1 : 3- and 1 : 6-linkages ; (*d*) the R_F 0·22 on paper chromatography (pyridine/butanol/water : 4 : 6 : 3) eliminated the possibility of maltose ; (*e*) neither was developed by alkaline triphenyltetrazolium chloride[9], which detects all reducing glucosaccharides except those with a 2-O-substituent ; (*f*) further indication of C-2-substitution was their low reducing power (about 6 per cent of glucose) towards the Shaffer–Hartmann reagent[10] ; (*g*) their stains on filter paper (aniline hydrogen phthalate spray) were similar to that of sophorose.

All these properties are consistent with the structure of 2-O-α-D-glucopyranosyl-D-glucose. Thus the above two sugars are both 2-O-α-glucopyranosyl-D-glucose (kojibiose).

It is hoped to publish full details elsewhere.

A. SATO
K. ASO

Department of Agricultural Chemistry,
Faculty of Agriculture,
Tôhoku University,
Sendai, Japan.

[1] Aso, K., and Shibasaki, K., *Tôhoku J. Agric. Res.*, **3**, 337 (1953).
[2] Matsuda, K., and Aso, K., *Tôhoku J. Agric. Res.*, **5**, 123 and 125 (1954).
[3] Matsuda, K., and Aso, K., *Tôhoku J. Agric. Res.* Matsuda, K., *ibid.*, **6**, 271 (1956).
[4] Peat, S., Whelan, W. J., and Hinson, K. A., *Chem. and Indust.*, 385 (1955).
[5] Aso, K., and Shibasaki, K., *Tôhoku J. Agric. Res.*, **6**, 159 (1956)
[6] Barker, S. A., Bourne, E. J., and Theander, O., *J. Chem. Soc.*, 4276 (1955).
[7] Barker, S. A., Bourne, E. J., Grant, P. M., and Stacey, M., *Nature*, **178**, 1222 (1956).
[8] Haq, S., and Whelan, W. J., *Nature*, **178**, 1222 (1956).
[9] Feingold, D. S., Avigad, G., and Hestrin, S., *Biochem. J.*, **64**, 351 (1956).
[10] Shaffer, P. A., and Hartmann, A. F., *J. Biol. Chem.*, **45**, 377 (1921).

Chemical Synthesis

I HAVE previously pointed out that kojibiose (one of the unfermentable gluco-bioses in koji extract) is believed to have most probably 1,2-α-glucosidic linkage from the following facts : (*a*) acid hydrolysis gave glucose as the only product detectable by paper chromatography[1] ; (*b*) resistance to almond β-glucosidase eliminates the β-linkage[1] ; (*c*) the low M_G value[2] (0·31) in borate buffer (*p*H 9·8) suggests that the linkage cannot be 1, 3- or 1, 6-, and the R_F value in butanol/pyridine/water (3 : 2 : 1·5) is different from that of maltose as well as from sakébiose (nigerose) and *iso*maltose[3] ; (*d*) the stain of this sugar on the paper chromatogram sprayed by aniline hydrogen phthalate has a colour similar to that of sophorose[3] ; (*e*) this sugar gives no phenylosazone by the usual method, though it showed reducing power against Fehling's solution[4].

For the direct proof of the structure of this new sugar, chemical synthesis of 1,2-α-linked gluco-biose was carried out. The method of synthesis was suggested by the observation of Zemplen[5] that the use of mercuric salt in the Königs–Knorr reaction tends to give α-linkage. This view was further supported by the fact that α,β-trehalose octaacetate was prepared by using mercuric cyanide[6].

α-Kojibiose octaacetate was prepared in the following manner. 3,4,6-Tri-O-acetyl-β-D-glucopyranosyl chloride (I) was prepared according to the procedure described by Brigl[7]. This was treated with mercuric acetate in acetic acid at room temperature for two hours. 1,3,4,6-Tetra-O-acetyl-α-D-glucopyranose (II) was obtained ; melting point 98–100°, $[\alpha]_D^{15} = +143°$ (*c*, 3·0 ; chloroform) (calc. for $C_{14}H_{20}O_{10}$; C, 48·27 ; H, 5·78 per cent ; found : C, 47·90 ; H, 5·58 per cent).

Gakhokidze[8] has obtained the β-isomer of the above tetra-O-acetyl-D-glucose (melting point 138°) by the treatment of (I) with silver acetate. But the high $[\alpha]_D$ value shows that the tetraacetate obtained by us is the hitherto unknown α-isomer.

Equimolecular portions of (II) and 2,3,4,6,-tetra-O-acetyl-α-D-glucopyranosyl bromide (III) were shaken in anhydrous nitromethane with mercuric cyanide for 8 hr. at room temperature. The reaction mixture was filtered and evaporated to a syrup. The residual (III) was removed by precipitation with a slight excess of benzylamine in absolute ether. The ether solution was washed first with dilute hydrochloric acid, then repeatedly with water and evaporated to a syrup. This syrup crystallized very slowly when dissolved in absolute ethanol and kept at 20° for two weeks. The twice-recrystallized product showed melting point 166°, $[\alpha]_D^{15} = +152·8$ (*c*, 2·0 ; chloroform) (calc. for $C_{28}H_{38}O_{19}$: C, 49·55 ; H, 5·64 per cent ; found : C, 49·75 ; H, 5·83 per cent).

These values are in good agreement with those reported by Peat *et al.*[9] and also with those obtained from hydrol as above. The melting point was not depressed on admixture with the specimen obtained from hydrol. The β-octaacetate was obtained by acetylating the free sugar with acetic anhydride and anhydrous sodium acetate ; melting point 118°, $[\alpha]_D^{15} = +113°$ (*c*, 2·0 ; chloroform) (calc. for $C_{28}H_{38}O_{19}$: C, 49·55 ; H, 5·64 per cent ; found : C, 49·42 ; H, 5·26 per cent). This was found to be identical with the specimen obtained from hydrol and also with that obtained from koji extract.

I wish to acknowledge my indebtedness to Prof. K. Aso for his guidance and encouragement.

K. MATSUDA

Department of Agricultural Chemistry,
Faculty of Agriculture,
Tôhoku University,
Sendai, Japan.

[1] Matsuda, K., and Aso, K., *Tôhoku J. Agric. Res.*, **5**, 123 (1954).
[2] Aso, K., and Hamada, S., *Tôhoku J. Agric. Res.*, **5**, 317 (1955).
[3] Aso, K., and Yamauchi, F., *Tôhoku J. Agric. Res.*, **5**, 305 (1955).
[4] Matsuda, K., *Tôhoku J. Agric. Res.*, **6**, 271 (1956).
[5] Zemplen, G., and Bruckner, Z., *Ber.*, **64**, 1852 (1931).
[6] Micheel, F., and Hagel, K. O., *Chem. Ber.*, **85**, 1087 (1952). Helferich, B., and Weiss, K., *ibid.*, **89**, 314 (1956).
[7] Brigl, P., *Z. physiol. Chem.*, **116**, 1 (1921).
[8] Gakhokidze, A. M., *J. Gen. Chem.* (*U.S.S.R.*), **11**, 117 (1941).
[9] Peat, S., Whelan, W. J., and Hinson, K. A., *Chem. and Indust.*, 385 (1955).

Effects of Kinetin on Division of Yoshida Sarcoma Cells

KINETIN (6-furfurylaminopurine) was isolated by C. O. Miller *et al.*[1] from deoxyribonucleic acid from herring sperms. They found that it induced a high rate of cell multiplication in the callus tissue of plants. R. Guttman's work[2] has shown that, in onion root-tip cells, kinetin promoted mitotic division, and induced polyploidy and various forms of pycnosis in addition. However, its effect on the division of animal cells is not well known, though negative results have been reported by H. Lettre[3] using animal and human cells.

We have investigated the effect of kinetin (kindly supplied by Dr. F. G. Okumura) on the mitotic activity of Yoshida sarcoma cells transplanted to