From morphology to molecules: a functional and multiscale journey into the lichen symbiosis

Fabio Candotto Carniel[1] & Ilse Kranner[2]

[1]Department of Life sciences, University of Trieste, via L. Giorgieri 10, 34127-Trieste, Italy
[2]Department of Botany, University of Innsbruck, Sternwartestraße 15, 6020-Innsbruck, Austria

This session examines the integrative physiology of lichens as complex holobionts, comprising a fungal mycobiont, an algal and/or cyanobacterial photobiont with their associated microbiota, through laboratory or field studies. Contributions may address intact thalli or aposymbiotic partners in axenic culture in order to disentangle individual symbiont roles and reveal traits that emerge only in symbiosis or are required for establishing the partnership. Emphasis can be laid on the desiccation tolerance of these consortia, which can endure repeated desiccation–rehydration cycles, with swiftly resuming metabolism upon rewetting, or other mechanisms conferring extremotolerance that support survival in alpine, polar or desert habitats. Topics may include morpho-anatomical, biophysical and biochemical adaptations, water relations and metabolic integration, cover primary processes such as photosynthesis and nutrient exchange within the thallus, and secondary processes exemplified by the synthesis of lichen-specific secondary metabolites that bolster stress tolerance. We particularly welcome physiology-oriented molecular approaches, including genomics, transcriptomics, proteomics and metabolomics, as recent metagenomic surveys have uncovered hundreds of biosynthetic gene clusters across lichen symbionts.