

covering the introduction of the National Health Service in 1948 has space only for a few highlights, concluding with a resume of the problems posed for society and the individual by increasing longevity.

Although Cartwright occasionally touches upon international developments, the book focuses on England. It can be recommended as an attractively presented brief overview for the reader seeking some historical background on the role of medicine and disease in society.

In contrast, *Health Care and Popular Medicine in Nineteenth Century England* is a series of essays by a group of historians and sociologists that concentrate primarily on the relationships between medicine and society in the first part of the 19th century.

The editors' exploratory essay, "Towards a social history of medicine," constitutes about a fourth of the book. In it they urge a synthesis of historical and sociological perspectives with medicine and the use of medicine as a theme for the elaboration of historical and sociological knowledge. They then review the existing body of literature on 19th-century English medicine and society, principally works by social historians, economic historians, and sociologists. This well-documented bibliographic survey should be particularly useful to physicians and historians unfamiliar with the field.

The five essays that follow Woodward and Richards's long introduction explore such sociomedical topics, within 19th-century English history, as the development of the early birth control movement, physicians' views (principally, contemporary male stereotypes) of the nature of male and female sexuality, and a case study of the status and social role of medical men in Sheffield from 1790 to 1850. Ivan Waddington's concluding essay on the conflicts between general practitioners and consultants traces the changes that took place in the structure of the medical profession in the first part of the 19th century to the widening demand for medical care stemming from the growth of the middle class brought about by the Industrial Revolution.

Woodward and Richards's collection of essays, drawing upon wide-ranging, original source materials, should provide new insights for historians, sociologists, physicians, and devotees of the Victorian period.

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## Behavioral Biology

**Biological Determinants of Sexual Behaviour.** J. B. HUTCHISON, Ed. Wiley-Interscience, New York, 1978. xviii, 822 pp., illus. \$43.

Exposure to gonadal hormones has an organizational influence on the developing brain of an organism to direct its later responses to be congruent with its genetic sex. Similarly, a well-conceived book can help to set the direction of research as a field matures. This volume, in addition to performing the more usual function of reviewing the information available in the field, has the potential for performing such a function for the study of the mechanisms underlying sexual behavior.

The volume is divided into four sections: on developmental processes; on the integration of sexual behavior, with a focus on physiological mechanisms; on the patterning of sexual behavior; and on the biosocial factors influencing sexual behavior. The development of sexual behavior is described from a genetic perspective by T. E. McGill in a chapter containing many novel ideas not only for future research but for integrating available facts. This chapter is followed by several on the role of early experience in the development of sexual behavior, and the section concludes with chapters on the ways in which gonadal hormones act on the developing brain to guide neuroendocrine and behavioral responses in a feminine or masculine direction. Among the intriguing findings reviewed in this section is the finding that circulating testosterone can be metabolically altered, for example aromatized to an estrogen in the brain. It may be that the product of this reaction operates at the cellular level to orient specific neurons in a masculine direction. This idea, when taken in the context of the chapter by D. B. Kelley and D. W. Pfaff that opens the next section of the book, suggests that we can now add known metabolic events within the cell to the web of events connecting hormones with behavior. This web, and it is more of a web than a chain, includes not only changes in the level of circulating hormones but, as is pointed out by Kelley and Pfaff, modifications in specificity and affinity for hormones by target tissues. Two factors that modify what hormone or what quantity of a hormone a target cell may remove from the circulation are prior exposure to the hormone and, as discussed in a provocative chapter by Hutchison, environmental stimuli such as seasonal events or even prior experience. The demonstration

that such events can modify hormonal responsiveness at the cellular level opens new avenues of inquiry into the mechanisms underlying behavioral expression. Although the recent discovery of sexually dimorphic structures in the brain and their possible dependence on the presence of gonadal hormones at critical times of early development has a great potential for influencing future research, this subject is given only brief attention in this volume. This is an unfortunate omission because it could have provided some anatomical underpinning to the biochemical events described.

The section on the integration of sexual behavior, consisting of 11 chapters, occupies almost half the volume. The most thorough and useful of the chapters in this section are those discussing the neural substrate for sexual behavior and the effects of hormones on its sensitivity. Two chapters deal with the neurotransmitters, especially the monoamines, that are known to be involved in sexual behavior. These chapters provide a very basic brief introduction to neuropharmacology that may be of considerable use to researchers oriented toward the behavioral and more traditional endocrinological aspects of sex. Here again, particularly in the chapter by B. J. Meyerson and C.-O. Malmnäs, some clear directions for future research are indicated. The authors point out that only 1 to 2 percent of the brain's neurons are known to contain aminergic transmitters and only about another 10 percent contain acetylcholine. This leaves neurotransmission in almost 90 percent of the brain's neurons unknown, although evidence is accumulating that amino acids such as glycine and gamma-aminobutyric acid (GABA) may perform part of this function. Strong suggestions that peptides such as luteinizing-hormone-releasing hormone (LRH) and derivatives of the adrenocorticotrophic hormone (ACTH) may have direct effects on sexual behavior and memory processes support the notion that amino acids or peptides may play important roles as transmitters in the central nervous system.

In the brief section on the patterning of sexual behavior J. C. Fentress focuses on the short-term transitions in behavior and makes a strong plea for definition of behavioral units so that it will be clear whether an investigator is dealing with functional endpoints, movements and postures, or causal antecedents of behavior. Clarification of these issues is essential in a field that is clearly becoming more interdisciplinary.

The concluding section of the volume provides an evolutionary context for sexual behavior as well as a mix of other topics. C. J. Erickson, for example, provides a discussion of pair bonding from a sociobiological perspective. In another chapter, E. B. Keverne presents the intriguing but highly speculative notion that two olfactory pathways may operate in mammals, including primates, to carry chemical signals of import for sexual behavior. One of these pathways is involved with sexual attraction, which is highly labile and subject to environmental and experiential factors, and another is involved with sexual performance once a pairing occurs. The latter may be less labile and even immune to cortical input.

The volume is not without shortcomings. The sequence of chapters is haphazard, and a number of chapters detract from the flow of ideas because they present information in highly specific and somewhat peripheral areas of inquiry. Fortunately, the chapters contain good summaries so the reader can make informed decisions about what to exclude.

Although the volume is longer than necessary, it contains many excellent reviews of current research into the basis of sexual behavior, and, more important, it suggests specific experiments and investigative strategies that will help us to understand this fascinating set of phenomena.

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