

From genes to molecules: genomics, biosynthesis, and biochemistry

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Lichen biochemical research has made substantial progress across multiple domains, unveiling new insights into the secondary metabolite potential and diversity of these intricate symbiotic organisms. Advances in heterologous expression techniques have facilitated the functional characterization of some of the biosynthetic gene clusters (BGCs), significantly deepening our understanding of lichen secondary metabolite synthesis. In cases where heterologous expression remains challenging, genome mining —driven by next-generation sequencing— and advanced BGC detection and clustering algorithms enable the linkage of genes to molecules. These approaches have led to the identification of novel BGCs and BGC classes, as well as a clearer picture of the genetic regulation underlying metabolite production. In addition, detailed metabolite studies, enabled by advances in high-resolution LC-MS/MS, have also furthered our understanding of the chemical potential of lichen. Furthermore, the integration of genomics with ecological studies has shed light on how environmental factors influence lichen biosynthesis and metabolic diversity. This symposium will present the latest advancements in these areas, focusing on the convergence of genomics, biosynthetic pathways, and ecological dynamics in lichen biochemistry.