

3. SUMMARY OF THE MAIN RESULTS OF THE THESIS

The submitted thesis includes seven papers discussing new findings in morphology, chemistry, ecology and distribution of the genus *Lepraria* and some other lichens. Hereinafter the main results coming out of these papers are listed.

1. During own chemotaxonomic research of the genus *Lepraria*, several species new for the science have been described – *Lepraria celata* Slavíková, *L. granulata* Slavíková, *L. humida* Slavíková & Orange, and *L. toensbergiana* Bayerová & Kukwa (Bayerová et al. 2005, Slavíková-Bayerová & Fehrer 2007, Slavíková-Bayerová & Orange 2006). Furthermore, other taxa provisionally named *Lepraria* sp. BG, *L. sp. G*, and *L. sp. H* have been introduced, whose taxonomic status is not yet entirely clear. In addition, there has been found a taxon *Lepraria* sp., which is chemically similar to the species *L. atlantica* Orange, differing however in morphology (Slavíková-Bayerová 2006). The taxon is either a yet undescribed species or an extreme form of *L. atlantica*. The examination of more material to clarify the identity of these taxa will be required.

2. In the species *L. atlantica*, *L. celata*, *L. jackii*, *L. granulata*, *L. humida*, *L. sylvicola* Orange, and *L. toensbergiana*, the presence of hyphae growing often into cracks and cavities of the substratum with the tendency to penetrate it was found out (Slavíková-Bayerová & Fehrer 2007, Slavíková-Bayerová & Orange 2006). The hyphae had been previously regarded as medulla (*L. jackii*) or hypothallus (*L. toensbergiana*). Since they do not form a continuous layer and their function is probably attaching to the substratum, the term rhizohyphae was proposed. They are orange in *L. atlantica*, *L. humida*, and *L. sylvicola*, whereas they are usually white in other species. They occur rarely in *L. granulata* and are whitish grey, grey to blackish grey, sometimes yellowish orange-brown. The orange-coloured hyphae contain anthraquinones and they show positive thallus reaction with K, whereas the white to blackish-grey do not react with K.

3. New aliphatic acids – toensbergianic acid, 'granulata unknown 1', and 'granulata unknown 2' – have been found in *L. granulata*, *L. jackii*, *L. sylvicola*, *L. toensbergiana*, and *L. sp. G* (Bayerová & Haas 2005, Slavíková-Bayerová & Fehrer 2007, Slavíková-Bayerová & Orange 2006). Toensbergianic acid is a diastereoisomer of roccellic acid (either diastereoisomer I or II, eventually a mixture of both isomers). The detection of the structure of the provisionally named substance 'granulata unknown 1' is an object of current research. The structure of the substance 'granulata unknown 2' is not being studied any more, because its concentration in the thallus is too low. All above-mentioned substances can be clearly distinguished from the other ones described so far using TLC.

4. For the Czech Republic, a number of new leprarioid lichens have been found – *Botryolepraria lesdainii* (Hue) Canals et al., *Caloplaca chrysodeta* (Vain. ex Räsänen) Dombr., *Lepraria borealis* Lohtander & Tønsberg, *L. crassissima* (Hue) Lettau, *L. diffusa* (J.R.Laundon) Kukwa, *L. ecorticata* (J.R.Laundon) Kukwa (sub *Lecanora leuckertiana* Zedda), *L. granulata*, *L. nylanderiana* Kümmerl. & Leuckert, *L. toensbergiana*, and *L. umbricola* Tønsberg (Bayerová & Kukwa 2004, Bayerová et al. 2005, Slavíková-Bayerová 2006,

Slavíková-Bayerová & Fehrer 2007). In *L. nylanderiana*, there were published localities moving the delimitation of its distribution area further to east (Slavíková-Bayerová 2006). The findings yielded from the examination of the Czech representatives were compared with the literature. The differences found were discussed.

5. The thallus surface of about 50 species of lichen-forming fungi, e.g. *Cladonia* sp. div., *Lecanora* sp. div., *Lepraria* sp. div., was investigated using scanning electron microscopy (Slavíková-Bayerová & Haas, in review). Crystals of secondary metabolites were found in different shapes and density on the thallus surface. Thread-like crystals (TCR) were the most frequent ones and they were divided into three categories (TCR 1, TCR 2 and TCR 3). TCR (most often TCR 2 & 3) were observed on the surface of soredia in terpenoid-producing species, e.g. *Botryolepraria lesdainii*, *Chrysothrix chlorina* (Ach.) J.R.Laundon, *Cladonia deformis* (L.) Hoffm., *Lecanora subaurea* Zahlbr., *Lepraria incana* (*Phyiscia clementei* (Sm.) Lynge was the only one forming TCR 1). However, the presence of terpenoids in the thallus does not always imply the formation of TCR, since the surface of non-sorediate species containing terpenoids, e.g. *Lecanora intricata* (Ach.) Ach., proved to lack such crystals. However, they might occur inside of the thallus (that was not examined). The examined species not containing terpenoids (both sorediate and non-sorediate), either had no TCR or developed thread-like crystals of the type 1 or tiny crystals of various shape (rarely larger angular stick-like crystals) or very exceptionally TCR 3 (*Cladonia zopfii* Vain.). Based on observations and chemical analyses, it can be concluded that thread-like crystals of the types 2 and 3 most likely consist of zeorin or other terpenoids, while TCR 1 and other forms of crystals might originate from terpenoids or the other secondary metabolites or some kind of contamination. The chemical composition of thread-like crystals of some species remains unclear and further studies are needed. The function of thread-like crystals is not quite clear as well. TCR may have a protective function, they may contribute to the spatial separation of a single soredium from consoredia and/or they could increase the surface exposure which would provide more effective wind dispersal.

During the examination of the thallus surface of selected representatives of the genus *Lepraria* using light and scanning electron microscopy, no so far neglected morphological features usable in taxonomy were found (except the already above-mentioned rhizohyphae). Only in *Botryolepraria lesdainii*, *Lepraria crassissima*, *L. ecorticata*, *L. elobata*, *L. incana*, and *L. lobificans*, there were found TCR 3 on the soredia surface, which might be visible even under binocular microscope (if present in high density). These crystals indicate the presence of terpenoids, which can be used for rough orientation in determination of some taxa. On the thallus surface of other representatives of the genus *Lepraria*, there were (i) either no crystals (e.g. in *L. alpina* (de Lesd.) Tretiach & Baruffo, *L. nylanderiana*) (ii) or present TCR 1 (e.g. in *L. rigidula*, *L. vouauxii*), (iii) or tiny crystals of oblong, but indistinguishable shape (e.g. in *L. diffusa*, *L. jackii*) (iv) or thin platelet-like formations (just in *L. toensbergiana*; Bayerová et al. 2005).