

Up to a frontier of astrophysics

E.N. Parker

Solar Magnetohydrodynamics.

By Eric R. Priest.

Reidel: 1982. Pp.470. Dfl. 235, \$99.

Solar Magnetohydrodynamics was written by Dr Priest over a period of several years as a text for a graduate course in magnetohydrodynamics at the University of St Andrews. In his preface, the author provides an interesting account of the development of the book and puts forward the fundamental point that the Sun, because of its proximity, is the primary astrophysical laboratory for the study of magnetic fields. The fact is, however, that the magnetic fields in the Sun, subject to the convection of the fluid beneath the visible surface, behave in ways that are baffling even to the expert magnetohydrodynamicist. A sunspot is an example of such a mystery, and it is gratifying to see that the chapter on the structure and stability of sunspots includes mention of the current speculation and doubt on the causes of the observed assembly of sunspots from small flux tubes.

The author takes a direct approach to the subject, beginning with the reduction of Maxwell's equations to magnetohydrodynamic form. The remainder of the first five chapters are devoted to the hydrodynamics of electrically conducting fluids carrying magnetic fields, forming the intellectual basis for the applications of that basic physics to the mysteries posed by the Sun and other stars.

The chapter on dynamo theory, attacking the question of the origin of the oscillating magnetic field of the Sun, is lucid and concise, giving a clear overall picture of what is (and is not) currently known about the production of magnetic fields beneath the visible surface. It concludes with a discussion of the outstanding problems with dynamo theory in general, and the solar dynamo in particular, that have yet to be overcome. The account of solar flares is also excellent, as one would expect from an author who has been so directly involved with the theory of magnetic reconnection and the explosive consequences in the solar flare. In the final chapters, Priest goes on to cover the important topics of prominences, and the associated eruptions, coronal transients, coronal heating and the solar wind.

The treatment is both broad and thorough, so that the reader is brought up

Quantum chemistry

Oxford University Press have issued a second edition of *Ab initio Molecular Orbital Calculations for Chemists*. The original book appeared in 1970. Written by W.G. Richards and D.L. Cooper, the new edition costs £8.95, \$16.95 in paperback.

to the working frontier of research. For this reason the monograph belongs on the desk of every astrophysicist interested in active objects, whether stars or galaxies. It should go without saying that the book is also an excellent text for a graduate course on magnetohydrodynamics; it would be relatively easy to base a one-semester course on selected topics, although there is plenty of pertinent material for open-ended study. This subject is, after all, one to which many astrophysicists are, in one guise or another, now devoting their principal research efforts. □

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Salt and the scholar

Roger Guillemin

The Hunger for Salt: An Anthropological, Physiological and Medical Analysis.

By Derek Denton.

Springer-Verlag: 1982.

Pp.650. DM360, £85.

The Hunger for Salt is the work of a scientist and scholar. Should one want to read about the endocrine, neuroendocrine and renal mechanisms involved in the homeostasis of sodium, water and related ions, the book contains all that is to be expected from a physiologist as Denton fundamentally is. But there is far more to Denton's treatment of the physiology of sodium and body-fluid regulation to be found in terms of the substantially behavioural stereotype, that of hunger and thirst. Of 10 chapters devoted to such physiological discussions, each is clearly directed at exploring salt appetite as it can be physiologically or experimentally modified.

In each chapter Denton usually ranges far afield in background knowledge, finally to arrive at some basic physiological question. For instance when the question is raised of the neuroanatomical location of the centres that will stimulate or inhibit salt licking or water drinking, Denton's account encompasses the more psychological problem of the animal's conscious awareness of its thirst for water, regardless of the true state of its hydration. Denton does not deal with the neuroanatomy and neurophysiology involved until he has discussed in some depth the general problem of consciousness in animals — citing the studies of Richter in rats, and those of Griffin, Gallup and Thorpe in the great apes — and also man, though somewhat more scantily. Here he quotes Proust (in English unfortunately, but using an excellent and typically Proustian sentence far less well known than that on the taste of madeleines),

Sperry, Hess, Heath and Penfield, without omitting the Popper–Eccles dialogue (with a definite nod to Popper). Broadly, Denton's conclusion is that animals' urgent or chronic appetite for salt must be preceded by true thirst or hunger for salt. A statement such as this, however, is as simplistic an indication of Denton's approach as are complex and extensive the pertinent chapters in the book (which include the presentation of recent studies on the effects of peptide hormones — I prefer the word cybernins — on acute salt appetite in sodium-replete animals).

All of this leads finally to an excellent discussion of the theories regarding the genesis of salt appetite, which culminates in the postulation that activation of salt-appetite drives may involve genetic transcriptions within the relevant neuronal systems, reminiscent of the mechanisms involved in expression of sexual behaviour.

Some of the most unexpected discussions in the book are to be found in the sections dealing with the anthropological background to salt appetite. One chapter, for example, is entirely devoted to cannibalism. Over more than 20 pages Denton gives us a critical survey of reports of cannibalism all over the world, with extracts from Captain Cook's journals, from those kept by Alfred Russel Wallace during his several years in the Amazon basin and also from more recent reports. These writings give eye-witness accounts of endo- or exo-cannibalism, leading Denton to set little store by Ahrens's recent book (*The Man-eating Myth: Anthropology and Anthropophagy*, published by Oxford University Press in 1979). If this extensive treatment of cannibalism is another example of Denton's grasp of anthropology — cannibalism to obtain salt or other minerals, as in the consumption of powdered bones, contributes to the book's thesis only in the context of geographical locations of low-sodium availability — it also shows the importance of hedonism in the hunger for salt.

The final chapter deals with the role of salt intake in the etiology of high blood pressure in modern man. A well-researched 100 pages in which one will find a superb summary of all one could hope to be told on the subject, it critically closes by stating that a causative role of sodium excess in the hypertension of modern Western man has not been unquestionably proven.

The Hunger for Salt is a large book which will not be read from cover to cover, all in one sitting. It is, however, an extraordinary compendium of well-organized knowledge, so rich in its scholarly treatment that it will most certainly constitute a primary source of reference, knowledge and new ideas for anthropologists, physiologists and physicians. □

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