

The Hidden Potential of South American Dermocyboid Cortinariii [POSADEC]: PhD Position

Wider research context

South American (SA) Nothofagaceae forests harbour unique, endemic tree species, representing the oldest lineages of *Nothofagus* evolution. Ectomycorrhizal fungi co-evolve with the associated plant partner, but mutualistic fungi are still widely under-explored in these areas. Our previous studies demonstrated that diversity of unknown dermocyboid Cortinariii is high there and is reflected in high chemotype (pigment) diversity. Pigments of dermocyboid *Cortinarius* species are based on (pre)anthraquinones, one of the most promising classes of natural photosensitizer. A systematic study of the photobiological active pigments is needed to understand the ecological function of such pigments. A thorough taxonomical investigation is essential, because chemical and pharmacological analyses must be based on unambiguously defined taxa and clearly identified vouchers.

Hypotheses of POSADEC

- H1. South American *Nothofagus* forests harbor a rich and unique diversity of dermocyboid fungi.
- H2. South American dermocyboid *Cortinarius* contain new and unique anthraquinone structures.
- H3. Pigments from dermocyboid fungi are relevant photosensitizers.

Objectives of POSADEC

- O1. Sampling and describing South-American dermocyboid *Cortinarius* species
- O2. Molecular Network Analyses
- O3. Isolation, identification, and photo-pharmaceutical evaluation of the pure pigments

Level of originality and innovation of POSADEC

Linking biological diversity to diversity of compounds and function is a straightforward approach, allowing for an efficient and successful discovery of new species, new compounds, and new photosensitizers. Molecular network analyses are used as highly innovative metabolomic-taxonomical tool and will be tested based on a multi-gene phylogeny and classical morphological methods. This will contribute to fill blank spaces in basal *Cortinarius* lineages on a global scale and contribute to understanding of secondary metabolite evolution. New pigments will be discovered, isolated, and identified. Photoactive pigments are tested for biological activity with a focus on targeted light activation.

The research focus of the announced PhD Position

Chemical characterization and photobiological ranking of fungal specimens belonging to dermocyboid *Cortinarius* and related species. Photoactivity guided isolation of the active compounds of the most interesting species. Performance of photoantimicrobial tests against common human pathogenic and

plant pathogenic microbes (S1 and S2 level), (photo)cytotoxicity assays, (photo)anthelmintic assays, and molecular biological assay to identify potential cellular targets, and/or the mode-of-action.

Supervision

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Co-Supervision: Ursula Peintner and Simone Moser

Cooperation/ International Partners

Norbert Arnold, Institute of Plant Biochemistry (IPB) Halle (Saale), Germany

Götz Palfner, Universidad de Concepcion, Chile

Carolina Barroetaveña, María Eugenia Salgado Salomón, Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Esquel, Argentina

Details Position University of Innsbruck

FWF PhD-position 3.4 years (initial contract 9 months) 25h per week, gross salary €2048,31 per month (14x per year)

Start

Between May 2023 and July 2023

Requirements

- Master in chemistry, pharmacy, food chemistry, biochemistry, or similar study
- Interest in multidisciplinary research questions, i.e., in photochemistry and photobiology, natural products from fungi (especially polyketides) and analytical studies (e.g., FBMN studies)
- Experience in the isolation of natural products, analytical studies, bioactivity assays, and data analysis will be an advantage.
- Interest in cooperation with international partner(s)
- Ability to work independently and affinity to mobility is desired

Application

Please prepare the following two pdf documents (with chapters in the given order):

NAME_application.pdf

1. Motivation Letter: 1-2 pages; description of why you want to participate in “Potential of South American Dermocyboid *Cortinarius* Species”
2. CV: 1-2 pages; including publication list if available.

NAME_documents.pdf

1. B.Sc.-diploma and transcript
2. M.Sc.-diploma and transcript
3. M.Sc.-thesis abstract

Please send your application or further questions to Bianka.siewert@uibk.ac.at