This book was written at the invitation of the Lady Tata Memorial Trust. The Danish manuscript was translated, brought up to date, and edited under the auspices of the Trust, thus taking stock of a period of intensive research which is likely to be interrupted by the present war. The book is carefully written and neatly produced. In the wealth of material surveyed it is comparable to Forkner’s “Leukemia and Allied Disorders,” and the two works complement each other.

An introductory historical survey is followed by a discussion of the classification and nomenclature of leukemia and related diseases. In his terminology the author adheres to the rule prevalent among hematologists in differing from everyone else, but, to his credit, his classification and nomenclature are refreshingly simple. Many will object to a classification of lymphosarcoma and “reticulosarcoma” under the general heading of leukemia—but not the reviewer. All tumors of myeloid cells are named chloroma.

The description of spontaneous leukemias occupies only a small part of the monograph. Knowledge of leukemia in animals is almost as old as that in man, and the disease in different species has its own peculiarities and problems. Spontaneous leukemia (leukosis) of fowls is considered in as much space as that of mammals. This is justified by the great economic importance of fowl leukemia and by the peculiarities of this disease not known to those familiar only with human leukemia. For example, erythroleukemia (erythroleukosis), a fairly common disease in poultry, is characterized by a progressive proliferation of basophilic (lymphoid) erythroblasts, and is readily transmitted by a filterable agent, l'r one of which we can only guess. As for the larger mammals, leukemia in cattle is of some economic importance. It has been studied extensively, and the suggestion made that heredity plays a major role in its occurrence, but adequate proof is lacking. The gross and microscopic changes and the blood picture of the different forms of leukemia are amply illustrated.

Almost all aspects of experimental leukemia are described and the findings, whether of the writer or of others, are discussed objectively. The material is well organized, and with the aid of the contents and of the index one can learn about the different aspects of the subject as little or as much as one desires. Under the heading Transmission of Fowl Leukemia are considered the character of the different strains, variations in percentage of takes, specificity of the strains, spontaneous remission and recovery from the transmitted disease, relationship between fowl leukemia and sarcoma, and the interrelationship of the different forms of leukemia. The various transmissible strains have their own well defined characteristics and their specific cell affinities are constant. The recent report of Duran-Reynals which contradicts this thesis is not considered but this work, revolutionary if correct, needs confirmation. Like Ellerman, discoverer of the virus of fowl leukosis, Duran-Reynals may not have appreciated the frequency of the spontaneous occurrence of the different types of leukosis among poultry and the variability of this frequency in different stocks and at different times. However, it is now generally conceded that leukosis and sarcoma are related. Not only are their properties alike but one virus may produce both. The author prefers the term virus to the less committal term agent, even though he has been considering the possibility that this virus is endogenous in origin. The tissue culture studies center around this question—can these viruses be cultivated in vitro only in the presence of cells which they endow with malignant properties in vivo? The few immunity studies reported point further to a similarity between sarcoma and leukemia. Uhl, an associate of Engelbreth-Holm, succeeded in immunizing chickens actively against fowl leukosis and has correlated immunity with the presence of neutralizing antibodies in the sera.

The chapter on transmission of mammalian leukemia includes studies on the lowering of resistance by irradiation with x-rays, attempts to demonstrate a virus in mouse leukemia, and metabolic changes in leukemic tissues. The statement is made that Krebs and his associates “found a means of lowering the resistance of mice to transplanted tumors by x-rays,” but these authors themselves duly credit James B. Murphy with this discovery.

The description of experimental findings is everywhere complemented by a discussion of the fundamental problems, most of which can be answered only by further experimentation; as, for instance, why is there a rise of virulence in the course of successive passages of transmission lines, and has cell-free material actually produced leukemia or merely hastened the development of the disease in susceptible animals? Throughout the book there are “hints of phenomena about the nature and significance of which we can only guess.”

The section devoted to heredity wisely considers the spontaneous and transmitted disease separately. There are two additional papers now on record concerning the heredity of spontaneous mouse leukemia (Mercier, Cole
and the reviewer), and these allow one significant conclusion to be appended; namely, that the mode of inheritance of leukemia varies with different stocks and that different types of leukemia may have different genetic bases. Considering the rapid progress made recently in the study of extrachromosomal factors, this section is fairly up to date. However, a few corrections are needed. Foster nursing does influence the occurrence of leukemia, and female mice have a higher incidence of the disease than males. The milk factor of Bittner is considered to be a virus, and reasons are given why mouse leukemia may likewise be produced by a virus, even though experimental studies have thus far failed to provide a solid basis for this theory.

The section on the significance of heredity in transmissible leukemia includes a survey of immunity reactions and their dependence upon heredity. Perhaps too much space is given to “Potter’s theory.” Evidently Engelbreth-Holm is anxious to consider every clue which might elucidate the phenomena of experimental leukemia. Potter’s theory was evolved in studies on immunity, and this theory, “though not improbable, certainly fails to offer an immediate explanation of the involved features of the immunization experiments described.” The nature of the immunizing processes is vividly surveyed in the light of Gorer’s recent experiments.

In the chapters on the experimental production of leukemia in both fowls and mammals, leukemoid reactions and leukemia are clearly distinguished, and the production of neoplasms other than leukemia by similar agents is harmoniously considered. Engelbreth-Holm adheres to the view that the production of leukemia by carcinogenic hydrocarbons is essentially an acceleration of a normal tendency. The reviewer is with the minority in considering the possibility of a different mechanism involved in hereditary and induced leukemias. How else could be explained a decided difference in the genetic character of the malignant cells in spontaneous and induced leukemias of the same inbred stock of mice?

In the closing chapter the nature of animal leukemia is considered and the conclusion reached that it is a malignant disease of the hemopoietic tissues. The statement made over and over again that there is a fundamental difference between leukemias in mice and in men is convincingly refuted. The similarity in behavior is remarkable; indeed, “so perfect right down to the smallest detail that doubt as to the identity of the two diseases can hardly be entertained.”

JACOB FURTH


This book is made up of three Edward K. Dunham lectures which were given at Harvard University in the fall of 1941. Owing to the untimely death of Dr. Rudolf Schoenheimer, the lectures were prepared for publication by Drs. H. T. Clarke, D. Rittenberg, and S. Ratner. The lectures—The Reactions of the Body Fats Investigated with Deuterium, The State of the Body Proteins, and The Role of Structural Elements in the Formation of Excretory Products—review and interpret the work on the intermediary metabolism of body constituents carried out so brilliantly with the aid of isotopes (heavy hydrogen and heavy nitrogen) by Dr. Schoenheimer and his collaborators. As a result of these investigations the author suggests the general concept “that all constituents of living matter, whether functional or structural, of simple or of complex constitution, are in a steady state of rapid flux.” To support this concept many experiments are cited on the metabolism of fatty acids, amino acids, and excretory products which show that these molecules, when supplied in the diet, rapidly interchange with and replace chemically identical molecules of the body tissues. At the same time they undergo numerous other transformations. Many of these transformations are fundamental chemical reactions proceeding continuously in the animal organism regardless of the constituents of the diet. To illustrate this general theory, it was found in studies on fat metabolism that on feeding palmitic acid to adult rats of constant weight the dietary fatty acid not only exchanged with the palmitic acid of the storage fat but also was converted into other fatty acids. In experiments on protein metabolism, glycine fed to animals in nitrogen equilibrium replaced glycine in structural as well as functional proteins and the nitrogen from the dietary amino acid was utilized for the formation of other amino acids. The conversion of phenylalanine into tyrosine in the body, even in the presence of an excess of dietary tyrosine, is an illustration of the concept that many chemical reactions are not dependent on the constituents of the diet.

Dr. Schoenheimer and his collaborators, by employing molecules labeled with isotopes, were able to investigate a number of problems in intermediary metabolism which had previously defied a direct approach. The book deals with the valuable contributions to biochemistry made by his group and will prove of great interest to students of the biological sciences.

DAVID SHEMIN

Jacob Furth

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