

The Enzymology of Post-translational Modification by Proteins, Volume 2

Edited by R.B. Freedman and H.C. Hawkins

Academic Press; London, 1985

374 pages. £81.00, \$95.00

The general subject area of this volume continues to be of considerable interest, not only in terms of the many intriguing problems that arise in enzymology, but also for those who attempt to produce proteins by recombinant DNA techniques. Many proteins depend for their biological properties on post-translational modifications which are beyond the capabilities of bacteria, such as *E. coli*, and even yeasts, which are better endowed in this respect, may not be able to effect such modifications as glycosylation in exactly the same way as mammalian cells.

The present volume is concerned with many aspects of the subject such as signal peptidases, the formation of terminal amides, glycosylation, iodination and phosphorylation of tyrosyl residues, blood clotting systems, protein methylation, processing of cytoplasmically synthesized precursors of organellar proteins, the role of transglutaminase and reversible modifications of nuclear proteins. All of these modifications are concerned with eukaryotic cells. One chapter by Earl Stadtman and his colleagues describes nucleotidylations involved in the regulation of glutamine synthetase in *E. coli*. The authors of all the chapters are well known experts so there is no doubt that this is a useful volume. An article in a recent TIBS by Finn Wold reminds us that a chapter on fatty acylation of proteins (myristoylation and palmitoylation) may soon be in demand.

The first chapter on signal peptidase (C. Mollay) confirms my impression that the characterisation of the mammalian enzyme that removes the signal peptide from the nascent chain of secreted proteins has been very difficult. The enzyme from *E. coli*, leader peptidase, has been isolated, especially from a plasmid-bearing strain that overproduces the peptidase. Since preproinsulin is expressed in

E. coli but only proinsulin is obtained, the leader peptidase is able to cleave some eukaryotic proteins and so the bacterial enzyme may be a good general model.

Ellis and Robinson provide an interesting description of the way proteins are transported into chloroplasts and mitochondria. It is interesting that not all such transport requires either that the protein has an N-terminal extension or that the inner membrane is energized so that, e.g. apocytochrome *c* itself is converted to cytochrome *c* by the addition of haem in the intermembrane space of the mitochondria.

Kreil considers the stepwise cleavage of dipeptides and the formation of terminal amides. The latter is an most important modification found in a wide variety of secreted peptides of diverse functions, particularly peptides with 3-66 amino acid residues. Some progress has been made in the characterization of this enzyme from porcine pituitary by D.G. Smyth.

Presper and Heath prove a very detailed account of *N*-glycosylation ending their chapter with a splendid diagram showing the numerous steps as the secreted protein moves through the various membranous organelles. The significance of the reversible modification of nuclear proteins, discussed by Mathews and Waterborg, has been conjectured for long. The chapter concentrates on acetylation and phosphorylation particularly in respect to the acetylation of the lysine residues on histones. They show that phosphorylation of histone H1 correlated with cell proliferation and chromosome condensation while phosphorylation of histone H3 is correlated with metaphase.

The discovery of phosphotyrosine in 1979 was an intriguing event in itself but the demonstration that cells transformed by certain viruses contain

10-times the amount of phosphotyrosine of normal cells heightened the interest. Courtneidge brings us up to date concerning the tyrosine kinases and the phosphotyrosine-containing proteins. Some of the kinases are clearly involved in the control of cell growth and many are associated with the plasma membrane. All the kinases are themselves phosphorylated at tyrosine residues. She points out that it is puzzling that in vivo never more than 10%, and often less than 1%, of a given protein thought to be a substrate for tyrosine kinase, is

phosphorylated at tyrosine and whenever function can be measured there appears to be no difference between the activity of phosphorylated and non-phosphorylated forms of target proteins. As she says the subject is in its infancy.

The volume is well produced and the editors and publishers are to be congratulated. I was surprised at the omission of the contents of Volume I and naturally disappointed at the price.

P.N. Campbell

The Biochemistry of the Polypeptide Hormones

by M. Wallis, S.L. Howell and K.W. Taylor

John Wiley and Sons; Chichester, 1985

488 pages. £39.50, \$64.00

As its title implies, this book deals exclusively with the polypeptidic hormones. It is organized as follows: the two first chapters are basic overviews of the functioning of endocrine glands and definition of hormones and hormone receptors. The third chapter is devoted to the description of the hypophysis and introduces the next five chapters dealing with adenohypophysis and neurohypophysis hormones. The six following chapters describe insulin, glucagon, hormones of the gastrointestinal tract, parathyroid hormone and calcitonin; erythropoietin, angiotensin, plasma kinin and related substances. Four concluding chapters deal with common approaches in the general study of hormone action: structure-function relationship, the role of cyclic nucleotides and calcium, hormone receptors and the use of genetic manipulations.

This book is presented as a guide for students. It can be considered as a useful document of reference for those new to the field and for teaching purposes. In fact, each section assumes an average knowledge of the topic considered and the bibliography mostly refers to basic, historical works. Chapters are concise, easy to read,

documented with numerous clear schemes and recapitulative tables. Also, although each chapter can be read independently, there is a logical organization, description of the glands preceding that of the discovery, the biosynthesis and the actions of hormones. Most care has been taken to constitute the index.

The area of polypeptide hormones is moving rapidly, and the authors are aware of it. Inevitably there are already some lacunae: there is no reference to the activation of guanylate cyclase by ANF, to the cloning of the insulin receptor, to the link between the metabolism of membrane phosphoinositides and calcium release from cellular internal stores, or to the common origin of glucagon-related peptides from proglucagon. However, the basic information that this book provides (description of the glands, discovery and biosynthesis of hormones) makes it a useful tool and, because of its organization, its reshaping should be easy if future editions are to be considered.

Françoise Pecker and Jacques Hanoune