

Magnetism in Relation to Chemical Problems. By K. N. Mathur. Lucknow University Studies, No. VIII. (The University of Lucknow), 1940. Pp. 185.

Chemists are just as much interested in effecting reactions between molecular units in order to study the results or in order to produce some new desired type of molecule, as in knowing the fundamental nature of the molecular units so that they can intelligently follow the chemical reactions taking place. For this latter object every available physical method of study is pressed into service. One of these useful methods is the study of the magnetic properties. Such studies give us a valuable insight into the nature of the different types

of chemical links, the structures of the molecules, and of inter- and intramolecular forces. Prof. Mathur has presented in this brochure a very clear account of the fundamentals of the subject, the experimental techniques, and some of the outstanding results of the studies, and in a manner that will hold the interest of many chemists who have no specialised knowledge of magnetism. The opening chapter deals with the fundamental units and experimental methods and is followed by other chapters discussing diamagnetic and paramagnetic properties. The closing chapter is on magnetism in relation to chemical equilibria.

The book is neatly got up and will prove an useful addition to the library of many chemists.

RECENT ADVANCES IN PHYSIOLOGY

Recent Advances in Physiology. Edited by James Murray Luck and Victor E. Hall. (American Physiological Society and Annual Reviews Inc.), 1941. Vol. III. Pp. viii + 784. Price \$5.00.

THE third volume of this Annual Review has been as informative and successful as its predecessors and the Editors are to be congratulated on bringing out such an excellent publication in spite of the difficulties associated with the present critical conditions due to war. The Editors have chosen acknowledged authorities in writing the reviews, cf. Fenn on *muscle*, Feldberg on *histamine*, Marshall on *chemotherapy* and Jasper on *electrical activity of the brain*.

The first chapter on the Relation of *Bioelectric Potentials to Cell Functioning*, by Bishop, deals mainly with the character of the potential and the course of excitation. Dealing with the interaction between electrical processes and chemical environment, Bishop refers to the work of Sir Henry Dale and quotes experimental evidence which tends to lead to a conclusion contrary to the view held by the Dale School that acetylcholine is the precursor of potassium at the neuromuscular junction. A brief but an illuminating account on constructing an artificial synapse, illustrates the modern methods employed for a study of the controversial question of synaptic transmission. In the next chapter Laurens dealing with the *Physiological Effects of Radiant Energy*,

refers to the effects produced by ultra-violet radiations of different wave-lengths and specially as they affect skin, eye, blood, metabolism, and also on bacteria, fungi, protozoa and proteins. The effects on the skin naturally leads one to the question of histamine or H substance being produced by ultra-violet radiation. The author believes, from the analysis of available data, that a chemical substance is involved in producing these reactions, this substance being either a protein or a simple protein derivative. But whether the substance is histamine or not, cannot be said at present. From a practical point of view, interesting developments are taking place regarding the action of ultra-violet rays on bacteria. It is now claimed that hospital wards and operating rooms can be 'disinfected' by radiations, although their mode of action still remains obscure.

The next two chapters on *Physiological Aspects of Genetics* and *Developmental Physiology* are written by A. H. Sturtevant and E. Witschi respectively. A very wide field in Genetics, sex in algæ and hymenoptera, self-sterility, tumors and leucaemias in mice has been covered. The most interesting contribution in human genetics is the electro-encephalographic patterns shown by patients who are liable to get epilepsy. Witschi has briefly summarized the work on fertilization and on parthenogenesis and polyploidy. Mechanics of gastrulation, fractionation of the organizer and chemical

nature of the organizer have also been described. The work on the influence of hormones on artificial masculinization and feminization among amphibians, especially salamanders and frogs will, no doubt, attract considerable attention.

C. E. Palmer and A. Ciocco have reviewed the work on *Growth*. Observations by various workers on the growth of children recorded from different view-points and the influence of factors like hormones and diet, vitamins, etc., have been described.

J. C. Scott and H. C. Bazett have written the chapter on *Temperature Regulation*. The role that hypothalamus plays in regulating mammalian temperature is now fully recognised. The centre for reactions to heat, is situated in the anterior hypothalamus and that for cold in the caudal part of the lateral hypothalamus. The process involved in the stimulation of thermoregulatory mechanism, however, is still under controversy and the idea that the temperature of the inflowing blood determines the activity of the hypothalamic centres is not fully acceptable. Physical and chemical regulation of temperature and slow adaptations to external temperature have been very lucidly discussed and will be of considerable interest to those who are working on basal metabolic rates in the tropics.

Discussing *Energy Metabolism*, T. M. Carpenter describes the basal metabolism in laboratory animals and reviews the experimental work relating to fasting, food, season, climate and environment.

A very interesting review on *Respiration* dealing with nearly 200 references has been written by C. F. Schmidt and J. H. Comroe. These authors have paid particular attention to three subjects, viz., (i) location and functional integration of the regulating mechanism in the central nervous system, (ii) nervous and chemical factors involved in pulmonary ventilation, and (iii) physiology of respiration at high altitudes. In spite of the traditional idea of a 'centre' being a sharply localized structure, it is now admitted that the respiratory centre is not a localized structure but a long chain of nerve centres. Lumsden's work published in 1923 has been confirmed by other workers. A reciprocal innervation between the inspiratory and expiratory neurons in the medulla has been described. The chemical stimulus to the respiratory centre is now

accepted to be CO₂ acting as such and not the hydrogen ion. The hyperpnoeas of muscular exercise and anoximia are attributed to excitatory reflexes rather than to chemical stimulus. The very important review on physiology of respiration at high altitudes covering a large number of papers is of topical significance.

While discussing the *Physical Properties of Protoplasm*, E. F. Adolph refers to the optical, mechanical and electrical properties of protoplasm. W. O. Fenn dealing with *Muscle* quotes the work dealing with the relation between the factors of length, heat and tension. He has also discussed briefly the mechanism of myoneural transmission of excitation and the distribution of electrolytes in resting and contracting muscles.

J. E. Thomas reviewed the work on the *Digestive System*. He refers to the papers dealing with motor and secretory activity of the stomach and intestines and also to the work dealing with experimental production of peptic ulcers. *Liver and Bile* are dealt with by W. B. Hawkins. He has reviewed the work of liver injuries, bile, prothrombin and heparin. The clinical application of some of the experimental observations reported in this review demands serious attention from clinicians.

The data of G. M. Higgins on cytological characteristics of the blood of experimental animals will prove useful to those engaged in the study of blood dyscrasias. Very important data regarding erythrocytes, reticulocytes and hæmoglobin are included in the review. Similarly, recent work on neutrophilic leucocytes, lymphocytes, mononuclear leucocytes, platelets and experimental leucæmias is included and the influence of vitamins on formed elements of blood has been discussed. C. J. Wiggers and H. D. Green have contributed the chapter on *Heart*. They have discussed the physiological properties and innervation of the heart, cardiodynamics, heart sounds, and electrical phenomena. The coronary and pulmonary circulations receive special attention.

Peripheral Circulation has been allotted a special chapter written by V. E. Hall. Venous and arterial circulations are first discussed followed by vasomotor mechanism and vasomotor reactions. Circulation in special regions like the spleen, kidney, skeletal muscles, etc., are then dealt with and a brief discussion on shock follows.

Electrical Activity of the Brain is a comparatively new subject in the field of physiology but the 176 papers very ably reviewed by H. H. Jasper, illustrate the keen interest taken by physiologists in general and American physiologists in particular, in this subject. Jasper has first summarized the results obtained after local stimulation of the brain. General factors affecting spontaneous cortical rhythms are then mentioned. Clinical studies include localization of cerebral lesions, epilepsy and psychiatric disorders.

The review of the *Autonomic Nervous System* and the 325 references given by D. Sheehan deals with a variety of subjects and the technique employed in physiological research. Researches on autonomic nervous system have been of special interest to clinicians especially in recent times with very advanced surgical skill. Pain is a subject of universal interest and Sheehan has begun his review with visceral afferents. That the impulses along visceral afferent fibres may produce responses in somatic as well as visceral effectors just as somatic afferent impulses may elicit activity in visceral as well as somatic effectors is a conclusion of considerable interest to the medical profession. Literature pertaining to visceral efferents (autonomic) has been summarized with particular reference to extremities, sudomotor fibres, dorsal root potentials, striated muscle, bones and joints and different organs of the body including the endocrines. Transmission at the synapse naturally receives special attention.

Hearing, Visceral Receptors and Vibratory Sensations and Pain are reviewed by E. Barany. R. Granit and Y. Zotterman respectively and *Physiological Psychology* by H. S. Liddell.

The chapter on *Kidney* is written by L. Leiter. He has dealt with a number of subjects including anatomy, physiology and pathology of the kidney. Ischaemic hypertension and kidney extracts have come into prominence in recent years because of their role in elucidating the causes of human hypertension and this subject has been very methodically summarized.

Metabolic Function of the Endocrine Glands are reviewed by S. Soskin. He has dealt with the pancreas, adrenal cortex, thyroid and the anterior hypophysis.

Endocrine Aspects of the Physiology of Reproduction form the subject of review by O. Riddle. The very extensive and intensive work done in this important branch of physiology are condensed in about 40 pages quoting nearly 200 references and Riddle confesses that he has only dealt with a part of the literature published during the year. Sex hormones are first considered in relation to the adrenal and the pituitary gland. Interesting reviews on calcium metabolism and sex hormones and on the action of sex steroids on blood fat follow. Prolactin, mammogenic hormones and neural relationships are briefly discussed and types of reproductive behaviour mentioned.

Reproduction in Mammals is a contribution by M. H. Friedman. The central nervous system and reproduction are discussed first followed by environment and seasonal rhythms. The relation between diet and reproduction is stressed. The indirect criteria of human ovulation are summarized briefly but obviously none of the criteria suggested so far have received all-round scientific confirmation.

E. K. Marshall, Jr., who has now been accepted as the leading authority on chemotherapy has contributed the chapter on *Bacterial Chemotherapy*. The review is restricted to three important sulphonamides, viz., sulphanilamide, sulphapyridine and sulphathiazole. These have been reviewed in relation to their toxicity, absorption, excretion and distribution in the body. The mode of action of sulphonamides is briefly discussed.

W. Feldberg has contributed a chapter on *Histamine and Anaphylaxis*. He has discussed the evidence for liberation of histamine in anaphylaxis in various species. The responses of smooth muscle preparations to histamine and antigen are then mentioned. The review on allergic conditions in human beings will be of great interest to clinicians.

The last chapter on *Exercise* is written by A. H. Steinhaus. He has reviewed the different practical aspects of exercise and has briefly discussed the adjustments of the body during and immediately following exercise. Recent work in the nature and estimation of fatigue is briefly reviewed. Reference is also made to pathology, therapeutics and biomechanics of exercise.

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