scratches at the surface of the substratum on which the eggs are to be deposited. As the eggs are extruded the cloaca is brought into close contact with this surface and attachment is thus effected. The female removes any eggs which may partially adhere to the cloaca during extrusion by a precise flexor-extension reflex of the hind legs. In this the tarsi are applied directly to the adhering eggs and a slow extension effects the removal.

Deposition of an egg mass is usually followed by a quiet moment during which the bodies of the pair become slightly more inflated than normally. The intervals between egg deposition, ranging from 2 to 10 minutes or longer, are spent in bursts of vigorous activity, mainly on the part of the female. What function this may serve, if any, is conjectural, but it apparently takes place under natural as well as artificial conditions. In the laboratory such periods are followed by a rest and then further oviposition. Shortly after laying is complete, the pair becomes separated. The entire time in amplexus has been observed to range from 8 to 40 hours or more.

The total number of eggs deposited was found to range from 500 to 750; however, Storer[1] reports an instance of 1,250 eggs being laid. The number of eggs per clutch is usually about 16, but varies from 5 to 60. Further, a tendency exists toward the close of the laying for the size of the clutch to taper off to 3 or 4 or even single eggs. There is indication that the embrace of the male may be requisite to the proper extrusion of eggs by the female. Three gravid females, isolated without mates, laid only 26, 92 and 80 eggs, respectively, on the evening following capture, and all three died during the ensuing day. The evidence at hand indicates that resorption of eggs does not occur in the gravid, unmated female. It would thus appear that retention of the eggs is fatal to the animal.

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THE PROPOSED TERMS "EXERGONIC" AND "ENDERGONIC" FOR THERMODYNAMICS

THE terms "exothermic" for reactions giving off heat and "endothermic" for those absorbing heat were coined in the last century when it was hoped that a concentrated attack on thermochemistry would solve the problems of chemical affinity and enable the chemist to predict the direction of spontaneous chemical reaction. This hope was illusory, but the nomenclature is quite useful and may also be applied to reactions for which the decrease in heat content $-\Delta H$ is positive or negative, respectively.

Those reactions do go spontaneously for which the entropy of the system and surroundings increases. This criterion of the second law of thermodynamics is rather general, and it has been found more convenient to particularize the law with reference to the free energy F and use the criterion that a reaction will go by itself if the free energy decrease $-\Delta F$ is positive at constant pressure and temperature, or in other words, if useful work (rather than heat) could be produced by a reversible mechanism. An interesting chemical analysis of the correlation of these two thermodynamic criteria has been given by T. W. Davis,[1] since the change in entropy ΔS is negative for many reactions for which $-\Delta F$ is positive and reaction occurs spontaneously. The importance of free energy in chemistry is so great that G. N. Lewis and M. Randall[2] included it in the name of their classical book that crystallized the course of research in chemical thermodynamics.

No terms have received wide acceptance which aptly characterize so-called spontaneous and nonspontaneous reactions. We therefore propose that the term "exergonic" be applied to reactions which can produce work, and "endergonic" be applied to those on which work must be expended to cause the reaction to occur. At constant pressure and temperature exergonic signifies $-\Delta F$ is positive, and endergonic signifies $-\Delta F$ is negative.

These two words are derived from the Greek *ergon,* work, and are etymologically analogous to the corresponding thermochemical terms derived from *thermē,* heat. The word *ergon* was formerly used as a synonym for the unit of work, the erg, and in a more restricted sense applies in physics to a unit of work measured in heat. This application of the cognate word is consistent with modern scientific usage to express free energy values and changes in calories.

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SAT-CHROMOSOMES

THIS technical term, introduced by Heitz,[1] is widely misunderstood and has been misused repeatedly in cytological literature. "SAT" is an abbreviation[2] of "Sine Acido Thymonucleinico." "SAT-Chromosome" is not a synonym for satellited-chromosome but signifies either a satellited chromosome or a chromosome with a secondary constriction that is associated with the formation of the nucleolus. All satellited chromosomes are SAT-chromosomes, of chromosomes with secondary constrictions, some are SAT-chromosomes,[3]

1 T. I. Storer, *Univ. Calif. Publ. Zool.,* 27: 225, 1925.

1 *Jour. Chem. Educ.,* 13: 376 (1936).

2 "Thermodynamics and the Free Energy of Chemical Substances," McGraw-Hill Book Company, New York, 1923.

1 E. Heitz, *Planta,* 12: 775–844. 1931.

2 E. Heitz, *op. cit.,* p. 812.

3 L. Geitler, "Chromosomenbau," Berlin, 1938, p. 24.

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