BOUND WATER STRUCTURE ON THE SURFACE OF *USNEA ANTARCTICA* AS OBSERVED BY NMR AND SORPTION ISOTHERM

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Antarctic lichens are pronounced example of extremophilic organism drought and cold resistant [3-5]. Experiencing the acute desiccation stress lichen thallus is covered by single or less than monolayer of water [2]. Thus, it is fundamental for understanding the molecular mechanism of the metabolic activity recovery during rehydration to have knowledge about the number and distribution of water binding sites, sequence and kinetics of their saturation, as well as the formation of tightly and loosely bound water steps at different steps of hydration process.

In our experiment we focused on the population of water binding sites during the hydration process, the nature of binding sites, and water fractions bonded at subsequent stages of early hydration process for *Usnea antarctica*. Samples were collected in Maritime Antarctic, Antarctic Peninsula, King George Island, Polish Antarctic H. Arctowski Station.

To monitor early hydration processes, the hydration courses from the gaseous phase were performed, revealing several components differentiated by their binding strength. For all samples the sigmoidal form of adsorption isotherm was observed [1], with percentage of water binding sites with high affinity higher than in freeze-dried photosynthetic membranes [6] and close to the other fruticose lichen species [2]. NMR data were analyzed using FID decomposing procedure of CracSpin [7]. The sorption isotherm revealed a sigmoidal form and, thus, was fitted using Dent model, allowing us to distinguish very tightly bound water pool. The proton relaxation results differentiated tightly and loosely bound water fraction.

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