lowered in the presence of α -lactalbumin, being 15, 8 and 3mM at 100, 200 and 400 μ g./ml. of human α -lactalbumin respectively. High glucose concentrations inhibited the reaction at the higher α -lactalbumin concentrations. The K_m for UDP-galactose was 20 μ M, considerably lower than the 500 μ M reported by Babad & Hassid (1966) for the bovine enzyme.

I thank Professor P. J. Huntingford, Department of Obstetrics and Gynaecology, St Mary's Hospital Medical School, London, W. 2, for arranging the supply of human milk.

- Babad, H. & Hassid, W. Z. (1966). *J. biol. Chem.* **241**, 2672.
 Brew, K., Vanaman, T. C. & Hill, R. L. (1968). *Proc. nat. Acad. Sci., Wash.*, **59**, 491.
 Brodbeck, U., Denton, W. L., Tanahashi, N. & Ebner, K. E. (1967). *J. biol. Chem.* **242**, 1391.
 Brodbeck, U. & Ebner, K. E. (1966). *J. biol. Chem.* **241**, 762.
 Ebner, K. E., Tanahashi, N., Brodbeck, U. & Kiyosawa, I. (1968). *Fed. Proc.* **27**, 784.

Rat Liver Tryptophan Pyrrolase Activity and Brain 5-Hydroxytryptamine

By G. CURZON and A. R. GREEN. (*Department of Chemical Pathology, Institute of Neurology, London, W.C. 1*)

The major route of tryptophan metabolism starts with its oxidation by liver tryptophan pyrrolase to formylkynurenine, and a minor route leads to 5-hydroxytryptamine (5HT). Pituitary-adrenal activation causes increased pyrrolase synthesis (Knox & Auerbach, 1955). It has often been suggested that decreased 5HT synthesis might result from this. Curzon & Green (1968) showed that rat brain 5HT decreased significantly after intraperitoneal injection of hydrocortisone (5mg./kg.). Brain 5-hydroxyindolylacetic acid (5HIAA) also fell, suggesting decreased brain 5HT synthesis. A rise of pyrrolase activity preceded these changes, which were prevented when the pyrrolase inhibitors allopurinol (Becking & Johnson, 1967; Chytil, 1968) or yohimbine (Madras & Sourkes, 1966) were injected with the hydrocortisone (Green & Curzon, 1968).

Hydrocortisone injection was followed by a transient but significant fall of plasma tryptophan associated with the peak of pyrrolase activity. This fall was prevented by allopurinol. Not only decreased tryptophan but also increased tryptophan metabolite contents must be considered as possibly contributing to the fall of brain 5HT after hydrocortisone injection, as a decline from $0.64 \pm 0.02 \mu$ g./g. of brain (11 animals) to $0.48 \pm 0.03 \mu$ g./g. (4 animals) was found 2hr. after injection of 5mg.

of L-kynurenine/kg. Comparable falls occurred after injection of either of the two consecutive kynurenine metabolites L-3-hydroxykynurenine and 3-hydroxyanthranilic acid. Metabolites formed either at side branches of the route from tryptophan to 3-hydroxyanthranilic acid or formed subsequently to the latter, namely kynurenic acid, anthranilic acid, xanthurenic acid, picolinic acid, quinolinic acid and nicotinamide, had no effect. Nicotinic acid was an exception, as 5mg./kg. caused a fall of brain 5HT to $0.48 \pm 0.02 \mu$ g./g. (4 animals).

In general, when 5HT was found to fall, the percentage changes were comparable in experiments with either hydrocortisone or tryptophan metabolites (25–30%). Higher dosage did not result in larger falls. This suggests that a specific fraction of brain 5HT may be susceptible to these influences.

The effect of a stress situation was also studied. In qualitative agreement with Corrodi, Fuxe & Hökfelt (1968) a 20–45% fall of brain 5HT was found 5hr. after rats were immobilized. Liver pyrrolase rose considerably. The 5HT fall was significantly smaller when the rats were pre-injected with 20mg. of allopurinol/kg., indicating that part at least of the mechanism by which it occurred involved pyrrolase increase. In contrast with the findings was hydrocortisone, increased 5HT breakdown was also indicated as 5HIAA rose.

- Becking, G. C. & Johnson, W. J. (1967). *Canad. J. Biochem. Physiol.* **45**, 1667.
 Chytil, F. (1968). *J. biol. Chem.* **243**, 893.
 Corrodi, H., Fuxe, K. & Hökfelt, T. (1968). *Life Sci.* **7**, 107.
 Curzon, G. & Green, A. R. (1968). *Life Sci.* **7**, 657.
 Green, A. R. & Curzon, G. (1968). *Nature, Lond.* (in the Press).
 Knox, W. E. & Auerbach, V. H. (1955). *J. biol. Chem.* **214**, 307.
 Madras, B. K. & Sourkes, T. L. (1966). *Fed. Proc.* **25**, 195.

Inhibition of Alanine Aminotransferase by L-Penicillamine

By D. F. EVERED,* BARBARA M. C. HARGREAVES* and Z. H. M. VERJEE. (*Department of Chemistry, Chelsea College of Science and Technology, London, S.W. 3*)

The PALP†-dependent enzymes, alanine aminotransferase (EC 2.6.1.2) and aspartate aminotransferase (EC 2.6.1.1), were depleted in the tissues of rats treated with L-PEN; parallel experiments with D-PEN were not performed (Kuchinskas, Horvath & Du Vigneaud, 1957). This effect was thought to reflect loss of coenzyme, since PALP forms a thiazolidine with L-PEN (Du Vigneaud, Kuchinskas

* Present address: Department of Biochemistry, Chelsea College of Science and Technology.

† Abbreviations: PALP, pyridoxal 5'-phosphate; PEN, penicillamine (β -dimethylcysteine).