XIII. SUMMARY

In the presented thesis, selected polish lichen species have been subjected to phytochemical reseach and assessment of biological activity.

Lichens are symbiotic organisms consisting of fungus (mycobiont) and a photosynthetic partner (photobiont) that can be either an alga or cyanobacterium. They are the only partnership of this kind not fund among other plant symbioses. Before Schwendener's revolutionary discovery of 1867 about their dual nature, they were treated as a systematic unit separate from fungi, mosses or algae and include in the plant kingdom. Nowadays lichens belong to fungal kingdom and are referred to as lichenised fungi because they have the ability to form symbiosis with algae.

20 species of lichenised fungi were collected from the areas of lubelskie and małopolskie voivodships. Four of them: *Cetraria islandica* (L.) Ach., *Cladonia phyllophora* Hoffm., *Cladina mitis* Sandst., *Hypogymnia physodes* (L.) Nyl. were collected from two, and *Cladonia furcata* (Huds.) Schrader from three different sites. In total, 26 samples were collected. Separate extracts were prepared from all samples. The collected lichens included species under partial species protection in accordance with the RMŚ of October 9, 2014, for which a permission was obtained for collection issued by the Regional Director for Environmental Protection in Lublin.

The raw materials were extracted using a Soxhlet apparatus. Dichloromethane, methanol and 60% methanol extracts were prepared and Thin Layer Chromatography and High Performance Chromatography were used for fingerprint analysis with the use of (+)-usnic acid as a standard. The extracts were also subjected to HPLC quantitative analysis of (+)-usnic acid. The antioxidant potential of lichens was also tested by TLC using a DPPH solution as a derivatizing agent. The free radical scavenging capacity was identified on the TLC chomatogram as light yellow zones of antioxidants on a purple background. Quantitatively, the activity of the extract was examined spectrophotometrically with the use of two methods: DPPH and FRAP. The method with DPPH and FRAP enabled the determination and quantitative expression of the antioxidant activity as gallic acid and trolox equivalent. In addition, analysis from DPPH allowed the calculation of %inhibition of free radicals extracts.

After optimization of the TLC separation conditions, the samples were examined by direct bioautography (TLC-DB) analysis using the *Bacillus subtilis* strain. Cytotoxic properties were also tested, using the HL-60 / MX2 cell line.

In the next stage of research, the results were subjected to chemometric analysis. To enable comparison of the chemical similarity between the tested extracts, similarity and distance measures were used for their chromatographic data: Euclidean distance and Pearson's correlation coefficient (r). The obtained results were presented as the dendrograms. The data were also subjected to the principal component analysis (PCA), which also showed similarity between the analyzed extracts. Then, the TLC and HPLC chromatographic data were correlated with the cytotoxic data and the data describing the antyoxidative activity of tested lichens using the least squares regression (PLS) method.