and compactness of the apparatus. It should be noted, however, that a mixture can be separated by this method only when the difference in the circular R_F values of any two components is greater than 0.06.

The original method or the subsequent modification does not provide for a direct positional comparison of known and unknown substances, the identification depending on the determination of the circular R_F values. However, Rao and Giri (*4*) have recently attempted such a comparison by placing the known and the unknown materials in alternate spots along a small ring around the center of the filter paper and running the chromatogram with a suitable solvent. A convenient method has now been developed for running mixed chromatograms. The known and the unknown substances are separately introduced as microdrops (*A* and *B*, Fig. 1) at the two corners where the tail, about 5 mm wide, joins the rest of the filter paper. The introduction of the solutions should be done in such a way that the two microdrops come as close to each other as possible but do not actually touch as shown in the figure.

When the chromatogram is run in the usual way (*3*), the substances spread themselves as semicircular rings. The latter more or less touch each other to form complete circular rings if the substances are identical; otherwise they remain merely as concentric semicircles facing each other. The chromatograms with the same and with different materials are shown in Figures 2 and 3.

For purposes of identification the substance or the mixture to be analyzed is introduced at *A* and the reference compound or compounds at *B* (Fig. 1), and the chromatogram is run with an appropriate solvent. As already pointed out elsewhere (*3, 5*), for confirming the identity, replicate chromatograms should be developed with two or more different solvents. It may be noted in this connection that the circular R_F values are in no way affected by the modification in the technique.

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Book Reviews

Micrometeorology: A Study of Physical Processes in the Lowest Layers of the Earth's Atmosphere. O. G. Sutton. New York–London: McGraw-Hill, 1953. 333 pp. Illus. $8.50.

Meteorology, the observational and theoretical study of our atmosphere, concerned itself at first merely with the large-scale aspects of weather and climate. In recent years increasing attention has been given to the special problems which arise in connection with the investigation of the atmospheric layers next to the ground. These layers are of particular importance both for meteorology in general and for practical reasons. It is these lowest layers which, by their roughness, provide the breaking action for atmospheric motion and which determine primarily the transfer of heat and water vapor from the solid ground and from the water surfaces to the atmosphere as a whole; hence their importance for meteorology in general. Furthermore, human activities take place almost exclusively in these lowest layers; hence their practical importance for such varied fields as agriculture and the investigation of atmospheric pollution. A peculiarity of this atmospheric boundary layer is the rapid change of the meteorological parameters, such as wind, temperature, and humidity over small distances, caused by changes in the properties of the underlying surface.

The term micrometeorology, as used by Professor Sutton, deals with the study of the physical phenomena taking place in these lowest atmospheric layers. A broader definition might also be taken to include such micrometeorological phenomena as the fine structure of upper atmospheric phenomena and the microphysics of clouds. But because of the large amount of information to be discussed the author wisely restricts himself to the more narrow field of the surface layers. Even here he does not touch at all on the importance of atmospheric effects on radio wave propagation, referring merely to existing accounts of this subject. Nevertheless, even specialists in this field will profit greatly by a study of *Micrometeorology* because the author presents an integrated picture of the present state of our knowledge of the distribution of meteorological parameters affecting electromagnetic wave propagation.

Micrometeorology is written so that it can be read by anyone who has acquired the "standard of an initial degree in mathematics and physics," and no initial knowledge of meteorology is assumed. Instead Sutton presents this, to the extent that it is required for the study of micrometeorology, in a concise and very readable fashion throughout his book. Accordingly the first chapter deals with "The Atmosphere at Rest." The next two chapters treat of "The Atmosphere in Motion" and discuss first laminar, then turbulent flow. Among the topics included in these chapters are Prandtl's boundary layer theory and the statistical and similarity theories of turbulence. Chapter IV takes up the discussion of heat transfer and diffusion; Chapter V surveys radiation and its micrometeorological significance. These first five chapters, slightly more than half of the book, thus lay the groundwork for the more detailed discussions in the latter part of the book—namely, the temperature field (Chap. VI), the wind structure (Chap. VII), and diffusion and evaporation (Chap. VIII).

A wealth of data has been accumulated, especially during and since the last war, on the distribution of wind, temperature, humidity, and the spread of particulate matter. Many of these observations cannot be compared with each other without great reservations because of the different observational techniques employed and because of the difficulty which meteorology shares with the other earth sciences—that instead of controlled laboratory experiments, information has to be gathered, with a few exceptions, by direct observation of natural phenomena as they occur. A critical collection of these data would be a highly desirable task, but it would be quite impossible within the scope of Professor Sutton's book. Consequently, he restricts the presentation of data to typical illustrative examples which demonstrate the successes and inadequacies of the various hypotheses aimed at a theory of the meteorological phenomena and the fields of meteorological parameters observed in the surface layers. Thus the last three chapters stress the theoretical advances in micrometeorology to which the author has contributed so much. Nevertheless, a great deal of observational information will also be found here for readers seeking mainly factual information on the behavior of the lowest atmosphere. The book contains more than 230 references to original articles which will guide the specialist to more detailed studies of any particular problem.

There are only a few minor points on which the reviewer would want to take issue with the author. It is not general meteorological practice to use the surface pressure as the standard for defining potential temperature (p. 10). As another example (p. 26), it would have been desirable in conjunction with the discussion of the permanence of irrotational motion in inviscid fluids to point out specifically that this applies only to the incompressible or barotropic fluids of classical hydrodynamics.

The book is very well written and the presentation of the quantitative, mathematically formulated theories is clear and easy to follow. The author expresses the hope that the book will help to increase the number of micrometeorologists. Since the book sums up in a well-organized presentation our present knowledge of the subject it will not fail to do so. Meteorologists in general, and specialists in micrometeorology and in fields for which the physics of the lowest atmospheric layers is important, will be grateful to the author for providing them with an authoritative account of a very important branch of the science which is in rapid and vigorous development.

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Scientific Book Register

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