CELL BIOLOGY

Chairman: Edward Hinsman, Veterinary Science,
Purdue University, Lafayette, Indiana 47907

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ABSTRACTS

L-Serine Deaminase of *Escherichia coli*—A Study of an Enzyme with Novel Cofactor Requirements. R. E. Zimmerman and P. J. Burck, Eli Lilly and Company, Indianapolis, Indiana 46206.——L-Serine and L-threonine deaminases which require pyridoxal phosphate as a cofactor have been crystallized from several sources. L-Serine deaminases from bacterial sources have been reported, but the deaminases were very unstable during purification attempts. In these reports enzymatic activity was assayed in phosphate buffers by determining the amount of pyruvate produced from L-Serine. From *Escherichia coli* we have partially purified an L-Serine deaminase which requires NADH and ferric ion for maximum activity. Compounds which complex ferric ion, including phosphate ion, markedly inhibited the deamination of L-Serine by this enzyme. L-Serine deaminase activity was determined by disappearance of L-Serine or formation of an equimolar amount of ammonia. Any pyruvate formation appeared to result from contaminating enzymes in the cell extract and disappeared as the L-Serine deaminase was purified. We postulated that deamination of L-Serine by this enzyme involved an enzyme-bound ferric ion-glyceric acid intermediate which dissociated in the presence of NADH to yield equimolar amounts of lactic acid and ammonia.

Evidence Concerning the Role of Thyroid Monoamine Oxidase in Thyroxine Biosynthesis. Cleo Huang and Arthur R. Schulz, Indiana University Medical Center, Indianapolis 46220.——Two steps in the synthesis of thyroxine in the thyroid gland require hydrogen peroxide are the iodination of tyrosine (or protein-bound tyrosyl residues), and the coupling of iodotyrosine molecules to form iodothyronine. The thyroid gland must contain a hydrogen peroxide-generating system which is capable of providing sufficient hydrogen peroxide to support thyroxine synthesis.

The thyroid gland contains monoamine oxidase and addition of a substrate for this enzyme to thyroid microsomes will support the iodination and 'coupling' reaction *in vitro*. In contrast to monoamine oxidase isolated from other tissues, the thyroid enzyme exhibits a rather high degree of substrate specificity. Tyramine and phenylethylamine are oxidized most rapidly. The thyroid gland contains an aromatic amino acid decarboxylase which catalyzes the synthesis of these two amines.

Experiments were conducted to determine the physiological significance of thyroid monoamine oxidase in the synthesis of thyroxine. We found that a wide variety of inhibitors of thyroid monoamine oxidase inhibit the incorporation of radioactive iodide into the protein of bovine thyroid slices. Some of the compounds used were general inhibitors of monoamine oxidases, but others such as 3-iodotyramine were rather specific inhibitors of thyroid monoamine oxidase. The results were consistent with the hypothesis that thyroid monoamine oxidase plays an important role in thyroxine biosynthesis.

The Surface Structure of *Pseudomonas aeruginosa* After Freeze-Etching. RICHARD L. WEISS and DEAN FRASER, Microbiology Department, Indiana University, Bloomington 47401.——The surface structure of *Pseudomonas aeruginosa*, a non-sporulating gram-negative rod shaped bacterium, was examined by the freeze-etch technique. After freeze etching the cell envelope could be divided into the cell wall and cell membrane, both of which were correlated with similar structures observed after thin sectioning and negative staining of intact cells. The results obtained by freeze etching suggest a layered arrangement for the envelope structure. The outermost structure, the cell wall, appears to consist of two layers. The surface profile of the two cell wall layers presented some differences in detailed fine structure. The cell membrane was observed to consist of two morphologically distinct layers. The outer layer, which was studded with small globules, seemed to be intermixed with an underlying layer containing numerous, rather large hemispheres. Studies on the membrane structure of spheroplasts seemed to confirm the idea of a bi-layered membrane structure and suggested that the rigidity of the bacterium is confined to the wall structure.

Morphological Contributions to Experimental Brain Tumor Research. HANS H. GOEBEL and HUMBERTO CRAVIOTO, Division of Neuropathology, Indiana University Medical Center, Indianapolis 46202, and Department of Pathology, New York University Medical Center, New York.—— Tumors of the central and peripheral nervous system were induced by parenteral application of ethylnitroso-urea to pregnant brown BD rats. Eighty-five per cent of the offspring developed single or multiple tumors of exclusively neurogenic origin. These neoplasms occurred after a latent period of 168 to 323 days. The majority of tumors were malignant neurinomas of the cranial and peripheral somatic nerves and of the abdominal cavity. Less frequently tumors arose in the spinal cord (ependymomas) or brain (occasionally as microtumors). A second series of experiments with white Sprague-Dawley rats yielded predominantly neurinomas of the trigeminal nerves indicating a hitherto unseen and unexplained type specific tumor induction. The pattern of some of these experimental neoplasms differed from the human counterparts in respect to distribution, admixture of cell types within individual tumors and the frequency of anaplastic changes. Meningiomas were not seen. The histological features were comparable with the extensively described and classified human tumors. These neurinomas

exhibited ultrastructural similarities to human material; whereas ependymomas displayed a considerable lack of differentiation in rats. The neurotropy of these alkylating agents is ascribed to the urea group of methylnitroso-urea and ethylnitroso-urea.

OTHER PAPERS READ

Inosine Diphosphatase: Possible Role in Polysaccharide Synthesis. C. GOFF, Department of Life Sciences, Indiana State University, Terre Haute, Indiana 47809.

Electron Microscope Observations of the White Matter of the Lumbar Spinal Cord of the Early Postnatal Rat. C. K. HENRIKSON, Purdue University, Lafayette, Indiana 47907.