A Leader in Biomedical Science

Walter B. Cannon. The Life and Times of a Young Scientist. SAUL BENISON, A. CLIFFORD BARGER, and ELIN L. WOLFE. Belknap (Harvard University Press), Cambridge, MA, 1987. xvi, 520 pp., illus. $30.

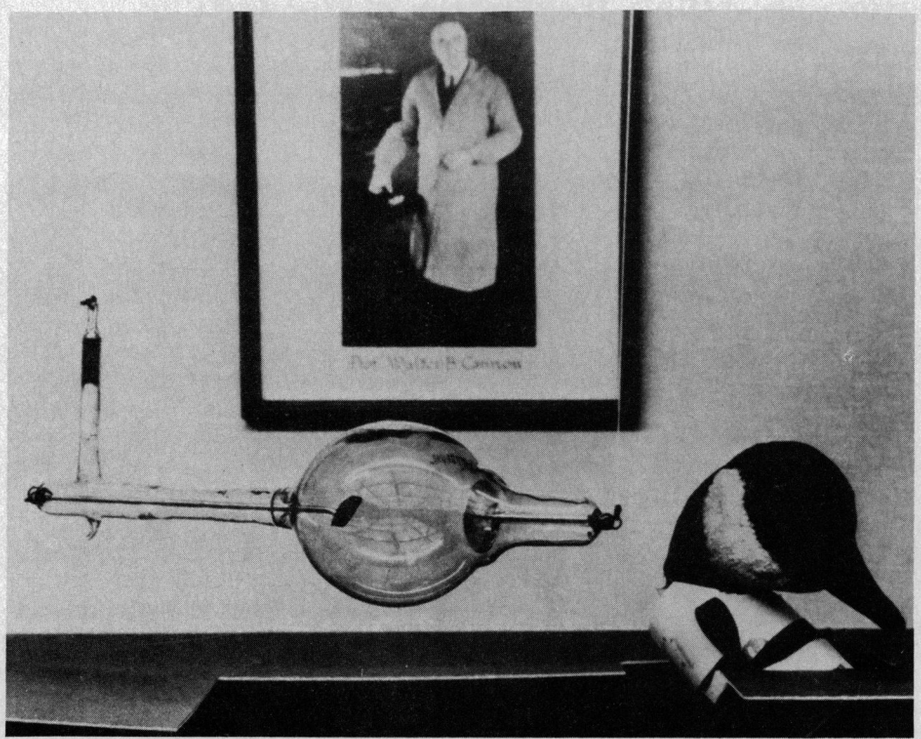
Walter Bradford Cannon (1871–1945), best known for coining the term "homeostasis" in 1926, was among the most eminent American physiologists of his time, yet this study of his life up to 1917 is the first move toward giving him full biographical treatment. Writing contextualized biography par excellence, Saul Benison, Clifford Barger, and Elin Wolfe—respectively historian, physiologist, and archivist-editor—use Cannon's career as a vehicle for exploring the early-20th-century transformation of American academic biomedicine.

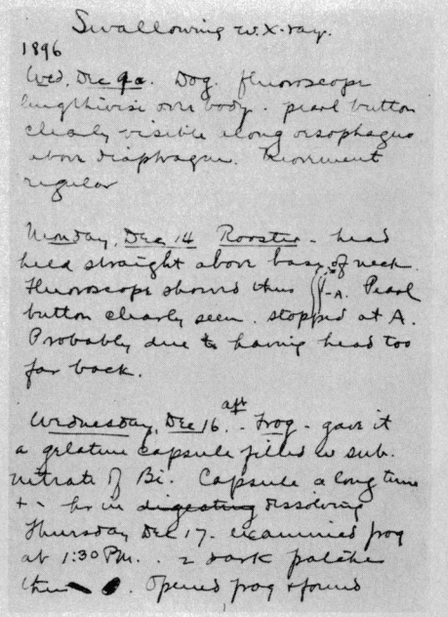
Cannon's involvement in shaping the Harvard Medical School, where he taught from his graduation there in 1900, sets one central theme. The authors, going beyond existing histories of the school, deftly trace how conflicting assessments of the place of science in medical education were played out in disputes over admissions requirements, the curriculum, the balance between teaching and research, and the respective roles of the laboratory and the clinic. Cannon was the most effective mediator among divergent faculty convictions, but he could not create the consensus needed, for example, to impress the Rockefeller General Education Board with the clarity of the school's aims. Indeed, the authors reveal that the Board's first competition for a grant to advance clinical education was a sham contest, in which Johns Hopkins was the preordained winner and Harvard an inevitable loser.

Cannon was also a leading activist in countering attacks against animal experimentation, prompting the authors to write one of the best studies we have on the response of early-20th-century American scientists to the antivivisection movement. Initially Cannon was a minor player, one combatant against antivivisectionist legislation proposed in Massachusetts, but in 1908 his role was recast on a national stage when he became founding chairman of the American Medical Association Council on the Defense of Medical Research. Cannon's antilegislative campaigns brought him to national prominence. But his most persistent strategy was to instruct medical practitioners about the nature and importance of animal experimentation, with the expectation that they in turn would educate the public.

Some historians have recently argued that claims to practical medical relevance made by turn-of-the-century American scientists in fields such as physiology and biochemistry were above all calculated strategies to legitimate and strengthen their own disciplinary aspirations. Yet as the authors of this volume convincingly display, Cannon's claims about the practical relevance of experimental physiology to medicine, such as those he arrayed before the antivivisectionists, were not simply rhetorical window-dressing. A persistent theme in Cannon's career was the application of experimental physiology to clinical problems, a personal commitment he acquired young and pursued by collaborating with clinical investigators and repackaging laboratory findings to demonstrate their utility to medical practitioners. Cannon's example does good historiographic service by suggesting that the fact that basic scientists' claims of medical relevance for their work patently functioned as tools in the sociopolitics of scientific discipline building does not necessarily belie their underlying intellectual integrity.

If this splendid biography comes up short anywhere, it is in the depiction of Cannon at the bench. During the years it covers Can-





X-ray equipment used by Walter B. Cannon and his handwritten notes describing his first experiments on swallowing, December 1896. [Countway Library of Medicine, Boston; from *Walter B. Cannon: The Life and Times of a Young Scientist*]

non elucidated gastrointestinal motility by being the first to apply x-rays to the study of digestion; he demonstrated the emotional production of adrenaline, following a line of research initiated by observing the effects of stress on gastrointestinal function; and, from his work on the emergency function of the adrenal medulla, he developed the more general concept of the "fight or flight" response. The major trends in his work are of course chronicled and the key experiments are summarized. But though peaks in Cannon's research are made visible and the connections between them sketched, by and large the style and rhythms of his workaday routine—his ways as an investigator—remain more obscure. In the final analysis, the reader gets a finer-grained image of Cannon functioning in the political arenas of science and in the domestic sphere than at work in his own laboratory.

The authors have combined a deep exploration of Cannon's exceptionally rich archive with their own sensitivity to historical interpretation to produce an important and fascinating book. They exercised prudent restraint in electing to end the present study in 1917, but one can hope that their collaboration will yield a companion volume on the remainder of Cannon's life.

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Early Epidemiology

Yellow Fever in the North. The Methods of Early Epidemiology. WILLIAM COLEMAN. University of Wisconsin Press, Madison, WI, 1987. xvi, 202 pp., illus. $49.50; paper, $17.50. Wisconsin Publications in the History of Science and Medicine, no. 6.

The importance of epidemiology in the understanding of disease is well recognized, but investigation of its history has been limited. The advent of the germ theory made causal agents the primary focus of research on communicable disease, obscuring earlier approaches, and historians, especially in recent years, have been more concerned with the social and political consequences of disease outbreaks than with the ideas governing the thinking of contemporary investigators of them. William Coleman's new book makes an important contribution to knowledge of the methods of epidemiology in the period before the development of the germ theory.

Coleman has chosen yellow fever as the vehicle for his analysis. Yellow fever offers insights into epidemiological thinking because it was a center of controversy in the first half of the 19th century. Observers disagreed not only on whether the disease was contagious but also on whether it was brought from outside into a community or was the product of the development of other local "fevers." These were not just matters for theorizing but issues with consequences for action. Sanitary and quarantine measures depended on what viewpoint was predominant.

To provide illumination about epidemiological method, Coleman leaves aside the large-scale epidemics of yellow fever in the Americas and the Caribbean, where medical demands often overwhelmed investigation, and concentrates instead on two small isolated outbreaks in the port towns of Saint-Nazaire in 1861 and Swansea in 1865.

The unusual northern European setting of these epidemics in Brittany and Wales and the limited numbers of cases made it possible for epidemiological investigators to trace exhaustively the contacts and activities of those stricken and to assess fully local environmental conditions. François Mélier, a prominent French hygienist and expert on crowd diseases, reported on the Saint-Nazaire outbreak and George Buchanan, a public health inspector of the Privy Council of Britain, on the Welsh one. In the central part of his book, Coleman examines closely the model reports of these two epidemiologists, giving the most extended discussion to Mélier and Saint-Nazaire. An earlier section on the investigation by a French commission of a larger outbreak of yellow fever in Gibraltar in 1828 provides the author with a baseline for determining the significance of the findings in the later epidemics.

As Coleman shows, Mélier and Buchanan established that yellow fever had been imported into the two communities by ships. It was not a product of local environmental conditions. The disease displayed both contagious and noncontagious attributes, and its spread could be checked by sanitary measures.

Coleman closes with a chapter "What was epidemiology?" that skillfully sums up his findings. Epidemiologists had developed a clear sense of themselves and their task by mid-century. Case tracing and thorough examination of environmental factors could lead to informed decisions on sanitary and preventive measures even when the causes and agents of transmission of disease were unknown. This book should stimulate other research into the subtleties and complexities of thinking about disease.

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Marine Mycology

The Biology of Marine Fungi. S. T. Moss, Ed. Cambridge University Press, New York, 1986. xii, 382 pp., illus. $49.50. From a symposium, Portsmouth, U.K., Aug. 1985.

This collection of papers provides a reasonably up-to-date summary of the state of the art in marine mycology. And art it does seem to be. A pervading plaint, one omitted from scarcely any paper, is how much is not known about marine fungi. There has been a distinct change of direction since the extensive descriptive works of Johnson and Sparrow (1961) and the Kohlmeyers (1979) established marine mycology as a legitimate field of research. Today, the emphasis is on physiology and nontraditional phylogenetic and taxonomic approaches. However, we appear to be in the early stages of this change, so early that even the methodology to be used is under serious question, and the interpretations are even more controversial. The opening chapter, by D. H. Jennings, starts off with criticism of how fungi have been grown—a seemingly elementary matter, but one that has not been given adequate thought in the context of the marine habitat and that may affect quite considerably the derived interpretations. Given this introduction, it is not surprising to find that many papers devote considerable space to delimiting the cultural and physiological parameters of fungi. Fortunately, this puts the work into perspective and the reader gets a sense of the complexity of marine studies and of how they differ from terrestrial or freshwater investigations.

The most useful chapters may be those that deal with the evaluation of methodology: Jennings on fungal growth in the sea; Newell, Fallon, and Miller on measuring fungal biomass (an account of different methods and their limitations); Molitoris and Schaumann on determining enzyme production; and Booth and Kenkel on the distribution of marine fungi. The various chapters on physiological aspects are of interest to students of yeasts, chytrids, ascomycetes, and "protistan" fungi such as the thraustochytrids and labyrinthulids. These last two groups receive attention in three chapters—by Moss, by Bahnweg and Jäckle, and by Findlay, Fell, Coleman, and Vestal—that offer excellent accounts of the phylogeny, taxonomy, and biochemistry of these ubiquitous but poorly understood marine organisms. Moss points out that even though thraustochytrids and labyrinthulids are probably not really members of the Mycota, only mycologists have studied them, and their presence in a volume on marine fungi is therefore justified. This sug-