

The Science of Flavonoids

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Edited by

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 Springer

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The background of the cover corresponds to the accumulation of flavonols in the plasmodesmata of Arabidopsis root cells, as visualized with DBPA (provided by Dr. Wendy Peer). The structure corresponds to a model of the Arabidopsis F3 'H enzyme (provided by Dr. Brenda Winkel). The chemical structure corresponds to dihydrokaempferol.

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PREFACE

There is no doubt that among the large number of natural products of plant origin, debatably called secondary metabolites because their importance to the eco-physiology of the organisms that accumulate them was not initially recognized, flavonoids play a central role. These compounds and their derived pigments have contributed to shaping our knowledge of modern genetics, providing colorful tools to investigate a number of central plant problems, including the biology of transposons, the regulation of gene expression, gene silencing, and the organization of metabolic pathways. The legacy left by several outstanding chemists who have devoted their lives to the understanding of the chemistry of flavonoids is being carried by a growing number of scientists who take interdisciplinary approaches to continue to advance our knowledge of the pathway and develop new means to manipulate the synthesis of these compounds, which have significant potential in providing solutions to plant and animal illnesses alike.

The interdisciplinary nature of the research currently being carried out in the area of flavonoids is part of the spirit that this book has tried to capture. Chemistry, biochemistry, genetics, and cellular and molecular biology are all parts of the toolbox that the investigator has at hand in addressing fundamental biological questions regarding the biosynthesis, storage, regulation, evolution, and biological activities of flavonoids. These tools are combined in each of the nine chapters that form this book to address what I have perceived to be some of the most significant challenges currently being pursued in the area of the biology of flavonoids. If specific topics have been left out, such as, for example, the metabolic engineering of flavonoids, it is only because in my opinion the number of reviews in this subject exceeds the quantity of novel relevant primary research publications.

Chapter 1 provides a novel look at flavonoids from the perspective of stereochemistry. Chapter 2 provides an overview of the state of the art in flavonoid isolation and characterization. Historic and up-to-date perspectives on the biosynthesis of flavonoids are provided in Chapter 3. Chapter 4 integrates the studies in several plants to provide models on how the multiple branches of flavonoid biosynthesis might be regulated. Chapter 5 explores the poorly understood mechanisms that underlie the trafficking of flavonoids within cells. A review of the contributions that flavonoids and derived pigments have and continue to provide to geneticists and molecular biologists is provided in Chapter 6. Chapter 7 illustrates models that may help to explain the evolution of flavonoids and the corresponding regulatory and biosynthetic genes. Chapter 8 delves into the expanding field of the role that flavonoids play in health, and Chapter 9 provides a review on the role of flavonoids as plant-signaling molecules.

I want to finish by thanking the authors who contributed to this book and for their patience in bearing with the multiple revisions of their submissions. I also want to acknowledge the several reviewers who provided me with comments on the chapters. Most wholeheartedly I want to thank Sarat Subramaniam for his help with the formatting and editing of the book.

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