Human Sleep and Its Disorders

AN

INAUGURAL DISSERTATION

ON THE

CAUSES AND EFFECTS

OF

S L E E P.

SUBMITTED TO THE EXAMINATION OF THE

REV. JOHN EWING, S. T. P. PROVOST,

THE

TRUSTEES AND MEDICAL PROFESSORS

OF THE

UNIVERSITY OF PENNSYLVANIA,

ON THE SEVENTEENTH DAY OF MAY, 1796,

FOR THE DEGREE OF

DOCTOR OF MEDICINE.

BY THOMAS BALL, OF VIRGINIA,

MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY.

Tir'd Nature's ſweet Reſtorer—BALMY SLEEP!

YOUNG.

PHILADELPHIA:

M.DCC.XCVI.

Title page of a dissertation on sleep written by Thomas Ball, an 18th century American physician. This fascinating work contains comments on such subjects as the effectiveness of hypnotics and causes of excessive sleepiness. (Courtesy of the Library of Congress)

Human Sleep and Its Disorders

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In Memoriam

Robert A. Woodruff

Preface

In this book we trace the development of several major themes in sleep research, from the first formal description of REM sleep in the early 1950s through the present. Chapter 1 provides those less familiar with this area with a perspective on the many possible ways to examine sleep. Chapter 2 describes in detail a major viewpoint of this book: that observations of pharmacological interventions affecting the neurotransmitters may aid in the understanding of sleep regulation. The remainder of the book is devoted to endocrine systems related to sleep (chap. 3) and to the contribution of sleep research to the understanding of various pathological states (chaps. 4–7). The areas of investigation open to those who wish to understand sleep are much broader than the traditional problems of insomnia and narcolepsy. Such disorders as depression, schizophrenia, and alcoholism have long been associated with disordered sleep. Our search for an understanding of the latter phenomena may clarify the nature of these conditions.

We have emphasized the study of *human* sleep. There are, of course, some scientific disadvantages to this approach. Because of ethical considerations, we obviously cannot, and do not wish to, employ the invasive procedures of the animal laboratory. Hence our inferences must often be indirect, and we may sometimes be observing epiphenomena, rather than the physiologic events themselves. On the other hand, there are several unique advantages to studying human sleep. First of all, sleep has a dual nature: It can be seen as both a physiological function and a subjective experience. In order to study the interworkings of these two phenomena, we must necessarily deal with humans. Second, it is our intention that our studies will ultimately be useful in solving human problems. In the absence of adequate

animal models, we must study such conditions as the affective disorders and schizophrenia in persons suffering from them. Third, there is a technical advantage. The human REM-nonREM cycle lasts approximately 90 minutes, much longer than that of most laboratory animals. We are becoming more and more convinced that it is useful to study the effects of drugs that are infused briefly at different points in the sleep cycle. We also wish to examine substances in the blood that may appear in a specific stage of sleep. This can only be done when the cycle is long enough to be broken down into its constituent parts, as is the case in the human REM-nonREM cycle.

Finally, a few comments about our method of presentation are in order. We have tried to write in a manner that is understandable to the student as well as the professional researcher. For this reason, we have provided a section at the beginning of each chapter that outlines the basic concepts in the field. (In chapter 7, for example, we begin by briefly describing the symptoms and natural history of depressive disorders.) We have also tried to avoid giving the text a sedative quality of its own, which is often the result of narrating the results of one experiment after another. Since it is important that this information be available, however, we have made a series of tables describing the data from all the studies in a given area. In the text, we have emphasized the interplay of ideas derived from these studies. One approach that we found particularly useful was to determine the criteria needed to confirm or refute a hypothesis (e.g., that the secretion of a hormone is related to the occurrence of a sleep stage), and to determine how well these criteria have been met. Finally, we have tried to convey to the reader the sense of excitement we have experienced in studying the nature of sleep, a phenomenon both universal and exceedingly mysterious.

We wish to recognize the people who inspired and supported our work over the years: Drs. Frederick Snyder, William Bunney, Robert Cohen, Robert A. Woodruff, Donald W. Goodwin, Eli Robins, Irwin W. Feinberg, William Dement, and Alan Hobson.

In particular, we would like to thank Drs. Donald W. Goodwin, Lawrence S. Jacobs, and James F. Leckman for their valuable suggestions regarding various portions of this book. The responsibility for all statements in the text, however, lies with the authors.

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