Symposium volumes tend, of course, to be ephemeral, but the useful ones provide a sort of snapshot of the arts and ideas that dominate a field of inquiry at a particular time. Good snapshots and good symposium volumes are rare: excellent ones, with equal attention to physical and compositional requirements, are potentially archival. *International Cell Biology, 1976–1977* is of archival quality. More than that, it approaches as closely as any recent publication the ideal of a serious and representative textbook of the field.

The book adheres to the high standard of publication established by the Rockefeller University Press and the *Journal of Cell Biology*. It is a standard that most other scientific publications have difficulty in meeting. Brinkley and Porter, who are experts at it, have seen to it that application of the standard was rigorous throughout. It is evident also that equal care has been lavished on those other matters over which editors have some control. The result is a fine snapshot indeed: easy to look at, artfully composed, and with a very high information content.

The symposia treat a comprehensive, although by no means exhaustive, set of the problems to which cell biologists currently attend: the molecular organization, ultrastructure, interactions, specializations, physiology, and pathology of cell surfaces and intracellular membrane systems; the structure and function in the secretory processes of plant and animal cells; contractility and motility, and the molecules involved in those activities of cells; cellular growth-division cycles; chromosomes, chromatin organization, molecular cytogenetics, and nucleocytoplasmic interrelations; gametogenesis; cell transformation and the expression of infectious genomes in higher cells; photoreceptors; atherosclerosis and cells of the arterial wall.

To attempt a selection of such a selection for purposes of comment would be presumptuous. Suffice it to say that for each of these subdisciplines there are several distinguished contributions of data from current research and that the papers are generously supported with bibliography. To enhance their value for nonspecialists and for students, the papers are accompanied in most sections of the volume by introductory or concluding commentaries, or by both.

To the editors, to George Palade and the American Society for Cell Biology, who were the hosts, and to Daniel Mazia and the International Federation for Cell Biology, who did nothing more (as he reports) than to nucleate the 1976 International Congress of Cell Biology, thanks are due for the volume. Quite independently of the success of the meeting, their labors have yielded in this book a model for such publications. The cost and effort that so manifestly underlie its production should be repaid by the efficiency with which the book will broadcast the message that cell biology is alive, flourishing, and invasive—although or course benignly so.

PAUL R. GROSS

Department of Biology, University of Rochester, Rochester, New York 14627

Prehistory of Quantum Physics

Early History of Planck's Radiation Law. HANS KANGRO. Translated from the German edition (Wiesbaden, 1970). Taylor and Francis, London, and Crane, Russak, New York, 1976. xviii, 282 pp., illus. $39.50.

The history of Planck's law for blackbody radiation—the law that first suggested the quantum discontinuity—has usually been presented as that of a problem for physical theory: how could experimentally observed deviations from Wien's and Rayleigh's theoretical laws be reconciled with electromagnetic theory and thermodynamics? Kangro sees more to the matter than that simple problem situation, however, and wants to draw a living, breathing picture of the complexities both of doing experiments and of evaluating them. As he writes,

> Partial aspects, such as infra-red spectroscopy, calibration by dispersion, the type of detector apparatus for radiation, accuracy of measurement and difficulties of measurement, the estimation of errors or the problem of realizing a black body belong just as much as conformity with laws and their interrelationship with thermodynamics, mechanics, statistics or the electromagnetic theory of light to the picture of the course of development which should be delineated in greater relief in that way [p. 181].

To the degree that Kangro has succeeded in his goal of historical enrichment his book can only be welcomed. He shows, for example, just how problematic was the judgment of irremediable deviation from Wien's relation for the distribution in wavelength of heat from a blackbody. Friedrich Paschen and Heinrich Rubens, two most expert investigators of long-wavelength radiation, supported the Wien law as late as the end of 1899. Though Lummer and Pringsheim had already begun to claim systematic discrepancies, Paschen could easily ascribe them to problems with the blackbody source. Only during the course of 1900 were experimental conditions realized that forced Planck's reformulation, in October, of the radiation law and ultimately forced a fundamental reevaluation of physical theory on the basis of the quantum.

More important than Kangro's description of the actual onset of crisis is his story of 15 preceding years of complex interaction between experiment and theory. Repeatedly, he argues, the development of ever more sensitive experimental techniques was prerequisite to the possibility of more incisive theoretical questions about the nature of heat radiation and its laws. (Indeed, Kangro makes this point so often that one wonders why he does not go on to examine the degree to which theoretical concepts had meaning only in terms of concrete experimental realities.) Though the strength of Kangro's account lies in the description of the experimental problems, his discussion is not limited to that realm but includes very interesting sections on successive theoretical derivations: by E. Lommel, V. A. Michelson, H. F. Weber, R. V. Kövesligethy, and Wilhelm Wien. Wien's theoretical approach is particularly important for its similarities to and differences from that of Planck, notably in the application of entropy considerations to radiation and to the relation between radiation and resonators. Planck's particular concerns, however, will be found more cogently treated elsewhere (see M. J. Klein, *Archive for History of Exact Sciences* **1**, 459 [1962], and T. S. Kuhn, *The Black Body Problem and the Quantum Discontinuity: 1894–1912*, Clarendon, in press).

Early History of Planck's Radiation Law adds a significant dimension to the prehistory of quantum physics, but the prospective reader should be warned that he or she is expected to know beforehand the meaning of "thermopile," "bolometer," and "black body," as well as Stefan's law, Kirchhoff's law, and the traditional questions and answers of heat radiation. One not so prepared will find little enlightenment here. The reader must be prepared to cope also with inconsistent notation, unmotivated formulas, and major results (for example Planck's radiation law, p. 203) buried in the flow of details. Now all of this might be easily surmountable by the average physicist if it were not for the fact that this translation of *Vorgeschichte des Planckschen Strahlungsgesetzes* often requires the reader to supply punctuation, to complete sentences, to rearrange word order, and even to supply different words. (See the quotation above.) The book is to be recommended

primarily, then, to highly motivated souls who have the stamina to rewrite the book they are reading and to supply its missing context in previous historical treatments. More general readers will want to turn to the now-classical interpretation by Klein and to the important new reinterpretation by Kuhn that are cited above.

M. NORTON WISE
Department of History,
University of California,
Los Angeles 90024

Sleep

Human Sleep and Its Disorders. WALLACE B. MENDELSON, J. CHRISTIAN GULLIN, and RICHARD JED WYATT. Plenum, New York, 1977. xiv, 260 pp., illus. $19.50.

The recent development of a clinical, multidisciplinary approach to disorders of sleep has generated new concepts, techniques, and challenges. A major criticism leveled at biological and medical research is that proliferation of scientific studies does not ensure clinical usefulness and a hiatus often exists between research results and practical clinical application. This book attempts to bridge this gap with respect to sleep and its disorders.

The touchstone of any emerging medical discipline is the nosology of symptoms, syndromes, and "diseases," and in the history of medicine "pathology" has been a critical factor. The sleep disorders, however, are primarily "functional" in nature, and no unifying structural, anatomical, or biochemical abnormalities have been found. The discomfort and disturbances experienced are nevertheless very real. Clinical conditions such as narcolepsy-cataplexy affect social, economic, and emotional well-being. The hypersomnia-sleep-apnea syndrome is associated with major disturbances of daytime vigilance and leads to serious cardiorespiratory abnormalities. Such recurrent sleep-related disturbances as nocturnal seizures, night terror attacks, somnambulism, bruxism, enuresis, and nocturnal myoclonus can be puzzling and disturbing to the patient and to his or her family.

Although these specific clinical problems are discussed in the book, its major themes are drawn from the authors' own areas of research, the pharmacology and neuroendocrinology of sleep and the effects of alcohol and alcoholism on sleep. There is also an extensive and detailed account of the effect on sleep of the affective disorders (depression and mania) and schizophrenia. These subjects are well reviewed and critically analyzed, but as an analysis of human sleep and its disorders the book is less comprehensive than the title might lead the reader to expect. The special sleep disorders of the aged and children are not discussed, and there is a notable lack of attention to the important developing view that disorders of human sleep are part of a more general disturbance of the sleep-waking rhythm.

Persistent and often profound abnormalities of sleep and sleep-stage patterns, such as decreased REM latency and variability and shortening of total sleep time, are typically present in patients with affective disorders and schizophrenia. In their discussion the authors emphasize the heterogeneity of the syndromes and the lack of correlation between specific abnormal sleep patterns and the subclassifications of these disorders. The chapter on alcohol and sleep reviews evidence that not only does alcohol ingestion acutely affect sleep but the "dry" alcoholic—for periods of up to two years—will often have disturbed sleep with multiple awakenings and altered sleep-stage patterns.

The book has an extensive bibliography but a skimpy index.

Although uneven in both coverage and quality, this book will be especially valuable to scientists and clinicians who are trying to relate findings of sleep research to the maladies that disturb daily sleep-wake periodic functions.

ELLIOT D. WEITZMAN
Department of Neurology,
Montefiore Hospital and Medical
Center, Bronx, New York 10467

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