all legends may therefore be typed. The only disadvantages noticed were that, in blacking in areas, a fine dust sometimes forms and must be blown off to prevent smudging; and occasionally the lines may have to be gone over twice, especially if a hard smooth-surfaced paper is used.

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Electrophoretic and Chromatographic Studies of Purified Human Profibrinolysin[1]

BY A method previously described (*1*) it has been possible to prepare a human profibrinolysin that appears to be 100% pure electrophoretically. The starting material for this preparation was pyrogenic lyophilized human plasma (supplied by the Office of Naval Research). The one deviation in our current procedure from the previous report is in the first step. Instead of taking the precipitate from dialysis, the starting material is the residue from an acetic acid precipitation at pH 5.2 ± 0.1. In the electrophoretic studies the homogeneity of the single component was tested by reversing the current. The isoelectric point for this single component is pH 6.1; this would indicate profibrinolysin to be a gamma globulin according to reference electrophoretic curves (*2*).

By quantitative chemical methods profibrinolysin was found to be 13.4% nitrogen (micro-Kjeldahl) and 2.03% carbohydrate (orcinol).

Two-dimensional paper chromatograms with phenol and butanol-acetic acid water as developing agents, indicated the following 17 amino acids to be present: alanine, arginine, aspartic, cystine, glutamic, glycine, histidine, hydroxyproline, isoleucine, leucine, methionine, proline, serine, threonine, tryptophane, tyrosine, and valine.

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[1] This study was aided by a grant from the Office of Naval Research.

Horizontal Migration Method of Paper Chromatography

THE method of horizontal migration, which is sometimes referred to as circular paper chromatography (*1*), is a distinct phase in the development of paper chromatography. The method of Rutter (*2*) as modified by Rao and Beri (*3*) involves the use of a circular filter paper on which a small rectangular "tail" is

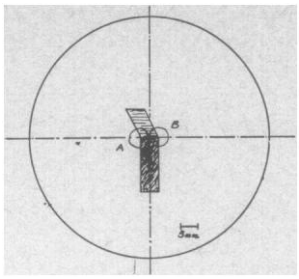

FIG. 1. *A*, the unknown substance (single or mixture); *B*, the known substance (single or mixture).

cut in such a way that its base lies on the diameter, and its sides are at equal distances from the center. The tail is folded back on its base so that it is perpendicular to the plane of the paper. The substance to be analyzed is introduced at the center as a microdrop. When the solvent rises up the tail and spreads as a halo on the horizontal filter paper, the substance migrates from its point of application and forms a ring and, if a mixture, separates into concentric circular zones. This method is more advantageous than the downward or the upward migration method in speed of development, ease of manipulation, and simplicity

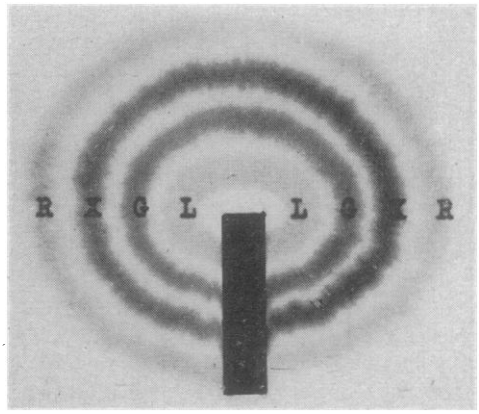

FIG. 2. R, rhamnose; X, xylose; G, galactose; L, lactose (with moist butanol as solvent).

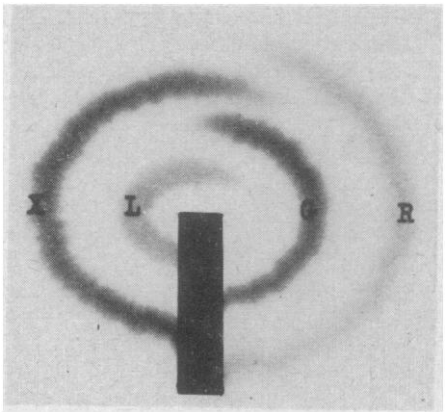

FIG. 3. X, xylose; L, lactose; G, galactose; R, rhamnose (with moist butanol as solvent).

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 tur-