

Preface

This book arose from a meeting at Rothamsted Experimental Station in September 1993, sponsored by the Plant Metabolism Group of the SEB. It was one of several meetings, on a wide variety of topics, which helped to celebrate the 150th anniversary of Rothamsted, which was founded by John Bennett Lawes in 1843. At that time, Lawes was involved in the commercial production of superphosphate fertilizer, and the experiments begun by Lawes and his co-worker Gilbert investigated many aspects of plant nutrition. That the conference (and this book) dealt with amino acids, end products of nitrogen assimilation in plants, is most appropriate considering the pioneering work of Lawes and Gilbert on plant nitrogen nutrition.

Amino acid biochemistry in plants has been a major topic of research at Rothamsted for more than 20 years, and many major advances have been made: the discovery of the glutamate synthase cycle for the assimilation of ammonia, the first description of the photorespiratory nitrogen cycle, and detailed genetic, biochemical and molecular analysis of these processes; the biochemistry and genetics of amino acid biosynthesis, particularly aspartate-derived amino acids; and most recently the biochemistry of amino acid-derived secondary metabolites. This work has involved many other researchers from laboratories all over the world, and it was a great pleasure to welcome so many past and present collaborators to the meeting, and to read of their latest work in the chapters of these proceedings. One aspect that was very clear at the meeting, and I hope is reflected in the book, is the need to integrate many disciplines if we are to understand the biology of amino acids in plants: physiology, genetics, biochemistry and molecular biology all have a part to play, and none of them alone can provide all the answers. The fastest and most secure progress will come from integrated approaches covering all these disciplines and methodologies.

Many other topics are covered in this volume, yet even so we have not been able to cover the whole field of amino acid metabolism in plants – no single volume could! In particular, the amazing variety of

non-protein amino acids and amino acid-derived secondary metabolites are only superficially covered, and we have not included any chapter on the shikimic acid pathway and the vast range of metabolites derived from it. Fortunately, aromatic amino acid biosynthesis and metabolism have been comprehensively reviewed elsewhere. Several other books have recently dealt with aspects of amino acids in plants, and it is a measure of the scale of the field that there is relatively little duplication or overlap with the current volume!

There are still many aspects of amino acid metabolism in plants that are only poorly understood. The biosynthesis, and metabolic regulation of synthesis, of several protein amino acids still pose questions, such as histidine synthesis, the regulation of methionine synthesis, (neither covered here), and proline metabolism, which is dealt with in a limited way in this volume. Amino acid-derived secondary metabolites are still a rich field for biochemists, and recent progress in understanding cyanogenic glucoside and glucosinolate metabolism is encouraging. The differences between these superficially similar pathways are intriguing, and suggest that the plant kingdom still has many surprises for us. The meeting at Rothamsted has, I hope, encouraged new interactions and stimulated current ones between workers in the field, to take research forward in many of these (and other) areas.

I would like to record my appreciation of the financial and other assistance provided by Rothamsted, Ciba-Geigy, Schering AG, Cyanamid, and Unilever, plus the encouragement and assistance provided by Steve Rawsthorne of the Plant Metabolism Group. Many people helped to make the meeting a success, and to produce this book, and my thanks go to all of my colleagues for their assistance and support.

Roger Wallsgrove
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