Impacts of ultraviolet-B radiation on mycosporine-like amino acids-producing crust-forming cyanobacteria.

Anjali Singh, PhD.

Laboratory of Cell Cycles of Algae, Centre Algatech, Institute of Microbiology CAS, Třeboň

Cyanobacteria are photosynthetic prokaryotes and grow in a wide range of habitats including certain extreme and harsh conditions such as exposed rock surfaces, hot deserts, arid areas, bark of trees etc. While growing in their natural habitats they exposed to harmful doses of UV radiation together with other abiotic stresses. These abiotic stresses especially UV-B adversely affect their normal physiology and survival. Production of UV absorbing/screening compounds such as mycosporine-like amino acids (MAAs) is one of the efficient protection strategies employed by cyanobacteria to counteract the damaging effects of UVR. This study describes the cyanobacterial species richness in biological crust samples, effects of UV-B radiation on growth, ROS generation, enzymatic and non-enzymatic defense mechanisms developed by selected test organisms isolated from crust samples (*Nostoc* sp. BT, *Scytonema* sp. Br1 and *Scytonema* sp. BT). An attempt has also been made to extract, purify and characterize UV-B screening MAAs from natural crust samples and from test organisms.

UV-B exposure resulted in significant increase in ROS generation and lipid peroxidation (MDA content) in all three test organisms isolated from crust samples. Quantitative analysis of total MAAs in crust samples revealed presence of high MAAs content (between 2,567-15,729 nmol g dry wt^{-1}) in trunk crust of *B. flabellifer* followed by roof top crust. In contrast to high amount of MAAs found in crust samples, lab grown isolates possessed relatively lower amount of MAAs (between 238-424 nmol g^{-1} dry wt). MAA present in *Nostoc* BT, *Scytonema* Br1 and *Scytonema* BT were identified as porphyra-334, shinorine and mycosporine-methylamine-threonine.