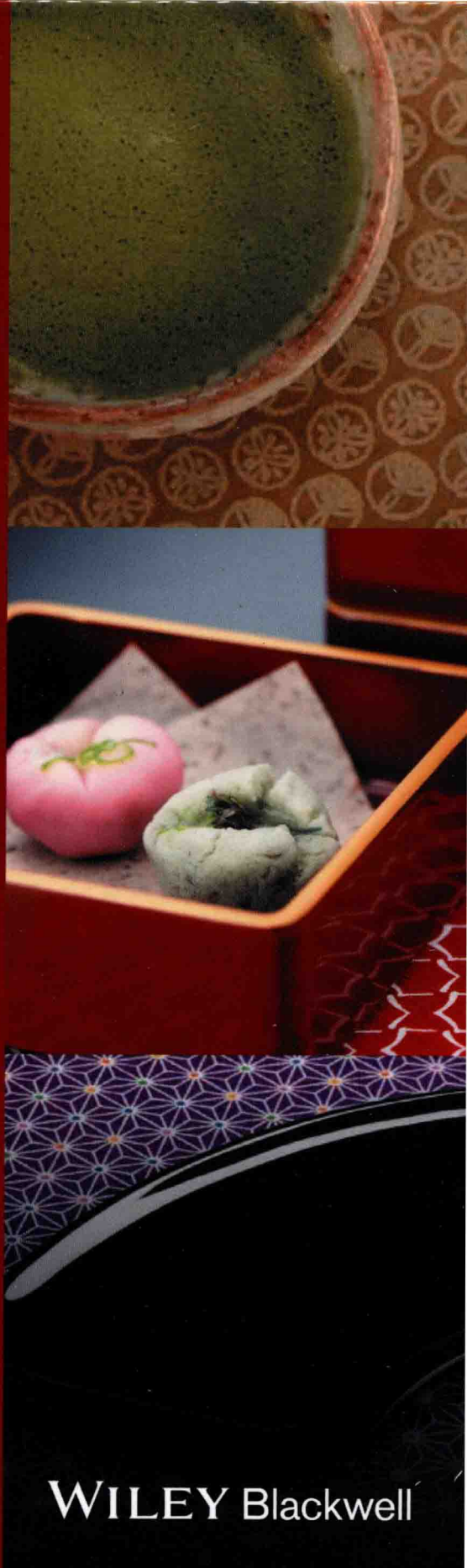


# Recent Advances in Polyphenol Research

**Volume 5**

Edited by

Kumi Yoshida,  
Véronique Cheynier  
and Stéphane Quideau



**WILEY** Blackwell

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# Recent Advances in Polyphenol Research

## **Recent Advances in Polyphenol Research**

A series for researchers and graduate students whose work is related to plant phenolics and polyphenols, as well as for individuals representing governments and industries with interest in this field. Each volume in this biennial series focuses on several important research topics in plant phenols and polyphenols, including chemistry, biosynthesis, metabolic engineering, ecology, physiology, food, nutrition, and health.

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To **Michel Bourzeix**—one of the founders of Groupe Polyphénols and its secretary from 1972 to 1995—who devoted his career to promoting research on polyphenols and supported GP activities and conferences with dedication and enthusiasm

To **Dieter Treutter**—a faithful member of the Groupe Polyphénols board for many years and the organiser of ICP2000

*in memoriam*

The editors wish to thank all of the members of the “Groupe Polyphénols” Board Committee (2012–2014) for their guidance and assistance throughout this project.

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# Preface

Polyphenols are secondary metabolites that are variously distributed in the plant kingdom and characterized by a wide diversity of chemical structures. On behalf of the international scholarly society “*Groupe Polyphénols*,” which organizes the biennial conference, “*International Conference on Polyphenols*” (ICP), we define the term “polyphenol” as related to plant products exclusively derived from the shikimate/phenylpropanoid and/or the polyketide pathway, featuring more than one phenolic unit and deprived of nitrogen-based functions (<http://www.groupepolyphenols.com/the-society/why-bother-with-polyphenols/>). The number of known plant polyphenols is quite large, from structurally simple compounds such as the stilbenoid resveratrol or the flavonoid quercetin to complex macromolecules such as the proanthocyanidin oligomers or the lignin polymer. It is thus not surprising that their functions in plant and physicochemical properties are also quite varied. In the early 20th century, investigations on polyphenols were mainly dedicated to the determination of their structures and their roles in traditional medicines, as well as in vegetable tanning. Nowadays, research on plant polyphenols concerns a much wider area of science with novel and multidisciplinary efforts made toward the understanding of their properties and exploitation thereof in *inter alia* the development of new materials, the innovation in agriculture and food products, including the development of new crops and flowers, the higher fixation of carbon dioxide, and the formulation of functional foods with human health benefits, as well as the discovery of new pharmaceutical medicines.

This book series “*Recent Advances in Polyphenol Research*” began its publication in 2008 on the occasion of the 24th ICP in Salamanca, Spain. The content of this first volume was already mostly based on review articles written by plenary lecturers of the previous ICP, which had taken place in Winnipeg, Canada. Since then, this flagship publication of the *Groupe Polyphénols* has been released without any discontinuity every 2 years to provide the reader with authoritative updates on various topics of polyphenol research written by ICP plenary lecturers and by invited expert contributors.

This book, the fifth volume of the series, is concerned with the topics that were covered during the 27th ICP, which was organized jointly with the 8th edition of the *Tannin Conference* in September 2014 in Nagoya, Japan. In more than 40 years of the history of the *Groupe Polyphénols*, it was the first time that the *International Conference on*

*Polyphenols* took place in Asia. Six different main topics of the polyphenol science were selected for the scientific program of this memorable ICP2014 edition:

- 1) **Chemistry, Physicochemistry, and Materials Science**, covering structures, reactivity, organic synthesis, molecular modeling, fundamental aspects, chemical analysis, spectroscopy, molecular associations, and interactions of polyphenols.
- 2) **Biosynthesis, Genetics, and Metabolic Engineering**, covering molecular biology, genetics, enzymology, gene expression and regulation, trafficking, biotechnology, horticultural science, and molecular breeding related to polyphenols.
- 3) **Plants and Ecosystems, Lignocellulose Biomass**, covering plant growth and development, biotic and abiotic stress, resistance, ecophysiology, sustainable development, valorization, plant environmental system, forest chemistry, and lignin and lignan.
- 4) **Food, Nutrition, and Health**, covering food ingredients, nutrient components, functional food, mode of action, bioavailability and metabolism, food processing, influence on food and beverages properties, cosmetics, and antioxidant activity of polyphenols.
- 5) **Natural Medicine and Kampo**, a special session for this first conference held in Asia covering oriental traditional medicine, herbal medicine, Chinese herbal medicine, folklore, mode of action, metabolism, natural products chemistry, and drug discovery.
- 6) **Tannins and Their Functions**, another special session on the occasion of this joint meeting with the *Tannin Conference* covering research topics related to condensed tannins, hydrolyzable tannins, tea, wine, persimmon, seed-coat color, mode of action, and enzymatic reactions.



More than 500 scientists from 35 countries attended the conference, with 321 paper contributions that comprised 61 oral communications and 260 poster presentations. The fifth volume of "*Recent Advances in Polyphenol Research*" contains chapters from 14 guest speakers of the conference. The support and assistance of the *Groupe Polyphénols*, the *Tannin Conference* Group, several Japanese academic associations and foundations, notably the Nagoya University, the City of Nagoya and the Nagoya Convention & Visitors Bureau, and numerous private sponsors are gratefully acknowledged, as the great success of these joint editions of the *International Conference on Polyphenols* and the *Tannin*

*Conference* would not have been possible without their contributions. As a final note, we would also like to deeply thank all of the plenary, communication, and poster presenters for the quality of their contributions, from basic science to more applied fields, and all of the attendees, with a special thank to the numerous Asian researchers for their first participation in the ICP and for expressing their eagerness to attend the next ICP meetings.

Kumi Yoshida  
Véronique Cheynier  
Stéphane Quideau



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