In these cases, the choice of a generic name would have to be made arbitrarily since, unfortunately, no ideal solution to this difficulty appears possible at present. Mason has admirably discussed these difficulties and stressed the need to study the fungi in their "hochkultur", a concept which has been conveniently and elegantly used in the classification of Fusaria by Appel and Wollenweber and several later workers. There have also been suggestions for developing a classification of the Hyphomycetes *vis-a-vis* their relationship to perfect stages. Indeed, "if we could consistently predict the Perfect genus by an inspection of its conidia, there would be no need for an Imperfect classification at all". As Mason[4] emphasized, "over large tracts of the Fungi Imperfecti, however, we cannot do so, and unless the Perfect classification becomes improved out of all knowledge, it does not appear probable that we ever shall be able to do so".

I am grateful to the Rev. Fr. Dr. H. Santapau for the Latin diagnoses.

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ADVANCES IN CANCER RESEARCH*

IN recent years there has been so much work on cancer research that it is almost impossible for any one to keep pace with the findings of various workers. Comprehensive reviews on the different aspects of oncology are therefore most welcome. This need has been fully met by the series of *Advances in Cancer* Research, the first five volumes of which were ably edited by Dr. J. P. Greenstein and Prof. A. Haddow. For the sixth volume Prof. S. Weinhouse joined Prof. Haddow as co-editor owing to the death of Dr. Greenstein. The sixth volume contains reviews on blood enzymes in cancer, enzymes in hepatocarcinogenesis, cancer chemotherapy by perfusion, radiation chimeras, mouse leukæmia and antagonists of purines, pyrimidines and folic acid. A small chapter on plant tumour problem has also been included.

The topic of blood enzymes in cancer and other diseases has been extensively reviewed by Oscar Bodansky. Studies on serum enzymes have been classified into two types: (1) Tissue specific enzymes and (2) Enzymes involved in metabolism. Any defect in the secretion or excretion of tissue specific enzymes is reflected in the serum which is indicative of the pathological process. For example, the elevated levels of acid phosphatase indicates carcinoma of the prostate and those of serum alkaline phosphatase indicate osteogenic sarcomas of hepatobiliary diseases. The potentialities of serum enzymes such as 5-nucleotidase and glucose-6-phosphatase indicating hepatobiliary disease and other hepatic disorders have been rightly stressed by the author. The field opens up possibilities of finding out tissue specific enzymes and those indicating hereditary diseases such as cardiovascular disorders which would be revealed by their alterations in the peripheral blood. The second class is that of the metabolically involved enzymes. Since these enzymes are neither tissue nor disease-specific the alterations of these enzymes in the serum have no significance on the induction of the disease. However although the serum enzyme in this class constitutes a mixture of functionally similar enzymes from different tissues, it is possible to distinguish them by using kinetic electrophoretic and immunological procedures. Their alterations in the serum may then possibly indicate a specific disease or a pathological process. This would, however, need further exploration.

The chapter on blood enzymes has been very well written. It gives details about the properties, assays and significance of the various serum enzymes and should prove of immense value to workers in the field.

Among the biochemical investigations in carcinogenesis the problem of hepatocarcinogenesis has been studied quite extensively This is due to two reasons: (1) The liver is an organ of major metabolic importance and (2) it has afforded appropriate normal tissue for comparison which is very essential for investigations on carcinogenesis. The review on enzymes in hepatocarcinogenesis relates a systematic

* *Advances in Cancer Research*, Vol. 6. By Alexander Haddow and Sidney Weinhouse. (Academic Press, Inc., New York and London), 1961. Pp. 524. Price $ 13·00.

exploration of metabolic behaviour of normal and neoplastic liver. Various qualitative and quantitative enzymatic alterations in the metabolic behaviour of hepatoma have been properly emphasized in this review. The absence or depletion of enzymes such as G-6-Pase, responsible for release of glucose and phosphoglucomutase for glucogenesis with a substantial increase in G-6-P dehyrogenase responsible for glucose oxidation *via* HMP pathway and the increased production of lactic acid mark the carbohydrate metabolism of hepatoma as distinguished from normal liver. The increased anabolism and the decreased catabolism of nucleic acids, the dependence of Krebs cycle enzymes on pyridine nucleotides and the decreased fatty acid synthesizing enzymes are some of the other salient features of the hepatoma However, the author, George Weber, has rightly emphasized the point that an increase or decrease in enzymes may not be indicative of the behaviour of the metabolic pathways in general and a critical evaluation of the other factors is essential to draw valid conclusions.

The review on enzymes in hepatocarcinogenesis is comprehensive as well as lucid. The author has compared different types of hepatomas in their carbohydrate, protein, nucleic acid and fat metabolisms with due consideration to the morphological aspects.

A chapter on cancer chemotherapy by perfusion has been made equally illuminating by Creech and Krementz. This technique has been recently adopted for increasing effectiveness of toxic chemotherapeutic substances such as nitrogen mustards. The techniques of regional perfusion are based on the concept that various anatomic regions can be isolated from the remainder of the circulation, supplied with a separate extraneous system for pumping and oxygenating blood. This new technique thus permits the use of toxic anticancer agents in amounts far exceeding the permissible safe doses. The chapter deals with detailed surgical descriptions of perfusions relating to lower extremity, upper extremity, pelvis and brain. The dosage, pathological changes and complications are discussed in detail. The authors have stressed the need for careful and proper postoperative management when perfusion techniques are employed. As a review on a recently developed technique, it should prove of considerable help and value to surgeons and clinicians.

The chapters on etiology of mouse leukæmia make very interesting and absorbing reading. Leukæmia in mice could be caused by œstrogens, carcinogenic hydrocarbons, ionizing radiations and viruses. In a systematic review Gross has given the stepwise development of the viral origin of mouse leukæmia. Thus, according to Gross, although several factors are necessary for the evolution of the disease, the main responsible agent is a submicroscopic, filterable, thermolabile, self-reproducing and transmissible particle which probably belongs to carcinogenic viruses. Evidence has been cited to suggest the presence of a latent leukæmogenic agent which gets activated subsequent to total body irradiation. Miller in his review on etiology of mouse leukæmia has discussed various other factors influencing susceptibility to leukæmia such as genetic factors, influence of age, nutritional factors, endocrine factors, thymus involvement and many others. The review is marked by a very interesting discussion on the pros and cons of the virus theory in the causation of mouse leukæmia. The lack of evidence for replication, infectiousness and antigenicity are some of the factors against this theory. The author has brought out the problem of thymus involvement, removal of which prevents the development of the disease, and has stressed the need for elucidation of relationship between the leukæmogenic virus and the thymus factor. Both these reviews on etiology of mouse leukæmia contain useful discussions.

The problem of protection against radiation injury deserves to be considered by a larger number of scientists, especially in this atomic age. Reviews such as the one on radiation chimeras by Koller and colleagues serve a useful purpose. The present review deals in detail with damage to hematopoietic system with a radiation dose 400 r to 1,500 r. The methods of identification of the chimeric state and the tissue therapy have been reviewed in a lucid manner. The immunological approach to the problem has been thoroughly discussed. The application of the bone marrow therapy in the treatment of leukæmia in experimental animals and at clinical levels has formed an important part of this review.

The series of volumes on "Advances in Cancer Research" has been serving a very useful purpose. Besides giving detailed reviews on various aspects of oncology the volumes have helped in the critical appraisal of problems and a stimulation of new ideas. Volume 6 is in the tradition of the preceding volumes and should prove of great help to clinicians and researchers alike.

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