

meter now used for the realization of the temperature scale above the gold point.

The last subject dealt with is called "spectroscopic thermometry" and contains reference in the titles to "population" temperatures in hot gases, electron density and temperatures in plasmas by line broadening and temperature measurement in arcs.

The papers occupy 439 pages of the book and another 60 pages are devoted to a bibliography which comprises NBS monograph 27 1953-1960 and its supplements (1) 1960-1962 and (2) 1963-1965.

Almost all the contents of this book have been published previously, albeit scattered in time and space through the literature. Very little typesetting has been involved in producing the book, the pages being reproduced from the originals. The effort involved seems to be well worth while, for it is a great advantage to the specialist reader to have this collection in one cover at a comparatively low price. By its very nature, however, there are bound to be significant omissions in the subject and an introduction to the book filling in briefly these omissions and surveying the contents in the light of the latest information would have added considerably to the value of the work for reference purposes.

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ATMOSPHERIC PHYSICS

Exploring the Atmosphere

By G. M. B. Dobson. Second edition. Pp. xiv + 209. (Clarendon Press: Oxford; Oxford University Press: London, January 1969.) 42s boards; 21s paper.

WITH the advent of satellites and sounding rockets, the experiments performed to measure the physical and chemical properties of the Earth's atmosphere have been brought very much before the public eye. Although the scale of this work in the United States and the Soviet Union perhaps eclipses that done elsewhere, it is as well to remember that Great Britain has made a considerable contribution, not least of which has been the highly successful satellite Ariel 3. As a result of wide press publicity, many people, especially scholars and students of physics, geography and astronomy, have had their interest awakened in the fascinating subjects of atmospheric physics and geophysics.

This book is written for them; its exposition is simple and non-technical and the text is interspersed with many clear diagrams. The first edition of this book (published in 1963) presented a summary of the results obtained during the International Geophysical Year of 1957-58. This second edition brings the subject up to date and includes the observations made in the further international year, 1964-65, which was a period of minimum solar activity.

The book begins with a review of the whole atmosphere up to heights where it merges into outer space; then the reasons for the existence of the stratosphere and troposphere are set out. The formation of cloud, rain, frost and hail is discussed, special reference being made to the possibilities of artificial control of the weather. Lightning and thunder are next dealt with, for although these subjects have been studied for many years we now have a much better understanding of them. The discussion of ozone, that vital atmospheric constituent which absorbs the harmful ultraviolet radiation, is followed by a chapter on solar terrestrial relationships and the effects of the variable solar activity on the Earth's ionosphere. Included in the subjects for this chapter are sunspots, solar rotation, solar flares and the solar wind. The aurorae and airglow are discussed and mention is made of the new knowledge obtained of the upper atmosphere by the injection of sodium vapour into this region. The book ends with chapters on the effects of the Earth's magnetic

field on the ionosphere and cosmic rays, the production of the Van Allen belts, and the magnetosphere.

This is an excellent book, clear, and most rewarding to the reader. It presents this vitally alive subject in a fascinating way, emphasizing the facts and also stressing the uncertainties of our present position where knowledge and theories are in a constant state of flux.

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Did Fertilization Occur?

SIR,—The interesting note "Early stages of fertilization *in vitro* of human oocytes matured *in vitro*", recently published in *Nature* by Edwards, Bavister and Steptoe¹, merits critical examination and comment. For this purpose it is useful to know what fertilization is, that is to define it, which can be done as follows: Fertilization is the incitement of an egg to development by a spermatozoon, together with the transmission of male hereditary material to the egg. At fertilization the spermatozoon contributes the stimulus for development and a set of chromosomes embodying the paternal contribution to the genetic make-up of the zygote. Without wishing to engage in semantic hair-splitting, one must observe that the "early stages" of fertilization may be and, in the note by Edwards *et al.*, are so early as to raise the question whether fertilization, if the word is to have a meaning, occurred at all.

Everyone knows that development involves the repeated division of the egg into more and more cells. No division was achieved in the experiments of Edwards *et al.*: so the first criticism of fertilization as defined above was not realized.

Neither the juxtaposition of the sperm and egg nuclei (identified as such), nor their "fusion", was observed by Edwards *et al.*: it follows that the second criterion, concerned with the intermingling of hereditary material derived from the father and mother, was not realized.

These observations in no sense imply that I disapprove of the work; nor that I do not admire it as a preliminary experiment, although similar work has been done before, as reported by Professors W. J. Hamilton and T. W. Glenister in *The Times* on February 18 this year. Nevertheless, the claim to have fertilized a human egg outside the mother, albeit as far as the "early stages" (only mentioned in the title, but not in the text or summary), is premature. Every gametologist knows how difficult it is to be sure that a mammalian egg has been fertilized (see Austin²), which is why a rigorous definition is needed. Parthenogenesis and the entry of a spermatozoon into an egg without fertilization are well known phenomena.

Yours faithfully,

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¹ Edwards, R. G., Bavister, B. D., and Steptoe, P. C., *Nature*, 221, 632 (1969).
² Austin, C. R., *The Mammalian Egg* (Blackwell, Oxford, 1961).

SIR,—We consider the earlier stages of fertilization include attachment of spermatozoa to the zona pellucida, their movement through it and the presence of spermatozoa in the perivitelline space. Our data¹ gave convincing