

PREFACE

Ecometabolomics is an emerging new discipline that concentrates on applications of metabolomics, wherein we can integrate metabolomic approaches with ecology to decipher the biochemical interactions of organisms across the diverse spatial and temporal scales. Metabolomics is an untargeted biochemical approach to estimate the numerous thousands of metabolites in different plant and animal species. Any variation in metabolite concentration can contribute to our understanding of mechanistic evidence for biochemical processes that are pertinent at ecological scales. This variation is comprised of physiological, phenotypic, and morphological responses of plants and plant communities to ecological variations, and also their interactions with other organisms. Conventionally, research in biochemistry and ecology represents totally discreet paradigms emerging from two different directions and moving at diverse spatiotemporal scales. Typically, biochemistry adopts the bottom-up approach, commencing from cellular processes and advancing from spatiotemporally refined to expansive scales. On the contrary, ecology is based on extrinsic processes that occur at the population and community levels, and generally investigates the top-down and bottom-up processes together. Ecometabolomics is a trans-disciplinary subject that integrates biochemistry and ecology and inter-relates the discreet spatiotemporal levels. In this book, we have summarized developments and analyzed the progress made in ecometabolomics over the past decade from varied angles. Furthermore, we have tried to cover metabolomics topics such as (1) targeted metabolite profiling and metabolite fingerprinting; (2) an integrated approach to plant biology via multi-analogous methods; (3) metabolomics studies of stress in plants; (4) climatic change and metabolome fluxes; and (5) statistical analyses and bioinformatics software tools. The presented solutions to challenges in these areas of study are likely to advance our understanding by connecting the distinct spatiotemporal scales and bridging the concepts of biochemistry and ecology. We have tried our best to cast a glance over the comprehensive development that has taken place in metabolomic studies, but there is always scope for further improvement. We will be pleased if students or readers/naturalists add to our efforts through valuable comments and constructive criticism.

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