urine of adrenalectomized rats decreased significantly, whereas there was slight increase in that of dioxogulonate. Also, there was slight decrease in the total ascorbate content of blood.

Decreases of about 20 and 30% were observed in the activities of D-glucurono- δ -lactone hydrolase and L-gulono- γ -lactone oxidase respectively, whereas that of L-gulono- γ -lactone hydrolase remained practically unchanged. An appreciable increase in the activity of dehydroascorbate and a moderate increase in that of dioxoaldonate decarboxylase were observed in liver and kidney of adrenalectomized rats. All corresponding alterations were more conspicuous in rats 12 days after adrenalectomy.

Hepatic Enzymes and Vitamin Deficiency

By MAHTAB S. BAMJI and D. SHARDA (*National Institute of Nutrition, Indian Council of Medical Research, Jamai-Osmania P.O., Hyderabad-7, A.P., India*)

Enzymic changes associated with deficiency of B-complex vitamins have in recent years become the basis of functional tests for the evaluation of nutritional status of certain vitamins (Bamji, 1969, 1970). Since multiple deficiency is normal in Nature, the influence of nutrients other than the vitamins in question on the test has to be known. Erythrocytes form a convenient biopsy tissue, and metabolic alterations in erythrocytes can be expected to indicate the trend in other tissues as well.

In this study the effects of thiamin, riboflavin and pyridoxine deficiency on the activities of hepatic transketolase and glutathione reductase were studied. In addition to thiamin deprivation, pyridoxine deficiency also produced a significant depression in transketolase activity but no change in thiamin concentration.

In a longitudinal experiment erythrocyte glutathione reductase was found to be more sensitive to riboflavin deficiency than was liver glutathione reductase, though the riboflavin content of the liver diminished at a faster rate than that of the erythrocytes. Hepatic xanthine oxidase was more sensitive than was glutathione reductase.

Liver enzymes of deficient animals could not be stimulated by addition of the corresponding co-enzymes *in vitro*.

Bamji, M. S. (1969) *Clin. Chim. Acta* **26**, 263

Bamji, M. S. (1970) *Amer. J. Clin. Nutr.* **23**, 52

Studies on the Biochemical Parameters of the Ontogenesis of Electrical Activity in Developing Chick-Embryo Brain

By ZAFAR IQBAL, NARGIS F. JAFFERY and G. P. TALWAR (*Department of Biochemistry, All India Institute of Medical Sciences, New Delhi-16, India*)

In the developing chick brain spontaneous and evoked electrical activity matures on or about day 12 of incubation and is practically absent at the embryonic age of 4 days or less. Present studies aim at the systematic analyses of the pertinent chemical and enzymic changes that underlie the development of such functional attributes in the maturing brain. The activities of $\text{Na}^+ + \text{K}^+$ -stimulated adenosine triphosphatase, an enzyme implicit in the active transport of cations, and that of acetylcholinesterase, an enzyme involved in synaptic transmission, have been found to increase with the increasing age of the embryo. Further, the increase in the activities of these enzymes show a correlation with the onset and maturation of electrical activity in brain. Changes in these membrane-linked enzymes also imply the changes in the structural components of the membrane with age. In this context membrane proteins have been extracted from synaptosomal fractions isolated from chick brain of various ages. The electrophoretic profiles of these proteins have been studied on polyacrylamide-gel columns. The results will also include the observations taken on the content of gangliosides, the membrane markers, and that of phospholipids at various stages of the development.

Photolysis of Citrulline in the Presence of Hydrogen Peroxide

By AHMAD SAFI ANSARI and RASHID ALI (*Department of Biochemistry, J.N. Medical College, Aligarh Muslim University, Aligarh, India*)

Irradiation of aqueous solution of citrulline (5 mM), pH 5.2, with u.v. light (high-pressure mercury-vapour lamp) in the presence of H_2O_2 (2.94 mg/ml) resulted in the formation of ammonia, urea and amino acids. Irradiation of citrulline without H_2O_2 was found to produce only ammonia and urea. The formation of these products as a result of irradiation was found to be related to the period of irradiation. H_2O_2 alone was found to be ineffective.

After irradiation of citrulline in the presence of H_2O_2 for 2h no significant change in pH was observed. The amount of H_2O_2 consumed was 1.75 mg/ml. The sample was subjected to ion-exchange chromatography on Dowex 50 (X8; Na^+ form) as the ion-exchanger. A 15cm column was used for basic

amino acids and a 100cm column for the separation of neutral and acidic amino acids (Moore & Stein, 1951). Three distinct peaks appeared when the 15cm column was used. The first peak corresponds to all the neutral and acidic amino acids, the second to ammonia and the last to arginine. With the 100cm column nine distinct peaks were obtained, which can be accounted for as urea, aspartic acid, glutamic acid, glycine, α -aminobutyric acid, valine, isoleucine and leucine. The final identification of these amino acids as their 2,4-dinitrophenyl derivatives is in progress. A possible mechanism to account these transformations will be presented.

Moore, S. & Stein, W. H. (1951) *J. Biol. Chem.* **192**, 663

The Pattern of Response of Rat Hepatic Lobes to Atromid-S (Ethyl α -p-Chlorophenoxyisobutyrate) Administration

By T. P. KRISHNA KANTHA (*Department of Biochemistry, Indian Institute of Science, Bangalore-12, India*)

Dietary administration of the antihypercholesterolaemic drug Atromid-S (ethyl α -p-chlorophenoxyisobutyrate) to the rat is known to increase the weight as well as the mitochondrial content of the liver. This response is not uniformly observed in all the lobes of the liver. The median and the left lateral lobes, which together constitute 60–65% of the total liver weight, account for most of this increase. The caudate lobes, which account for less than 10% of the liver weight, do not show any appreciable increase in weight.

The content of subcellular components is not different in the lobes of normal liver. On administration of the drug the caudate lobes do not show appreciable increase in the content of mitochondria, whereas the major lobes show an increase of 50% or more. No significant differences in the respiratory and phosphorylative activity of mitochondria are observed in the different lobes either before or after administration of the drug. When the drug is withdrawn from the diet, the weight as well as the mitochondrial content of all the lobes revert to the normal values, indicating the reversible nature of both these effects.

Observations on the Mode of Action of the Polyene Antibiotic A-435

By ASHA L. CHANDRA* and B. JARVIS† [*National College of Food Technology (University of Reading), Weybridge, Surrey, U.K.*]

The isolation and some characteristics of the new antifungal tetraene antibiotic A-435 from *Streptomyces rimosus* strain AC₂435 has been described (Pal & Nandi, 1970). The present communication summarizes preliminary results on the mode of action of the antibiotic.

The growth of *Saccharomyces cerevisiae* N.C.Y.C. 401 is inhibited by 50 μ g of antibiotic A-435/ml when the antibiotic is added to a lag-phase culture, but 200 μ g/ml is required to inhibit a similar concentration of cells in the exponential phase. As with other polyene antibiotics, the inhibitory effect of antibiotic A-435 was diminished in the presence of cholesterol (see Gottlieb *et al.*, 1958). Respiratory and fermentative activity in *S. cerevisiae* was inhibited by antibiotic A-435; aerobic production of CO₂ was inhibited more strongly than was anaerobic (fermentative) CO₂ production.

A significant loss of dry weight and leakage of both ninhydrin-positive and nuclear materials was observed on incubation of washed cells of *Saccharomyces cerevisiae* with antibiotic A-435. The leakage of Na⁺, K⁺ or PO₄³⁻ was not detected. Experiments undertaken with isolated cell-wall and cell-membrane preparations have shown conclusively that antibiotic A-435 is a surface-active agent that is bound to the cell membrane.

The results obtained show that antibiotic A-435 has a mode of action similar to that of other polyene antibiotics (Lampen & Arnow, 1959; Kinsky, 1961; Gottlieb *et al.*, 1961).

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Gottlieb, D., Carter, H. E., Sloneker, J. H. & Amman, A. (1958) *Science* **128**, 361

Gottlieb, D., Carter, H. E., Sloneker, J. H., Wu, L. C. & Gandy, E. (1961) *Phytopathology* **51**, 321

Kinsky, S. C. (1961) *J. Bacteriol.* **82**, 889

Lampen, J. O. & Arnow, P. (1959) *Proc. Soc. Exp. Biol. Med.* **101**, 792

Pal, A. & Nandi, P. (1970) *Indian J. Exp. Biol.* **8**, 321

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