the interrelationships of metabolic reactions is emphasized by the presentation of a model of the pathways of polysaccharide synthesis and degradation which can be manipulated by computer. By arbitrarily varying enzyme activity or substrate availability the model can indicate the consequences of such changes on the concentration of cellulose, glycogen, and mucopolysaccharide.

This would appear to be an effective new approach to the sometimes bewildering complexity observed in eukaryotic differentiation, if there were convincing evidence that the model accurately predicts or even describes the changing biochemistry of the cells. Unfortunately, accurate measurements of metabolic rates in vivo are difficult to make. In this presentation, the pitfalls inherent in the measurements are not critically considered. Data supportive of the present model are presented but conflicting results are generally not discussed. To suggest that the physiological steps necessary and sufficient for differentiation are known seems premature, even in as simple a system as *Dictyostelium*. Nevertheless, this book succeeds in reminding us that ultimately we must consider all of the biochemical processes involving both small molecules and macromolecules in the sequence of events from the genes which define the differentiation to the final molecules which give it shape.

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Neuroendocrinology

Steroid Hormones and Brain Function. Proceedings of a conference, Los Angeles, May 1970. CHARLES H. SAWYER and ROGER A. GORSKI, Eds. University of California Press, Berkeley, 1972. xiv, 388 pp. + plates. $30. UCLA Forum in Medical Sciences, No. 15.

The decision of Sawyer and Gorski to organize a conference bringing together the varied research findings of 30 scientists approaching the subject of relationships between the endocrine and the central nervous systems from different disciplines, concerns, and methodologies is itself to be applauded. The proceedings of that conference, now consolidated in book form, offer a valuable synopsis of the work accomplished in this area since the 1963 conference on "The Brain and Gonadal Function." The specific research findings are preceded by an introductory chapter written by Gorski, on "progress, principles, and problems," in which he presents a brief review of recent advances in neuroendocrinology, and the material is summarized in a concluding chapter prepared by Davidson. Rather than being a loose collection of individual research papers, the conference proceedings, and the book, reflect the efforts of Sawyer and Gorski to develop and follow a central theme—how steroid hormones alter brain function—at four levels of inquiry: intracellular, intercellular, systemic, and organismal.

In addition to providing a framework in which to view the research reported, the editors have reproduced the question-and-answer session at the end of each talk, thus preserving the dynamic spirit of the conference without sacrificing coherent and substantive presentation of material.

The effects of steroid hormones on brain function have been explored primarily in terms of electrophysiological and behavioral parameters, although some morphologic, biochemical, and clinical aspects also have been considered. Implicit in the research reported is the dual nature of hormonal action on the central nervous system, that is, regulatory as well as organizational, the latter being predominant during the developmental period. Thus, the effects of steroid hormones on the brain have been investigated during certain "crisis" growth periods—fetal, perinatal, and pubertal.

The mechanisms of steroid feedback and brain-pituitary function have been elaborated in several species—rat, cat, rabbit, monkey, and man—and although, as is reiterated throughout the book, the existence of hypothalamic releasing factors now has been firmly established, the possibility of a direct feedback of steroid hormones on the pituitary has not been eliminated; in fact, it is a primary concern of several of the investigators participating in the conference.

The physiology of hormone receptors and the biochemistry of hormone-binding to cell nuclei and cytoplasmic macromolecules, considered in several chapters, represent one of the most recent directions of research in this area. In fact, more attention to this aspect of the subject would have enhanced the book, inasmuch as hormonal influences on brain development and function have been well documented; our current concern is to seek, rather, the specific mechanisms of action at the cellular and molecular level by which these effects are produced. Such a criticism, however, may reflect the vantage point of one speaking three years later, when much has been added to our understanding of the subject. In any case, the lack should not detract from the excellence of this volume, which is a fine reference text not only for the neuroendocrinologist but for all of those working in endocrinology, neurology, and psychology whose specific research interests are in the relationships between hormones and the central nervous system at different age periods.

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The Dirac Story

Aspects of Quantum Theory. ABDUS SALAM and E. P. WIGNER, Eds. Cambridge University Press, New York, 1972. xvi, 268 pp., illus. $23.50.

This is a collection of essays dedicated to P. A. M. Dirac on the occasion of his 70th birthday. The Dirac story is on the whole a success story. Nevertheless two of the most substantial articles here are concerned with two "suggestions of Professor Dirac that nature does not seem to have used." They are by Amaldi and Cabibbo, on the so far unsuccessful search for the magnetic monopole, and by Dyson, on the lack of evidence so far for any time variation of fundamental physical constants. But several of Dirac's suggestions *have* been used by nature, and several more at least by theoretical physicists. These are very properly celebrated here: the Poisson bracket and quantum mechanics (by Lanczos), the bra and ket formalism (Jauch), the delta function (Schwartz), the quantization of radiation (Jost), the Fermi-Dirac statistics (Peierls), the Dirac wave equation (Wightman), the classical radiation reaction (Pais), and the indefinite metric (Heisenberg). The tone is not entirely one of piety. Thus Peierls mentions an occasion when Dirac was "somewhat naive" (conjecturing Fermi-Dirac statistics for gas molecules); Schwartz recalls the horror of mathematicians at Dirac's delta function; and Jauch argues at some length against Dirac's view that his formalism could be presented with mathematical rigor "only in a cumbersome way which would tend