taton et al. 2006) and a granitic outcrop in the Sør Rondane Mountains (East Antarctica), respectively, and share 100 % of 16S rRNA gene similarity.

METHODS





Fig. 2 ULC008 (a) and ULC180 (b) under microscope at 40x magnification.

Fig. 3 Experimental design. Desiccation chamber during desiccation (a) and after re-wetting (**b**) (200 uL of sterile water was also added onto the filters). (c) performed analysis.

sterile water

T0 = desiccated filters; T1 = 10 min; T2 = 1h; T3 = 24h after re-wetting

Colonies were monitored through a fluorometer measuring quantuum yields (QY) from the glass cover of the desiccation chamber, as in Karsten et al. (2014). The aquatic ULC008 strain was already stressed after ~ 2h of dehydration, absence of QY was observed after ~ 3-4h. "D" samples were taken at this time.



CONCLUSION

Preliminary results of the physiological state of the two *Nostoc* sp. strains suggest that desiccation is a major stress factor for both investigated Nostoc sp. strains. Not surprisingly, the aquatic strain (ULC008) produces higher amount of sucrose and a (Fig. 5) trehalose compared to the terrestrial strain, however, the Chlorophyll a content shows a better recover of its physiology after 24h from re-wetting, even higher than the starting values (Fig. 4). Further transcriptomics analysis are ongoing to unveil the genetic adaptation of these two unique strains.



Fig. 4 Pigment composition of ULC180 (on the left) and ULC008 (on the right) before desiccation (C), during desiccation (D) and after dere-wetting (T1, T2, T3).

Fig. 5 Trehalose and sucrose content of ULC180 (on the left) and ULC008 (on the right) before desiccation (C), during desiccation (D) and after dere-wetting (T1, T2, T3).

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