

Review

Turbulent Transfer in the Lower Atmosphere by C. H. B. Priestley. Published by the University of Chicago Press, Chicago 37, 1959; pp. i—vii, 1—130; price \$ 3.75.

The book has grown out of a series of lectures delivered by the author when he was a Visiting Research Meteorologist at the University of Chicago in 1957, and expanded later by him by addition of new material, especially a section on the approach to the geostrophic wind and a short chapter on evaporation. The book covers the work done by the author and his colleagues in the fields of turbulent diffusion and convection in the Division of Meteorological Physics of the Commonwealth Scientific and Industrial Research Organisation, Australia during the last decade or so, and as explicitly stated by him the position in the pre-1950 period is touched upon only in so far as it provides a background for a more complete treatment of subject matter dealt with in various sections. In fact, the book purports to supplement O.G. Sutton's treatise on *Micrometeorology* published in 1953.

The Australian school of micrometeorologists or meteorological physicists as they prefer to call themselves, headed by Priestley, and, in particular, Swinbank, Deacon, and Taylor have made outstanding contributions to the subject of turbulent and convective transfer of atmospheric properties near the ground and this book, coming as it does from the Chief himself, presents for the first time not only a connected account of some of the major contributions of these workers but also a critical and balanced appreciation of the latest position of each topic discussed.

There are in all eight chapters in the book with an index and a rich bibliography at the end. After introductory remarks in Section 1, the author discusses eddy flux of properties such as heat, momentum and matter in the atmosphere reviewing the theoretical position and quoting experimental results of different workers. Difficulties of practical measurements of eddy fluxes and need for proper interpretation of results are discussed at length. In the next chapter, the shearing stress and the wind profile are discussed with particular reference to the work of Deacon and Monin and Obukhov.

In the next three chapters, the concept and characteristics of free convection in the atmosphere, *e.g.*, its onset, structure, and role in large-scale physical transport of atmospheric properties such as heat, smoke, etc. is explained in detail. It is held that under unstable conditions near the ground free convection plays a more potent and effective role in transferring atmospheric properties than small-scale turbulence. Dr. Priestley has been well-known for his work on buoyancy effects and free convection and the reviewer has no doubt in his mind that those who did not have the opportunity of going through his earlier papers or have not the time to do so now will find a reading of these chapters highly rewarding.

In the seventh chapter, the author briefly touches on the subject of evaporation. During recent years progress in this subject has been rather tardy and the author wisely limits himself mostly to a statement of the theoretical position. In the final chapter, the author deals with one of the most important aspects of low-level meteorology and that is the evolutionary aspect of energy transfer. The classical problem of diffusion of the diurnal temperature wave at the earth's surface into the atmosphere as well as into the ground and the problem of air mass

REVIEW

321

modification when flowing over a surface to which the airmass is not thermally adjusted are of great interest not only to micrometeorologist but also to synoptic meteorologist who is confronted with problems of this nature in his day-to-day forecasting of weather. It is felt that both will find Dr. Priestley's treatment of the problems highly stimulating.

The book is attractively bound and adequately illustrated.

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