



SLOVAK ACADEMY OF SCIENCES  
INSTITUTE OF BOTANY  
DÚBRAVSKÁ CESTA 14  
845 23 BRATISLAVA  
SLOVAK REPUBLIC

TEL: ++421-2-59426143 FAX: ++421-2-5477 1948 E-MAIL: ANNA.GUTTOVA@SAVBA.SK

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To whom it may concern

Review of the PhD thesis

**New findings in taxonomy and chemistry of the genus *Lepraria* (Stereocaulaceae, lichen-forming fungi)  
[Nové poznatky v taxonomiii a chemismu rodu *Lepraria*]**

by Štěpánka Slavíková, Institute of Botany AS CR, Průhonice, Czech Republic

Introduction

The genus *Lepraria* is widely distributed in the world and comprises permanently sterile lichenized fungi with a leprose to byssoid thallus and entirely sorediate surface. For a long time it was much neglected, but the recent use of secondary metabolites along with the very recent application of molecular studies in taxonomy have intensified interest in the genus. The intensification of research in poorly studied areas has resulted in the description of many new taxa. I borrowed these facts from Adam Flakus and a great "leprariologist" Martin Kukwa (Lichenologist 39: 463-474, 2007) to introduce the setting of the scope of the reviewed PhD thesis and at the same time to pin point the fact, that the research in the genus *Lepraria* over the last decade was a giant leap for understanding it. Štěpánka Slavíková stepped into the "buzzing world" of the genus *Lepraria* and successfully got a grip over the theme since the very start. Her thesis present a step-by-step systematic treatment of topic based on the European material, predominantly from Czech Republic, Slovakia, Poland, Ukraine and Bulgaria. To review this work is a great challenge to me.

Assessment

- Presentation and clarity

The outputs of the studies are presented as a book collecting twelve chapters including References and Annexes in Czech language combined with reprints of already published articles, alternatively with a manuscript being peer-reviewed. The text is telling the story clearly, the style is accurate, without unnecessary duplications or repetitions. The reference list is accurate.

- Integration and coherence

There is logical and rational link between the chapters of the thesis. Already published articles or the manuscript are set in the text in such a way too. The link with the chapters is secured by appropriate introduction and comment in Czech language.

- Contribution to knowledge

The thesis is built upon 6 articles published in peer reviewed international journals. New species for science are published in top cryptogamological journals, being Bryologist (1 article) and Lichenologist (2 articles). New secondary metabolite was described in an

article published in Bryologist. New findings on diversity of the genus *Lepraria* in the studied area was published in Biologia and in a chapter of the book released by Mycotaxon Ltd. This is a “prima facie” evidence of a high standard of the thesis. Another one is also the team of co-authors, being experts in relevant topics – Martin Kukwa, Alan Orange (genus *Lepraria*), Judith Fehrer (molecular techniques) and Klaus Haas (chemistry).

- Originality and creativity

During the PhD thesis, Štěpánka Slavíková showed a great level of independent working, which is in countries with a few number of lichenologists a crucial precondition for success. The reason is that there is no chance to be a part of a larger team working towards a common goal/problem solution. Štěpánka Slavíková created her own strategic road map how to deal with the taxonomy of the genus *Lepraria*. She built her expertise during the stays in Germany, acquired skills with TLC techniques which are essential in this field, with a support of the Institute of Botany built her laboratory for TLC and electron microscopy, successfully fundraised to support her research work as well as study stays abroad and initiated basic studies on the nuclear ribosomal DNA (ITS) to add up further characters supporting/excluding species concept within *Lepraria neglecta* group. Highly innovative approach was to examine the surface of the thalli, when thread-like crystals were discovered (the manuscript), chemical composition studied and implications for taxonomical purposes was presented.

- Review of relevant literature

Chapters 4 – 7, with an exhaustive tables synthesizing the current knowledge on so far described species and their occurrence (Tab. 1), on morphology (Tab. 2), chemistry (Tab. 3), spot tests (Tab. 4) and ecological requirements (Tab. 5) are highlights of the review. Štěpánka Slavíková demonstrated that she has detail knowledge of original sources, thorough knowledge of the field and understands both theoretical and methodological issues. These chapters are an evidence of her analytical approach, with an understanding of differences in opinion. These chapters are concise, penetrating and challenging to read.

- Statement of the research problem

Research problems were clearly stated in Chapter 2 and the need why to address them is worthwhile was accurately justified.

- Methods of enquiry adopted

Sense of planning is clearly visible in the work. This includes a reasoned consideration of the techniques that the chosen methods require. As already mentioned in the section Originality and creativity, all relevant methods were thoroughly applied in the study: classical anatomy and morphology, compulsory chemistry (TLC techniques), genetic markers (ITS sequences) and creative approach of study the surface of the thallus through SEM. Štěpánka Slavíková clearly demonstrated why each particular analysis was conducted, how it was done, and what the analysis tells about the data.

- Discussion of outcomes

Chapter 10 summarizes without undue repetition what has been achieved and evaluates the contribution to the knowledge on the genus *Lepraria*. There are also pointers to future work to be done.

## Summary

The results of the thesis were already published in a peer-reviewed journals, hence underwent a review procedure and major questionable issues were already put in place. I would like to ask Štěpánka Slavíková the following questions:

- *Chapter 6.3 Types on infraspecific variability of chemistry*: 3 types of variability are explained, the last of them being accessory compounds. One group of accessory compounds could be biogenetically distant compounds present in higher concentrations, which are not related to the constant compounds and they cause major confusion. Could you give some concrete examples?
- Tønsberg 2004 (*Lichen Flora of Greater Sonoran Desert*) explains: "it is not possible to distinguish two aliphatic acids - angardianic acid and roccelic acid through TLC". Some species are characterized by the presence of either of them (ang/rok, see Tab. 3), some of the species (e.g. *L. membranacea*, *L. nylanderiana* or *L. nivalis*) just one of them (rok). Which techniques are appropriate to separate them? Are there any cases that either "ang" or "rok" define a species within the genus *Lepraria*?
- p. 39 *a list of abbreviation for secondary metabolites and their names in Czech*: I wonder what was the process to create Czech counterparts to English names of lichen secondary metabolites. Are they somehow accepted within the audience of experts dealing with chemistry?
- Related to the article on new species of the *Lepraria neglecta* group (p. 85 – 93): There was just one ITS variant detected from the specimen of *Lepraria* sp. G to avoid contamination (possibly mixed specimen). How many ITS variants were detected at other analyzed samples, in average? Which further genes are feasible to study in *Lepraria neglecta* group and other *Lepraria* groups to get a better supported hypotheses on relationship between and among other taxa?
- Referring to the reduction of *L. toensbergiana* to synonymy of *L. jackii* by Baruffo et al. 2006, are there any novelties which clarify the situation?

## Conclusion

The PhD thesis of Štěpánka Slavíková are of high standard and meeting all the criteria which are set. The success is undoubtedly due to a determined character of the candidate as well as the setting of lichenological environment in Prague created by the supervisor Dr. Jiří Liška, which she joined already during the Master degree studies. After successful defence of the PhD thesis I highly recommend that Štěpánka Slavíková is given the PhD degree.

Mgr. Anna Guttová, PhD.  
senior researcher  
Department of non-vascular plants