benzoyl- and phthalyl-taurin, and Bergell[1] has attempted to use β-naphthalinsulphotaurin as a means of estimating taurin in urine.

We have found that taurin like the carboxy amino acids[2] reacts with α-naphthylisocyanate to yield the corresponding hydantoic acid. The barium salt of α-naphthylureidoethyl sulphonic acid was prepared by adding to a concentrated solution of taurin which contained an equivalent amount of KOH, 1¼ equivalents of α-naphthylisocyanate and the mixture was shaken at frequent intervals for an hour. The insoluble dinaphthyl urea was filtered off and on acidifying with HCl the solution thickened but the free hydantoic acid did not separate. On addition of $BaCl_2$ solution the barium salt of the hydantoic acid was precipitated. This was washed with small quantities of ice water and then with alcohol and was dried to constant weight. Estimations of C, H, and Ba gave (per gram of substance) the following results.

Found	Calculated for $Ba(C_{10}H_7NHCONHCH_2CH_2SO_3)_2$
C.....0.419	0.431
H.....0.039	0.036
Ba.....0.187	0.189

104 (1686)

A cheap and convenient source for glutamic acid.

By CARL L. A. SCHMIDT and G. L. FOSTER.

[*From the Department of Biochemistry and Pharmacology of the University of California, Berkeley.*]

One of the pressing needs of biochemistry and allied sciences is an adequate supply of pure amino acids. While methods for the isolation and purification of these substances are well known,

[1] Bergell, P., *Z. physiol. Chem.*, 1916, xcvii, p. 260.

[2] Neuberg, C. and Manasse, A., *Ber. d. d. chem. Gesell.*, 1905, xxxviii, 2359.
Loewy, A., *Deut. med. Woch.*, 1905, xxxi, 1918.
Neuberg, C., and Strauss, H., *Berlin klin. Woch.*, 1906, xliii, 258.
Hirschstein, L., *Berlin klin. Woch.*, 1906, xlviii, 589.
Neuberg, C., and Manasse, A., *Berlin klin. Woch.*, 1906, xliii, 734.
Wohlgemuth, J., and Neuberg, C., *Med. Klinik*, 1906, ii, 227.
Neuberg, C., and Rosenberg, E., *Biochem. Z.*, 1907, v, 456.
Levene, P. A., and Van Slyke, D. D., *Biochem. Z.*, 1908, xiii, 440.
Hirschberg, E., Dissert. Berlin, 1910.

nevertheless the labor and expense involved are in many instances prohibitive except for the production of relatively small quantities. With the exception of glutamic acid no use for amino acids other than for scientific purposes has been found and manufacturers have as yet been unable to apply the benefits of quantity production sufficiently to make these substances cheap enough for extensive investigations.

It was shown some years ago by Ikeda[1] that the taste of the constituents of the seaweed *Laminaria japonica* is due to the content of glutamic acid. This is to a certain extent also true of meat extract and allied preparations. The demand for condiments of this type has led to the production of the mono-sodium salt of glutamic acid on a scale large enough to make it relatively cheap.

Our experiments with Ajinomoto (a commercial preparation of sodium glutamate sold by S. Suzuki & Co., Tokio, Japan) were carried out with a view of using this substance as a cheap as well as a convenient source for pure glutamic acid. Our results show that this preparation consists largely of the mono-sodium salt of glutamic acid. To isolate glutamic acid, Ajinomoto is dissolved in a small quantity of water (600 c.c. for each 100 grams) and HCl is added in an amount equivalent to the amino nitrogen present. Purified charocal is then added, the mixture brought to the boiling point, filtered hot and the filtrate placed in the ice chest to crystallize. The crystals are drained, washed several times with small quantities of ice water until free from chlorides and dried. From the mother liquor and washings, after concentration, a second crop of glutamic acid may be isolated. From 100 grams of Ajinomoto 55 grams of glutamic acid were obtained. On the basis of the amino nitrogen content (6.55 per cent.) of Ajinomoto the yield corresponds to about 80 per cent. of the glutamic acid present. On account of the NaCl resulting from the liberation of the glutamic acid from its salt and other impurities which are present, further crystallization is not profitable. The purified product yielded the theoretical nitrogen value and a 5 per cent. solution in 10 per cent. HCl gave a specific rotation of $+ 31.5°$.

[1] Ikeda, K., Communication to the 8th International Congress of Applied Chemistry, 1912, xviii, 147.