FREEZING AND DRYING RESISTANCE OF ANTARCTIC *TURGIDOSCULUM COMPLICATULUM* THALLI AS OBSERVED BY ^{1}H-NMR METHODS

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Lichenized fungi can survive freezing and deep dehydration [1-3]. Numerous data suggest that freezing and dehydration resistance have a common origin and depend on lichen morphology and habitat [4, 5, 6].

Turgidosculum complicatulum (foliose thallus) samples were collected in the vicinity of Arctowski Polar Station, King George Island, Maritime Antarctic. ^{1}H-NMR spectra were collected on Bruker Avance III 300, Bruker Biospin, spectrometer (transmitter power 400 W; pulse length $\pi/2$ = 2.2 μs; bandwidths 300 kHz). Proton Free Induction Decays (FIDs) were recorded at 30 MHz on a high power relaxometer WNS HB 65, Waterloo NMR Spectrometers (pulse lenghts $\pi/2$ = 1.5 μs, transmitter power 400 W).

Proton FID consists of a solid signal component fitted well by Gaussian ($T_2^* \approx$ 25 μs) and two liquid components described by exponential functions coming from a tightly bound ($T_2^* \approx$ 120 μs), and a loosely bound water fraction ($T_2^* \approx$ 500 μs). Solid signal is fitted well by Gaussian [6, 7].

^{1}H-NMR spectra are superpositions of a Gaussian component ($\Delta\nu_G \approx$ 40 kHz) coming from protons of solid matrix of thallus and one averaged Lorentzian component ($\Delta\nu_L \approx$ 3000 Hz) coming from protons of all water fractions in different motional states.

For thalli at low hydration level ($\Delta m/m_0$<0.3) the amplitude (in time domain) and line area (in frequency domain) of liquid signal expressed in solid signal units, *L/S*, constantly decreases with decreasin temperature, what suggests non-cooperative immobilization of water molecules. For highly hydrated samples rapid decreasing of *L/S* with decreasing temperature suggests ice nucleation process.

The hydration dependency of total liquid NMR signal component expressed in units of solid, *L/S*, both in time or in frequency domain is well described by the rational function suggesting the dissolving process of the thallus solid fraction at rehydratation.

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