



Book Reviews

Studies in Plant Science, Vol. 6: Advances in Plant Glycosides, Chemistry and Biology

Chong-Ren Yang (Kunming Institute of Botany, Chinese Academy of Sciences), Osamu Tanaka (Suzugamine Women's College), Elsevier Science B.V., Amsterdam, 1999, xiii + 428 pages, ISBN 0-444-50180-0, \$200.50

This book is the 6th volume of the continuing series on studies in plant science. It is based on the proceedings of the first International Symposium on Plant Glycosides (ISPG), held in Kunming, China, in 1997. More than 150 plant glycoside scientists from 17 countries attended the meeting, which gave the participants a good chance to consult with each other and develop their plans for future work. During the four-day meeting, a total of 96 reports on plant glycosides, including isolation and structural elucidation, ethnobotany, pharmacology, quantitative evaluation, synthesis, and biotechnology, were presented. In this 6th volume, 54 of these papers review the recent research results on plant glycosides.

It must be emphasized that more than 30 of the reports concern saponins. Saponins are complex molecules made up of sugars linked to a triterpene or steroid, and are widely distributed in plants, including some foods such as beans, spinach, tomatoes, potatoes, onions, garlic, and asparagus. The diversity of structures, the challenge of isolation, and the pharmacological and biological activities yet to be discovered are driving the studies on this group of natural products. A serious difficulty in assigning the structures of saponins lies in the identification of the oligosaccharide unit. P. Cai and co-workers report the structural determination of the sugar moieties of new triterpene saponins isolated from *Aralia spinifolia* and *Nothopanax davidii* by the concerted use of modern NMR techniques (COSY, RCT, NOESY, HMBC, DIFNOE, SINEPT, and ^{13}C -T₁ relaxation times). The authors clearly describe how to assign each ^1H and ^{13}C signal of the sugar moieties of saponins to elucidate the sugar sequences. Several two-dimensional (2D) NMR spectra are adequately displayed, which is helpful for the readers' comprehension. Medicinally potential and health-promoting saponins contained in foodstuffs and

folk medicines are reviewed by several researchers. M. Yoshikawa and co-workers focus on two foodstuffs, sugar beet and kidney beans. They report glucose absorption inhibitory triterpene saponins from sugar beet and histamine release inhibitory saponins from kidney beans, both having the oleanane skeleton. Excellent synthetic methods as well as spectral analysis are used for the structural determination of the saponins. T. Nohara and J. Kinjo present several olenolic saponins with hepatoprotective activity from the roots of *Pueraria lobata*. The trans-glycosylation method proposed by the authors is worthy of notice as a new strategy of synthesis of novel saponins. Triterpene saponins in some vegetables and fruits eaten in China are discussed by J. X. Wei as examples in order to explain that their physiological activities may always give help to the health of people and cure some ailments. Saponins with tumor chemopreventative activity in crude drugs are reviewed by T. Konoshima, mainly covering ginseng saponins. Ginsenoside Rg1 is concluded to be a possible candidate for an antitumor promoting agent. H. Yamada and M. Nishizawa summarize the structural revision of the well-known sweet saponin osladin obtained from a fern, *Polypodium vulgare*. The synthetic substance with the previously proposed structure for osladin is not sweet to the taste, and a related synthetic compound, which is different from osladin only in the C-26 absolute configuration, is very sweet. The authors confirm that (26*R*)-osladin is the real sweet principle of the fern. The distribution of steroidal saponins is limited to several families in the plant kingdom, while triterpene saponins appear in a wide variety of plants. O. Tanaka, B. Yu and co-workers, S. Kitanaka and co-workers, Y. Sashida, and A. J. Dong and co-workers contribute the reports on the isolation, structural determination, synthesis, and biological activities of steroidal saponins. The review by O. Tanaka on the steroidal saponins from *Yucca schidigera* covers the commercial value of Yucca extract as a food additive. Spirostanol saponins in the extract have potent antiyeast activity, and the extract is now commercially utilized for extending the shelf life of cooked foods and fermented seasonings such as soy sauce. A potent antitumor steroidal saponin with the cholestane skeleton from a garden lily plant,

Ornithogalum saundersiae is reported by Y. Sashida. His research gives an outstanding example of the fact that phytochemicals from ornamental plants with no medicinal folkloric background sometimes have unexpected biological activity. The other 20 odd reports concern glycosides whose aglycones belong to flavonoid, lignan, other simple phenolic, and isothiocyanate. Their structures are less complex than those of saponins. However, several glycosides have significant biological activities. The importance of *Citrus* fruit peels for medicinal materials is shown by A. Sawabe and Y. Matsubara. They discuss the isolation and structural determination of the flavonoid, phenylpropanoid, lignan, monoterpene, limonoid, and alkyl glycosides from 11 kinds of *Citrus* fruit peels and their *in vivo* hypotensive and hypertensive effects. The above mentioned topics have been selected by my own interest in the plant glycosides with medicinal potentials. However, not a few scientists must have much interest in the allelochemical role of plant glycosides. I introduce one example of this sort of topic reported in

this volume. G. R. Waller and co-workers describe the identification of saponins produced during the life cycle of mungbeans and their role as an allelochemical agent. Their research provides the first definitive evidence that when saponins produced by mungbean plants are added to the soil, they work as an allelochemical plant growth regulator and enhance the growth of new mungbean plants.

Plant glycosides are attracting attention of research workers not only by their chemical structures, but recently also by their biological activities. The editors appropriately coordinated the reviews of plant glycosides in this compact volume. This book is an excellent reading for all interested in plant glycosides, especially in steroid and triterpene glycosides. A lot of useful information and insight are to be found in it.

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Phytochemical Signals and Plant-Microbe Interactions

John T. Romeo, Kelsey R. Downum, Rob Verpoorte, *Recent Advances in Phytochemistry* Vol. 32, Plenum Press, New York and London, 1998. 254 pp. ISBN 0-306-45917-5

The papers assembled in this volume of *Recent Advances in Phytochemistry* were originally presented at the joint meeting of the Phytochemical Societies of North America and Europe held in The Netherlands in April 1997. In twelve chapters leading scientists review recent research progress on structure, biosynthesis and biological activity of chemical signals mediating communication between plants and microbes (bacteria, fungi, nematodes) in both antagonistic as well as in symbiotic beneficial interactions. Particularly, the central role of natural products in pathogenesis and disease resistance in plants is nicely highlighted. Most contributions place emphasis on the elucidation of the molecular basis of intra- and inter-specific signaling processes. An array of plant and microbial metabolites comprising simple phenolics, salicylic acid, hydroxamic acids, flavonoids, polysac-

charides, fatty acid derived octadecanoids, trichothecenes and perylenequinones are discussed. Unfortunately, the role of microbe and plant-derived peptides as signals for activating a plant's defensive arsenal in response to infection or herbivore attack was only scarcely addressed here.

It is a major asset of this volume that it includes two chapters describing the biotechnological application of knowledge and technology emerging from such research for modifying the chemistry of plants for the benefit of human health and nutrition.

This compilation of research papers should be essential reading for anyone interested in the molecular mechanisms underlying communication of plants with the environment. The comprehensive bibliography attached to each chapter will facilitate also non-experts to keep up with recent developments in this rapidly developing area of plant biology.

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