

tical elaborations but gives the essentials that are of colorimetric interest. Two slips may be noted: the attribution to Planck of Kirchhoff's law on black-body radiation (p. 4), and the transposition of two colour patterns in the diagrams of Plate 4. Incidentally, the publishers may be complimented on the printing and layout, which are a great improvement on the first edition.

As an easily understood introduction to colorimetric practice, Prof. Wright's book remains unsurpassed.

W. S. STILES

CLOUD PHYSICS

The Physics of Clouds

By Dr. B. J. Mason. (Oxford Monographs on Meteorology.) Pp. xx + 481. (Oxford: Clarendon Press; London: Oxford University Press, 1957.) 70s. net.

DURING the past ten years the subject of cloud physics has been firmly established as one of the most lively and exciting branches of meteorological science. Although the actual number of persons working in this field is small compared with those in other branches of either meteorology or physics, their enthusiasm and initiative have enabled great progress to be made—from both an experimental and theoretical point of view, but particularly the former. Dr. B. J. Mason, who has himself made many contributions to the subject in recent years, has, therefore, rightly decided that now is the appropriate moment for the production of an authoritative and comprehensive account of past, present and possible future developments in the field.

One can say immediately that it is an excellent volume, and although it has been written primarily for the atmospheric physicist, its scope and interest should reach considerably further than this. To any experimental physicist the elegance, ingenuity and simplicity of some of the numerous techniques described cannot fail to appeal. The use of the diffusion cloud chamber for the study of the growth of ice crystals and the 'spider's web' method for the examination of droplets are two such examples. The physical chemist and the applied mathematician are by no means left out, and it is rather surprising and refreshing to find a contemporary branch of physics in which classical principles and methods of analysis are dominant.

Dr. Mason has set out to achieve three main objects in this book. First, to present a logical description of the physical processes by which the essentially microscopic process of condensation of water vapour upon an 'atmospheric' nucleus can lead to the formation of a cloud on the macroscopic scale. Secondly, Dr. Mason has taken great pains to make the book not only an account of the present state of knowledge about the subject, but also a volume in which a research worker can be sure that he will find reference to innumerable relevant papers and articles which have been published in the past. This task in itself must have been immense, since it has been recognized for many years that one of the main difficulties about the subject has been the large amount of technical information lying hidden in numerous journals. The third object Dr. Mason has had in mind is to emphasize the very important link which must be established between laboratory experiments on one hand and meteorological measurements on the other. It is not so much that in the laboratory parameters may be controlled, whereas in the atmo-

sphere this is effectively impossible; it is in the mode of thought and interpretation that the link must be forged. Too frequently in the past the laboratory worker has failed to work out the way in which results of small-scale experiments can be made relevant to the larger field of atmospheric phenomena. Equally, the atmospheric physicist has often been very short-sighted in deciding between what can and cannot be measured with reliability and significance.

The book starts with an introductory chapter (written by Mr. F. H. Ludlam) in which the large-scale physics of clouds is discussed; actually, the main purpose of this chapter is to explain how a classification of the principal classes of clouds may be achieved. On the whole this chapter is too short, and although the photographic illustrations are excellent, there could have been more discussion in the text about some of the features they exhibit.

Dr. Mason then proceeds to a discussion of the condensation process in clean, ion-free air; although the book is mainly concerned with the condensation process in 'unclean' air, Dr. Mason rightly points out that, as an illustration of the method of approach to the general problem of nucleation, this more special but fundamental case of condensation is very valuable. A survey is given of the different methods employed by various workers (for example, Frenkel and Becker-Döring) on the subject, and it would have been worth while including a more detailed discussion of these methods and the physical ideas on which they are based.

The identification, concentration, size and sources of the various atmospheric nuclei are then dealt with, followed by an excellent discussion of the physics of the growth of droplets in cloud and fog. The important question of where snow and ice fit into the picture is very well presented and it is here, in particular, that the vital part that laboratory experiments (many of which are due to Dr. Mason and his research team) can play in the development of an understanding of the fundamental processes is well brought out.

The physics of the natural precipitation process is then fully discussed and a great wealth of material summarized. The making of artificial rain is described and a sensible and scientific appraisal of the possibilities of this technique is given. Immediately after this discussion of precipitation, some sixty pages are devoted to an explanation of the way in which radar has been used to give information about cloud structure; this technique is now so useful to the subject that it certainly merits the full and detailed analysis which is presented; this will enable those who are not so well acquainted with the physics of radar detection to appreciate its potentialities. Finally, there is a chapter on the electrification of clouds, and although the author stresses that no study of the mechanism of cloud formation (and disappearance) can be complete without taking into account the electrical phenomena, the summary at the end of the chapter is far too brief, and it is not easy to see how much of the work which has been done in this field can be correlated with the arguments and material presented in the earlier chapters.

The whole volume is well produced and the care with which the text, diagrams and many beautiful photographs have been prepared is very evident. Dr. Mason is to be congratulated on producing a book which not only reveals the present state of knowledge on the subject but also at last clarifies a wealth of previous observations and sets them in their correct perspective.

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