

Book review

STARCH Structure and Functionality

Edited by P. J. Frazier, A. M. Donald, and P. Richmond, The Royal Society of Chemistry, Cambridge, UK, 1997, ISBN 0-85404-742-5, hardbound, 277 pp, UK £59.50/US \$96.50

The book comprises the proceedings of a meeting on Starch: Structure and Functionality, which was held in Cambridge, UK, April 1996. There are 28 presentations from the keynote speakers and 37 abstracts from a poster session that focused the delegates on four subject areas of starch: diet and health, physico-chemical aspects, enzyme interactions and modifications, and genetic and agronomic questions. The presentations vary in length from 4 to 12 pages, with an average of 8. They primarily are mini-reviews. A large number of the keynote presentations were on the physico-chemical aspects of starch and seemed to this reviewer to be more of the same, although there are gems of information in most of the presentations. A presentation on the polysaccharide fractions in starch was made by R. F. Tester in which he states that while the components of starch granules are largely understood, the way that they are arranged in the granules and the effect that this has on functionality is still uncertain. He further states that with the advances in molecular biology of starch, new mutants are being produced that alter or eliminate key enzymes in biosynthesis and before too long, plants will be developed with “tailor-made” starches. These starches will have selected properties that will reduce the need to use post-extraction chemical modifications to provide desirable properties. V. Planchot, P. Colonna, A. Buleon, and D. Gallant presented a study of the α -amylolysis of starch granules and α -glucan crystallites. They report that granules with A-type crystallinity (from maize and waxy maize) were more susceptible to α -amylolysis than those with B-type (from potato and high amylose maize). The rate of hydrolysis for C-type starches (from

cassava and smooth pea) were dependent on the ratio of A- and B-type structures in the granule. They conclude that enzyme–substrate interactions with starch granules and crystalline structures need to be investigated on a molecular level and that studies are needed to determine the different kinds of hydrolysis sites that are present within crystalline material. A very interesting paper on the mechanism of amylose synthesis by granule-bound starch synthase I was presented by K. Denger, A. Edwards, C. Martin, and A. M. Smith. They report that the enzyme was greatly stimulated by malto-oligosaccharides acting either as primers or enzyme effectors. They speculate that the requirement for malto-oligosaccharides may be the reason for the presence of starch degradative enzymes (amylases, debranching enzymes, disproportionation enzyme, etc.) in developing storage organs during starch synthesis. A related paper on the occurrence and expression of granule-bound starch synthase mutants in hard winter wheat was given by R. A. Graybosch, C. J. Peterson, L. E. Hanson, A. Hill, and J. Skerrett. Overall, there does not seem to be a discernible organization, other than the separation of keynote presentations and poster abstracts, and there is a wide variability in the quality of the presentations.

Although starch technology has been developing and of interest for over one hundred and fifty years, this book indicates that this interest has been sustained and is still developing. This results from the importance of starch as the almost exclusive biomaterial that conserves the light energy of the sun as chemical energy, which is stored as starch granules in most plant seeds, roots, and tubers. As

such, starch serves as the primary carbohydrate in the human diet, especially when it is gelatinized by cooking. The presentations emphasize that starch from different botanical sources have different physical and chemical properties, is cheap and ubiquitous, and provides water-soluble polymers that display viscosity, gelling, adhesion, and surface coating properties. It is predicted that starch polymers will also have increasing uses in nonfood applications as a readily renewable, biodegradable material for chemical feedstocks and as substitutes for nondegradable, nonrenewable petroleum-based polymers.

The book serves primarily as a record of the meeting. The printing is from camera-ready copy and therefore of nonuniform, variable quality and format. The hardbound cover is attractive and of high quality. The price, however, is relatively high and probably outside the budgets of most individuals, even those with interest in the subject. The price, thus, will probably limit its availability to those employed by the starch and food industries and to those with access to a technical library.

John F. Robyt
Iowa State University, USA