some are not. The term "Nukleolenchromosom," perhaps best translated "nucleolar-chromosome," may be used as a synonym for "SAT-chromosome," although, as Heitz[2] points out, the two terms are supplementary rather than identical in meaning.

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SCIENTIFIC BOOKS

INFLAMMATION

Dynamics of Inflammation: An Inquiry into the Mechanism of Infectious Processes. By VALY MENKIN. New York: The Macmillan Company, Experimental Biology Monographs. 1940.

As the title indicates, the book presents one aspect of the broad subjects of inflammation and infection. The author reviews the significant contributions he has made to knowledge of inflammation and correlates them with the observations of others. He has been chiefly concerned with the fixation of injurious agents at the site of inflammation, the influence of inflammation upon the invasion of bacteria and the relation of inflammation to immunity.

The introduction is a brief review of the history of knowledge concerning inflammation up to and including the contributions of Cohnheim and Metchnikoff. Conventional subjects of dispute among those who have been interested in inflammation are fortunately ignored. It is doubtful if the opinions of Virchow concerning inflammation have been wholly abandoned, as the author states, for some modern writers still include parenchymatous degeneration in the domain of inflammation and existing nomenclature of disease perpetuates his influence upon knowledge of the subject.

Inflammation is broadly defined by the author as the complex vascular lymphatic and local tissue reaction elicited in higher animals by the presence of microorganisms or of non-viable irritants. The difficulty of finding a satisfactory definition of inflammation has been very great, and it is probable that this, like many other definitions of inflammation, will not be widely acceptable. The author's point of view is well expressed by the statement that an inflamed area is shunted off from the rest of the organism; it has its own metabolism, hydrogen-ion concentration and modified circulation.

Several chapters define the conditions under which dyes, foreign proteins, inanimate particulate matter and bacteria are fixed at the site of inflammation so that they fail to enter adjacent lymphatics, regional lymph nodes and circulating blood. The mechanism of this fixation, the author finds, is the deposit of a fibrinous network in the tissue and the occlusion of lymphatics by fibrinous thrombi. The significance of actual occlusion of lymphatics by thrombi may be questioned because the flow of lymph from the inflamed part is increased.

His observations on the local fixation of bacteria, measured by the fixation of a colloid dye (trypan blue), at the site of inflammation produced by staphylococcus, pneumococcus and streptococcus, suggest to him an explanation of the divergent ability of these microorganisms to invade the tissues. Staphylococcus aureus produces inflammation that within one hour prevents the penetration of trypan blue from the site of inflammation into regional lymphatics, whereas with pneumococcus this interval is six hours and with hemolytic streptococcus approximately 45 hours.

Observations confirming those of others are described to show that an exudate acquires increased acidity in the later stages of an inflammatory reaction. Parallel with this change, and, he believes, consequent upon it, polymorphonuclear leukocytes are replaced by macrophages. Macrophages survive and predominate when the pH falls to a level of about 6.9 or 6.8. Acidity, the author finds, is in part at least the result of glycolysis and the appearance of lactic acid in the exudate.

Menkin has sought for some substance that puts in motion the phenomena of inflammation and thus explains their apparent uniformity under very varied conditions. He finds evidence that histamine can not be accepted as the agent which, set free by injury of tissue, explains the ensuing vascular and cellular changes. He has extracted from exudates a crystalline, doubly refractive nitrogenous substance which contains amino- and carboxyl groups. It is not protein, but its chemical composition is not more exactly definable. It increases the permeability of blood vessels to fluids and to dyes and induces the migration of leukocytes. It does not produce in the body the well-known reactions of histamine. The author has designated this substance leukotaxine and thinks that the available evidence supports the opinion that increased permeability of blood vessels and leukocytic migration are referable to it. Nevertheless it should not be forgotten that there are a great number of substances, including many degradation products of proteins, that cause the same changes.

This monograph is an admirable presentation of its subject from the standpoint of experimental biology. The important contributions of the author and his clear definition of some of the problems of inflammation

will doubtless stimulate renewed investigation of them. The book reveals very fully the fundamental significance of inflammation in relation to infection and immunity.

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PHOTOELASTICITY

Elasticité et Photoélasticimétrie. By H. LE BOITEUX and R. BOUSSARD. 361 pp. Paris: Hermann and Cie, 1940. 180 francs.

ALTHOUGH the technique of photoelasticity, a practical method to determine complicated two-dimensional stress distributions experimentally, was originated in France by Mesnager in 1901, this is the first French book giving a comprehensive account of the theoretical and practical aspects of the method. It is divided into four sections, of which the first is an exposition of the theory of elasticity in the classical manner. The second section does the same for optics, first of isotropic and later of anisotropic mediums. These two sections comprise half the book and do not as yet mention photoelasticity. In the third section the two theories are combined and a discussion is given of apparatus, experimental techniques and properties of the materials used. The last quarter of the book is devoted to methods of numerical integration for finding the principal stresses individually, which is necessary since the photoelastic pictures only determine the difference between these stresses at each point. It is noted that the authors show a number of colored pictures of stress distributions, which represented good practice a decade ago. Although the superiority of monochromatic light and black-and-white pictures over colored pictures is casually mentioned in the text, the authors evidently do not use the improvement in their own laboratory.

A very complete and encyclopedic book, entitled "A Treatise on Photoelasticity," on the subject was published in 1931 by Coker and Filon (Cambridge University Press) which from a technical standpoint is now somewhat out of date. The present French volume is more clearly written; it is easily readable and presents the theory quite adequately; but, although appearing nine years later, it is no better than Coker-Filon in the technical parts of the subject. And it is just in the technical direction that great advances have been made lately, making the now obtainable accuracy in reading stresses about ten times better than that shown in the book.

Another recent volume on the subject written by Mesmer is entitled "Spannungsoptik."[1] The first half of its total of 220 pages follows the French book in its general structure, while the last half discusses experimental techniques and the more modern applications. The bibliography appended refers principally to the last decade, listing 240 papers published since 1930, whereas the French bibliography practically stops with the year 1931.

The most interesting recent development of photoelastic technique is its extension to three-dimensional stress distributions. This is done by exposing the bakelite model to a load at a fairly high temperature and then cooling it under load. A subsequent removal of the load leaves the model without stress but with optical properties that can be correlated to the stress that existed in it before the load removal. Although not yet developed to the point of being a practical engineering tool, this method shows great promise of becoming such a tool in the near future. It is discussed briefly by Boiteux-Boussard as well as by Mesmer.

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SPECIAL ARTICLES

ON THE INTERDEPENDENCE OF RESPIRATION AND GLYCOLYSIS[1]

THE following definition of the Pasteur effect has recently been suggested by Burk:[2] (a) O_2 inhibition of fermentative processes, and at times also (b) O_2 stimulation of anabolic syntheses, the latter effect not being invariably concomitant with the former. Crabtree[3] in 1929 found that the respiration of transplantable tumors was about 12 per cent. lower in the presence of glucose than in its absence and suggested that glucolytic activity exerts a checking effect on the capacity for respiration of tumors. This phenomenon has been called a reversed Pasteur effect (or the Crabtree effect). The occurrence of the Crabtree effect in transplantable tumors has been confirmed.[4,5] Likewise, the effect was observed in lymph nodes of leukemic mice.[6]

We have noticed that the inhibition of respiration by the addition of glucose occurs also in normal tissues with an aerobic glucolysis. In the renal papilla of the rat, which is known to have a metabolism similar to tumors,[7] the inhibition amounted to 20 per cent.

[1] From the Laboratory of Orthopaedic Research of the Harrison Department of Surgical Research, Schools of Medicine, University of Pennsylvania, Philadelphia, Pa.

[2] D. Burk, Cold Spring Harbor Symposia on Quantitative Biology, 7: 420, 1940.

[3] H. G. Crabtree, *Biochem. Jour.*, 23: 536, 1929.

[1] Berlin: Julius Springer, August, 1939.

[4] E. Krah, *Biochem. Zeit.*, 219: 432, 1930.

[5] K. A. C. Elliott and Z. Baker, *Biochem. Jour.*, 29: 2433, 1935.

[6] J. Victor and J. S. Potter, *Brit. Jour. Exp. Path.*, 16: 253, 1935.

[7] P. György, W. Keller and Th. Brehme, *Biochem. Zeit.*, 200: 356, 1928.