Book Reviews

Gonadal Hormones

The Sex Steroids. Molecular Mechanisms. KENNETH W. MCKERNS, Ed. Appleton-Century-Crofts, New York, 1971. x, 454 pp., illus. $24.95. Biochemical Endocrinology.

Work at the forefront in endocrinology has been preoccupied with a search for the primary effects of hormones on cells they specifically regulate. Efforts are directed toward localizing a subcellular site of action and defining the precise one-to-one molecular association of the hormone with a structural or metabolic element, an interaction that somehow directs and amplifies specialized responses by the target cells. Researchers on gonadal (sex) hormones have often pioneered or led the way in generating ideas on this complex problem, and students of hormone mechanisms should therefore find *The Sex Steroids* of unusual interest.

This compendium, third in a series on biochemical endocrinology, contains 15 articles, dealing mostly with two subjects. Well over half the papers deal with hormone-stimulated turnover, synthesis, and qualitative changes in classes of RNA and synthesis of special proteins. At least implicit in experimental design of these studies is the hypothesis that the primary effect of the hormones is on the genome. Presentations include descriptions of methodology and of effects, mainly of estrogen and progesterone, on histones, polymerases, DNA template activity, and translational events. The other subject category, to some extent overlapping the first, is steroid-binding ("receptor") proteins. Extensions are reported of the basic discovery that each steroid hormone is specifically recognized and held by one or more proteins of its target cells. The function of these steroid binders is unknown, but their possible action as obligatory intracellular steroid carriers or primary modulators of gene activity has stimulated a great deal of descriptive work and much discussion. A variant of the binding theme is addressed in three chapters wholly or partly devoted to properties of binding to isolated chromatin, pure DNA, and other nucleic acids. Other chapters examine possible roles of lysosomes and cyclic adenosine monophosphate in estrogen and progesterone action and effects of these hormones on energy metabolism involving preexisting enzymes.

Steroid-responsive target organs studied by authors include the uterus, vagina, mammary gland, hypothalamus, pituitary, and kidney. An emphasis on mammals reflects the fact that information at the molecular level for lower vertebrates is virtually nonexistent. The notable exception is work summarized in this volume on the chick oviduct, a model system of promise because of its function in producing egg proteins, one of which is synthesized in specific response to progesterone. With regard to emphasis, it is remarkable that a book on sex steroids deals almost entirely with the female. For no apparent reason, though consistent with a current social revolution, testosterone and its metabolites receive only oblique treatment in one paper and cursory description in another of effects on RNA labeling and turnover in kidney. Better balance might have been achieved by including, for example, important work on nuclear events in prostate, seminal vesicles, and other male sex accessory tissues. In like vein, an arbitrary decision was made to exclude from the definition of molecular mechanisms hormone effects on transport (though that of nucleotides is mentioned in passing), catecholamines and other amines, and target-organ bioconversion of hormones.

The format of the volume is commendable. Preliminary drafts of the chapters were presented at a symposium, and discussions, reproduced in full after each paper, are as good as this reviewer has seen outside the Laurentian Hormone Conferences. The reader, however, is left to guess when the symposium took place; examination of reference lists suggests it was some time in 1969. Authors were provided opportunity to update presentations before publication, and a few did so comprehensively, but most were content to insert 1970–71 material from their own laboratories. Interested students will find the volume useful for its intensive coverage of the major topics selected, though it will be rough going for all but the advanced. Introductions to most chapters are overly brief and in some are virtually absent. Full-citation reference lists are comprehensive, particularly for the past ten years, and the volume is adequately indexed.

For the specialist, the volume is recommended principally for the following: (i) The opening chapter. The theme is lysosomes, but the article doubles as a tour de force discussion of hormone action. It is difficult to read but worth the effort, for it develops an interesting and entirely new mechanism concept. (ii) At least one very good article on recent work on the mammary gland, a subject infrequently reviewed. (iii) Two informative, theory-oriented chapters on the physical biochemistry of steroid-macromolecule binding that should be mandatory reading for those in the field; one is on estrogen and protein and the other on steroids and nucleic acids. (iv) The discussions, which are laced with wit, frequently hard-hitting, and loaded with information. The primary action mechanisms of gonadal steroid hormones remain unknown, but experimental results thus far obtained nurture a conviction that correct avenues are being explored. In any case, much of the work presented in this volume illustrates the degree of skill in design and imagination in approach that will be required to solve the problem.

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Tall Woody Plants

Trees. Structure and Function. MARTIN H. ZIMMERMAN and CLAUD L. BROWN. With a chapter by Melvin L. Tyree. Springer-Verlag, New York, 1971. xiv, 336 pp., illus. $19.80.

A schoolmaster is said to have spoken of the author of the *Odyssey* as follows: "No one knows for sure whether Homer really lived; what is quite certain, however, is that he was blind." His testament provides an appropriate introduction to this review; for, although we