

## **SUMMARY**

This work deals with the possibility of Raman spectroscopical identification of selected biomarkers of extremophile species. It focuses mainly on selected cyanobacteria, algae and lichens with an emphasis on the ability to detect carotenoids. These pigments exhibit three characteristic bands of Raman spectra which represent stretching vibrations C=C; C-C and bending vibration C-CH<sub>3</sub> in molecules of carotenoids. Raman spectra were measured not only by laboratory microspectrometers ( $\lambda$  - 514 nm and 532 nm), but also by portable and handheld spectrometers ( $\lambda$  - 532 nm, 785 nm and 700 - 1100 nm). In the case of cyanobacteria, the spectroscopical analysis was performed also on the fractions obtained by high performance liquid chromatography (HPLC). This work critically evaluates the possibilities of Raman spectroscopy to identify the carotenoids of cyanobacteria, algae and lichens. Besides the signal of carotenoids, interpretation of other bands in the Raman spectra corresponding to the presence of other biomarkers is given here for selected samples. The obtained Raman spectra of carotenoids should be interpreted with great caution, because of the influence of several factors, which potentially cause unsystematic shifts in the positions of Raman bands (carotenoids bond in biological tissue, interactions with macromolecules, experimental factors including spectral resolution of Raman instruments). Significant structural similarities of many different carotenoids (including the length of the conjugated chain) is causing considerable similarities of Raman spectra and so this method often does not allow for a clear identification of these molecules. The ideal case of obtaining extracts is reflected in the analysis of pigment mixtures by HPLC.