reverted to glucose in the second solvent. Later, when the spot which was the least mobile in butanol–ammonia was eluted from a paper with water, using the technique introduced by Dent[7], and re-run on a chromatogram developed with the same solvent, it appeared in its original position; but if dilute acetic acid was used as the eluant the normal glucose spot was obtained on the new chromatogram. Under the same conditions the middle spot also reverted to glucose with acetic acid; likewise, the two extra spots produced from glucose by the sulphuric acid treatment were re-converted to the normal spot with acetic acid.

From the foregoing, therefore, it will be seen that we have observed on paper chromatograms phenomena which are of importance in the analysis of sugar mixtures, particularly in the examination of metabolic fluids and in the determination of the component sugars in a polysaccharide. Whether these various interconvertible spots differ in their internal structures, or whether condensation or addition reactions are involved, it is, at present, impossible to say; but the matter is being investigated further.

We are indebted to the Colonial Products Research Council for financial assistance.

R. J. Bayly
E. J. Bourne
M. Stacey

Department of Chemistry,
University of Birmingham,
Birmingham 15.
July 9.

[1] Partridge, S. M., *Nature*, **158**, 270 (1946).
[2] Partridge, S. M., *Biochem. J.*, **42**, 238 (1948).
[3] Partridge, S. M., *Nature*, **164**, 443 (1949).
[4] Horrocks, R. H., *Nature*, **164**, 444 (1949).
[5] Hough, L., Jones, J. K. N., and Wadman, W. H., *J. Chem. Soc.*, 1702 (1950).
[6] Consden, R., Gordon, A. H., and Martin, A. J. P., *Biochem. J.*, **41**, 590 (1947).
[7] Dent, C. E., *Biochem. J.*, **41**, 240 (1947).

Paper Partition Chromatography of Alcohols using the Potassium Xanthogenates

A few drops of the alcohol in a small test-tube are treated with 0·5 ml. of pure carbon disulphide and 0·1 gm. of pure powdered potassium hydroxide and the mixture shaken for some minutes. The liquid phase is decanted to another test-tube, evaporated and the residual xanthogenate dissolved in a drop of water. The resulting solution is developed by paper partition chromatography (ascending method) using alkaline butanol (2 per cent potassium hydroxide) as solvent. About twenty hours is required. The location of the xanthogenates on the paper is detected easily by their dark brown luminescence under ultra-violet light or by the yellow or blue colours produced by spraying with Grote's reagent[1]. In the case of solid alcohols, the xanthogenate formed is dissolved in formamide and developed in the same way. The R_F of formamide solutions of potassium xanthogenates, however, indicates, assuming the following reaction, the values of the corresponding ammonium xanthogenates:

$$ROCSSK + HCONH_2 + H_2O = ROCSSNH_4 + HCOOK$$

A few millilitres of ethanol, containing a trace of methanol, in a test-tube is treated with carbon disulphide and potassium hydroxide as above and is shaken for twenty seconds. After evaporation of the liquid layer, the residue of potassium xanthogenate is developed as above.

In this case two spots, corresponding to the potassium xanthogenates of methanol and ethanol respectively, are recognized clearly by ultra-violet light. Both spots appear at first yellowish in colour on spraying with Grote's reagent, but the spot of the latter alcohol turns brown in half an hour whereas that of the former still remains yellow. By using this method, 0·1 per cent of methanol contained in ethanol is easily detected. Limit of identification: methanol 18 γ, ethanol 25 γ.

The R_F values for alcohols, obtained by the potassium xanthogenate method, are as follows:

Methanol	0·23	*iso*Amyl alcohol	0·62
Ethanol	0·35	Benzyl alcohol	0·45
*iso*Propanol	0·44	Octyl alcohol	0·17
*iso*Butanol	0·54	*cyclo*Hexanol	0·04
n-Butanol	0·55	Ethylenechlorohydrin	0·91

Tatsuo Kariyone
Yohei Hashimoto

Institute of Pharmacy,
Faculty of Medicine,
Kyoto University.

Mutsuo Kimura

Kobe College of Pharmacy.

[1] *J. Biol. Chem.*, **93**, 25 (1931).

Partition Paper Chromatography of Some Organic Acids

In the course of studies on the metabolism of bacteria, our attention has been focused on the question of partition paper chromatography of organic acids, especially those occurring in living bacterial cells. The present communication describes an attempt to examine the possibility of detecting and resolving organic acids by use of paper chromatography.

The technique employed by us was essentially the same as that of R. Consden, A. H. Gordon and A. J. P. Martin[1]. As a developer, we used phenol saturated with water; as a stationary phase, we used water saturated with phenol. To prevent ionization of organic acids, the atmosphere of our chromatographic chamber was saturated with the vapour of formic acid (see J. W. H. Lugg and B. T. Overell[2]). The paper strips were placed after development in an oven at 110° C. for 15 min., or were dried at room temperature for 24 hr. Then the chromatograms were treated with a solution of a suitable indicator. It has been shown that 0·04 per cent (w/v) alcoholic solution of bromphenol blue gave the best results as regards the stability of revealed spots, although the bromthymol blue seemed to be more sensitive. The locations of some organic acids were also verified by their fluorescence in ultra-violet light.

Unfortunately, we have at our disposal only a limited number of organic acids known to be common metabolites of living cells. The experiments have been conducted both with aqueous solutions of single, chemically pure acids, and with their mixtures. The R_F values were determined as well as standard deviations and 95 per cent confidence intervals, which will be presented elsewhere.