The Physiology of Thirst

Thirst and Sodium Appetite. Physiological Basis. SEBASTIAN P. GROSSMAN. Academic Press, San Diego, CA, 1990. x, 289 pp., illus. $59.95.

Sebastian P. Grossman has been a central figure in the study of thirst for the last 30 years. His earlier work on drinking induced by the neurotransmitter acetylcholine was a landmark in the study of ingestive behavior because it demonstrated the possibility of inducing complex and apparently normal behavior in a conscious animal by the relatively simple procedure of placing a pharmacologically active agent directly in the brain. This work was the starting point for the huge and ever-growing volume of work on the neuropharmacology of the central mechanisms of behavior.

Thirst and Sodium Appetite is an excellent book, suitable for beginners as well as experts. Although it has only 216 pages of text, its subject is covered in satisfactory detail. Grossman's aim is to provide a description of physiological mechanisms, and he refers the reader to the primary literature for descriptions of the experiments on which the ideas are based. There is a 60-page bibliography, which spans the literature from Haller's compendium of 1764 to papers published in the late 1980s. At the end of each chapter Grossman summarizes its contents and draws attention to the areas of controversy. In the final chapter he sketches out the development of past ideas, highlights some present problems, and provides a forecast of future directions in research.

What emerges clearly from this final chapter, and from three others on brain mechanisms, is that research on thirst and sodium appetite is becoming more circumscribed, focusing on the central neural mechanisms. One leader in the field has even stated that thirst is essentially a neurological problem, but this view is unduly restrictive, and it is clear from his book that Grossman takes a more balanced view. As he says in his preface, the 1980s have produced "such a plethora of information" on brain mechanisms that he found it necessary to devote a significant portion of the book to them. But he also deals with the broad areas of physiological interest, devoting space to consideration of the stimuli that induce drinking behavior, stimulus-response relations, peripheral receptors, renin-angiotensin systems, aspects of fluid and electrolyte metabolism, and the role of the kidney. LeMagnen's memorable distinction between a decapitated physiology and a bodiless psychology sums up the different approaches perfectly. Part of the excitement of research in this field lies in precisely this continuing tension between the psychological and the physiological approach.

Inevitably in a book as short as this there are oversimplifications, but the major problems and controversies are clearly stated. For example, in his discussion of central osmosensitivity (p. 37) Grossman refers to the paucity of positive responses to central injections of hypertonic solutions despite the fact that these injections blanket the whole putative osmosensitive site. Again on the same page he points out that the reported selective impairment of drinking in response to cellular dehydration, but not to extracellular dehydration, after lesions in the lateral preoptic area may depend on the testing procedure; in so doing, he suggests the importance of testing a range of different thirst stimuli before coming to any conclusions about the specificity of the procedure causing the impairment. Grossman's analysis of the angiotensin-induced drinking phenomenon is admirable, and the present position is clearly summed up, with enough information to show where the doubts lie.

There are some errors (very few), one or two omissions, and occasional questionable statements. For example, Grossman states perhaps too confidently that salt causes hypertension. I should have liked some mention of the experiments of Kozlowski and Sobocinska on the effects of vagosympathectomy on drinking behavior in dogs, since this work was the first to address the problem of receptors for hypovolemic thirst. The stimulating effect of preparations of nerve growth factor on thirst and sodium appetite described on p. 76 is now known to be due to the small amounts of renin present in the preparations available when the studies were done. And although more than two pages are devoted to atrial natriuretic factor, its inhibitory effect on thirst and sodium appetite is not mentioned.

This is a well-written and authoritative work, which stimulates me to do more experiments on some of the problems Grossman has skillfully exposed. What more can be asked of a book? I warmly recommend it and wish it the success it deserves.

JAMES T. FITZSIMONS
Physiological Laboratory, University of Cambridge, Cambridge CB2 3EG, United Kingdom