Acta Biochimica Polonica

Vol. 48 No. 3/2001

801–805

QUARTERLY

Books reviews

Animal Toxins. Facts and Protocols. Edited by: Herve Rochat & Marie-France Martin-Eauclaire. Birkhauser Verlag, Basel-Boston-Berlin 2000.

Animal Toxins – Facts and Protocols is a successive position in the very interesting editorial series entitled Methods and Tools in Biosciences and Medicine. This title defines also the character and scope of the book. In the intention of the editors it was not to be just a compendium of natural toxins of animal origin, although it contains important information and data concerning those toxins. The main purpose of the book was to specify, basing on the knowledge of physical, chemical and biochemical properties of animal toxins, the possibility of applying them as tools in scientific research, especially in medicine and biosciences. Although, according to the editors, the expression "toxins as molecular tools" sounds like a truism, the amount of information gathered so far in this area of research is fragmentary and limited, whereas the number of those who are willing to use such tools, is increasing.

The editors, inviting co-authors from the best world centers involved in this type of research, undertook a successful, attempt at filling this informational gap. In this light, the book edited by H. Rochat and M.F. Martin-Eauclaire is a unique new source of information, of fundamental importance for progress in research on regulation of biochemical and immunological processes occurring in higher organisms.

Twenty chapters of the book, written in the same arrangement, contain each: characteristics of the particular group of toxins, their origin, mechanism of action, and detailed analytical procedures for their identification and determination, as well as the commonly occurring difficulties and possible errors in application of these procedures. In most cases, the chapters are terminated by conclusions, or only by comments showing perspectives of the experimental usefullness of particular toxins.

The described groups of toxins include: Dinoflagellate Toxins (Brevetoxin, Ciguatoxin, Saxitoxin), Maitotoxin (Okadoic Acid, Microcistins), Sea Anemone Toxin, Nemertine Toxin, Conus Peptides and their iodine-bound forms, Ant Polypeptide Toxin, Wasp Kinins, and special toxins such as Mastoparan, Bee Venom Active Polypeptides and their specific, e.g. immunological, properties, Snakes Toxins, as well as Dendrotoxins and Sarafatoxins.

Three chapters of the book are written in a different arrangement. Two of them discuss toxins that differ in origin but resemble in the mechanism of their action, e.g. blocking of ionic channels, or affecting the processes of protein coagulation. The third chapter present the possibility of obtaining, by chemical synthesis, of animal toxins of special importance.

Attention of the reader is attracted mainly by the "Procedures" which present detailed descriptions of the proceedings aimed at identification and determination of particular groups of animal toxins. Most of them are highly sophisticated immunochemical, immunoenzymatic or radioimmunologioal methods. In some cases, advantage was taken of pharmacological properties of the toxins, such as receptor binding or blocking of ionic-channels. This is, no doubt, the most interesting part of the book. It describes the biological mechanisms of action of animal toxins, as well as their diversified structure. Most of those toxins are in

the form of protein complexes of poly-peptides showing a selective affinity to critical elements of the central or peripheral nervous system. In this way they give almost unlimited possibilities of research: concerning the nervous system in higher organisms. Moreover, the fact that animal toxins act even when applied in micro-quantities makes possible to extend the scope and increase the sensitivity of such research.

Three indices placed at the end of the book concerning, successively; the problems discussed; analytical procedures applied; and the most commonly met practical difficulties, are a significant asset of the monography on animal toxins.

To sum up, the book discussed is an irreplaceable source of specific information, well adapted to contemporary requirements and most useful for all those who, studying various disciplines of biosciences, are interested in toxins of animal origin. This applies particularly to those whose work involves research on the mechanisms of pharmacological and neurotozic activity of chemical compounds, as well as techniques of their safe application, especially in medicine.

J. Brzeziński

Chitin and Chitinases. Edited by P. Jolles and R.A.A. Muzzarelli, Birkhäuser Verlag, 1999, ISBN 3764358157

As the title indicates, this book is devoted to all aspects concerning chitin, the most abundant nitrogen-bearing organic compound found in nature. At least 10^{13} kg of chitin are synthesized and degraded each year in the biosphere. Chitin, the insoluble polymer of *N*-acetylglucosamine (GlcNAc) is used by many organisms as a structural component of the protective cell walls or exoskeletons which surround them. Chitin is present in insect exoskeletons, crustacean shells, fungal cell walls and cyst wall of the protozoan parasites, in a form of microfibrils immersed in a matrix of proteins and other polysaccharides. The resulting structures behave like composites. Chitin-protein complexes provide hardness combined with flexibility. Association with lipoproteins and waxes provides impermeability properties to exoskeleton. Some chitin oligosaccharides are engaged in plant morphogenesis.

The first part of this book offers detailed information on chitin biosynthesis. Authors discuss the biochemistry of chitin synthesis *in vitro*, chitin biosynthesis and structural organization *in vivo*, as well as role of chitin synthases. In all the systems studied so far, synthesis of chitin occurs as a result of a transglycosylation reaction catalysed by enzymes collectively called chitin synthases which utilize the nucleotide uridine diphosphate *N*-acetylglucosoamine (UDPGlcNAc) as the sugar donor. Authors describe the mechanisms involved in chitin biosynthesis *in vivo*, its transport to the exocellular space where it crystallizes in the form of microfibrils, its most common modifications and its association with other molecules in order to give rise to the protective structures which surround the organisms.

Because of its insolubility it has been generally accepted that chitin is deployed in the extracellular space. Nevertheless, soluble precursors and the polymerizing enzyme chitin synthase itself are synthesized intracellularly. Chitin is synthesized in two different ways: in fungi the chitin synthase enzyme occurs as an inactive zymogen in vesicles called chitosomes and requires proteolytic activation. In arthropods this enzyme is membrane-bound. Although the mechanisms for the deployment of chitin in the exocellular structures appear to be different in the several organisms analyzed, all of them finally lead to its crystallization in the form of microfibrils. Three different crystalline polymorphic forms of chitin exist under natural conditions.

Chitin synthesis has been described in several systems, but the yeast cell wall is the most extensively studied. The use of budding yeast *Saccharomyces cerevisiae* as a biological model allowed identification of three distinct chitin synthases differing in the catalytic properties and functions. Chitin synthase has probably undergone sequential gene duplication and divergence during evolu-