
Preface

Over 450 million years ago plants started to colonize land and “greened” the continents. The appearance of land plants is a key event in the history of life and shaped the evolution of all terrestrial ecosystems on our planet. Remarkably, an alliance with fungi was probably essential for the plants’ conquest of land. Today, this alliance between plants and soil fungi, known as the “mycorrhizal symbiosis,” remains of vital importance: the vast majority of plants are dependent on mycorrhizal fungi for their uptake of minerals and water from the soil. Mycorrhizal fungi are not drawn into this interaction by philanthropy: they obtain essential photosynthetically fixed carbohydrates from their plant partners in reward for their efforts. However, over the course of evolution several plant lineages have found ways to subvert this *quid pro quo* interaction, and are able to obtain water, minerals, *and* carbohydrates from fungi. Some plants are able to exploit fungi to such an extent that they lost the need for photosynthesis. The ability of a plant to live on fungal carbon is known as mycoheterotrophy. This intriguing process has fascinated botanists for centuries, yet many aspects of mycoheterotrophy have remained elusive for a long time. And despite recent advances in our understanding of the process mycoheterotrophy and its protagonists, this volume also illustrates that there is still much to learn.

The idea for a book providing an overview of the biology of mycoheterotrophs sprouts from my passion for these plants and the lack of recent volumes offering general insights into their fascinating ecology, diversity, and evolution. Rather than assembling a volume consisting of research papers, I aimed to provide the reader with a thematic overview of different aspects of mycoheterotrophy. However, a multiauthor book like this will never be fully coherent, and inevitably there is a certain overlap between the contents of the chapters. I am also aware that there are gaps, and thus some topics did not receive the coverage they deserve. Despite these shortcomings, I hope that this book proves a valuable tool for everyone who is interested in the process of mycoheterotrophy, and offers strong stimuli for further research on these intriguing plants.

This book owes its existence to Sean Graham. Sean approached me after a talk I gave at the 2008 Monocots meeting in Copenhagen. I had concluded my talk with the suggestion that the time was ripe for a book on mycoheterotrophy, and Sean enthusiastically linked me with Springer. The project was further outlined in a meeting in Leuven at which many of the contributing

authors were present. I was able to organize this meeting with the support provided by Erik Smets and Suzy Huysmans. Without their involvement, the book would never have been put together. Editing this book has been a definite challenge and I could not have completed it without the help and dedication of all the authors, who also displayed considerable patience as the book slowly came together. I would like to thank them for their excellent work. I also deeply acknowledge the help of the many colleagues who provided direct or indirect support in the development of manuscript, including Tom Bruns, Anthony Amend, Steven Janssens, Benny Lemaire, Martin Brazeau, Rudi Smith, Joep Moonen, Mark Wapstra, and Sainge Moses. I also thank the people at Springer for their continuous support and advice. Over the years, my research on mycoheterotrophic plants has been possible with financial support from the Belgian and Dutch National Science Foundations (FWO Vlaanderen and NWO), the agency for Innovation by Science and Technology (IWT Vlaanderen), and the Belgian American Educational Foundation (BAEF), for which I am grateful. Finally, I also take this opportunity to thank my family, colleagues, and friends who have encouraged, motivated, and inspired me.

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