

ANTARCTIC LICHENS – HOW TO SURVIVE IN AN EXTREMELY HOSTILE ENVIRONMENT

Summary

Lichens or the lichenized fungi, perfectly well tolerate the extreme conditions of Antarctic environment. The lichens thanks to special adaptations grow southernmost on Earth. They have been encountered only 300 km from the South Pole, where four lichen species were found. From the maritime Antarctica over 400 species are listed, and they comprise the main component of the tundra, whereas the vascular plants are represented only by the two native species. The lichenization for the fungus is a very effective way to accomplish its supplies of glucose, since about 18% of fungi species undertook such survival strategy. The advantage of fungi over the vascular plants in populating the environments with the extremely difficult climate conditions is due to the fact that the lichens can survive the extreme dehydration and extremely low temperatures. Many species resist cooling down to the tempera-

ture of liquid nitrogen, and even the exposure to the cosmic space. The lichens can uptake the water directly from the snow up to the level sufficient to start the photosynthesis. Molecular mechanisms of the low temperature and drastic dehydration survival are not, until now, fully understood and are the aim of intensive investigations carried out by our research team including specialists from botany, biophysics and physics. Taking advantage of the nuclear magnetic resonance and the differential calorimetry we were able to observe the transformation process of the water fraction loosely bound in the lichen thallus to the water fraction tightly bound, and not freezing. Better understanding of the molecular mechanisms of the organism/tissue resistance can have in the future a practical application, such as the increased time of keeping the organs for transplantations.