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ANATOMY AS A SCIENCE[1]

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ON behalf of the College of Physicians and Surgeons, which I have the honor of representing to-day, I wish to extend to you, the members of the first year class in medicine, a most hearty welcome.

Since I have the privilege also of representing on this occasion the newly organized department of anatomy in this institution, and since, in the course of a few days, you will be actively engaged in anatomical studies, I thought it might not be inappropriate for me to speak to you about the subject of anatomy, with respect to a few of its past developments and to its present status amongst the biological and medical sciences.

[1] Address delivered at the opening exercises of the College of Physicians and Surgeons, Columbia University, New York, September 25, 1929.

In the preparation of this address I have drawn freely from the following sources: R. G. Harrison, "Anatomy; Its Scope, Methods and Relations to Other Biological Sciences," *Anat. Record,* vol. 7, 1913; W. A. Locy, "Biology and Its Makers," Henry Holt and Company, 1910.

An anatomical laboratory is no doubt frequently thought of as a place characterized by the presence of a morgue and large vats filled with formalin-soaked specimens; a place where boxes of rattling bones reside upon shelves to be doled out to beginning students in order to revive their powers of memory which they may have largely lost during the more or less care-free activities of their academic careers.

Based upon the experience of others, it may be regarded as a place where thousands of tedious facts must be learned and later forgotten before the gratifying emoluments attending the practice of medicine may be fully realized.

An anatomical laboratory does possess what I have mentioned—a lot of dead things—but if this were all that characterized the place, anatomy as a science would be as dead as the cadaver which is placed at your disposal in order that you may hack out the necessary morphological slices preparatory to the practice of surgery.

Morbidity and the association of morbid conditions: E. B. WILSON.

Bird-life of Mt. Duida, Venezula: F. M. CHAPMAN.

On new measurements on the intensity of cosmic rays as a function of depth beneath the surface of the atmosphere: R. A. MILLIKAN and G. H. CAMERON. New measurements on cosmic rays made by the most sensitive electroscope which the authors have thus far used bring to light three results of significance. First, the existence of very considerable homogeneity in the penetrating power of the rays responsible for the bulk of the ionization in the upper atmosphere. Second, the existence of an exceedingly hard component in the cosmic rays in excellent agreement with the recent findings of Regener. Third, the fact, heretofore ignored in all theories, that the nucleus plays an important rôle in the absorption of cosmic rays.

High frequency electric discharges in "non-conducting" vacua: R. W. WOOD. Discharges in vacua, usually regarded as non-conducting, were excited by a "continuous wave" tube oscillator having a frequency corresponding to a wave-length of $1\frac{1}{4}$ meters, with a potential of only a few hundred volts. Very remarkable changes in the gas content of the sealed tube under excitation were observed, the same tube showing a spectrum of pure atomic hydrogen, or pure oxygen, at the will of the operator. Luminous masses of singly ionized molecules of very definite shape (spheres, pointed spindles and pear-shaped bodies) appear in the tube, and their movements under magnetic and electric forces have been studied. These bodies may distribute themselves periodically along the tube, giving an appearance which reminds one strongly of stationary waves.

Capture of electrons by alpha particles: A. H. BARNES and BERGEN DAVIS. Swiftly moving alpha particles are passed through a highly evacuated vessel. They are deflected by a magnetic field and fall on a zinc sulphide screen, where they produce scintillations. There were about 60 alpha particles per minute, each having a velocity of 1.45×10^9 cm/sec. It was so arranged that electrons emitted by a hot filament were made to follow after the alpha particles by a suitable electric field. The alpha particle thus moves in a small part of its path surrounded by a cloud of electrons. These electrons can be made to move with a less velocity than the alpha particle, an equal velocity and a greater velocity as desired. It was found that the electron was captured only when it possessed definite energy. This energy which was obtained from applied field was closely equal to the value of the energy level in which the electron was captured. A second experimental tube was constructed in which the alpha particles could be in contact with electrons for only 3×10^{-10} sec. The electron density was less than 10^7 per cc. The average distance from electron to alpha particle was many times too great for it to fall to nucleus in 3×10^{-10} sec. under action of central forces. It is concluded that the electron or the alpha particle or both may possibly occupy a large region of space at certain energy relations but are exceedingly small at all other energies. The per cent. of captures increased rapidly with electron density up to 90 per cent. The second experimental tube permitted investigation as to whether one electron or two electrons are captured. It was found that at $V_0 = 590$ volts when the electrons and alpha particles are moving with equal velocity two electrons were captured. Also a whole series of voltages V_n was found at which double capture occurs. The condition is that two electrons together shall have an energy equal to that of removing two electrons from the helium atom. As an illustration, the work required to remove both electrons from helium atoms is $54.16 + 24.5 = 78.6$ electron volts. If the electric field V_n applied is such that the relative energy with respect to alpha particle of two electrons is 78.6 volts then double capture occurs, that is, $\frac{1}{2}(78) = 39 = (V_0^{\frac{1}{2}} - V_n^{\frac{1}{2}})^2$.

(To be continued)

BOOKS RECEIVED

BAKER, FRANK COLLINS. *The Fresh Water Mollusca of Wisconsin.* Bulletin 70. Part I. Gastropoda. Pp. xx + 507. 28 plates. Part II. Pelecypoda. Pp. vi + 495. 77 plates. University of Wisconsin.

BERNSTED, H. J., W. BULLOCH, L. DUDGEON, A. D. GARDNER, E. D. W. GREIG, D. HARVEY, W. F. HARVEY, T. J. MACKIE, R. A. O'BRIEN, H. M. PERRY, M. SCHÜTZE, P. BRUCE WHITE and W. J. WILSON. *A System of Bacteriology in Relation to Medicine.* Vol. IV. Pp. 482. Medical Research Council. His Majesty's Stationery Office, London. £1, 1s.

BURGESS, ERNEST W., Editor. *Publications of the American Sociological Society.* Vol. XXIII. The Rural Community. Pp. viii + 416. University of Chicago Press. $2.00.

CHAPMAN, FRANK M. *My Tropical Air Castle.* Pp. xv + 417. Ill. with drawings by Francis L. Jaques and photographs by the author. Appleton. $5.00.

COLLINS, A. FREDERICK. *Experimental Science.* Pp. xvi + 280. 145 figs. Appleton. $2.00.

FISHER, V. E. *An Introduction to Abnormal Psychology.* Pp. x + 512. Macmillan. $2.60.

GRIFFITH, R. O., and A. MCKEOWN. *Photo-Processes in Gaseous and Liquid Systems.* Pp. viii + 691. 52 figs. 54 tables. Longmans, Green. $8.50.

HACKH, INGO W. D. *A Chemical Dictionary.* Pp. viii + 790. 232 ills. Blakiston. $10.00.

HOLLINGWORTH, H. L. *Vocational Psychology and Character Analysis.* Pp. x + 409. Appleton. $3.00.

HOUSTOUN, R. A. *Intermediate Dynamics and Properties of Matter.* Pp. ix + 138. 139 figs. Longmans, Green. $1.25.

KÜSTER, ERNST. *Pathologie der Pflanzenzelle.* Teil I. Pathologie des Protoplasmas. Pp. viii + 200. 36 figs. Verlag von Gebrüder Borntraeger, Berlin. 15 M.

LULL, RICHARD SWANN. *Organic Evolution.* Pp. xix + 743. 265 figs. 31 plates. Macmillan. $4.50.

OSBORN, FREDERICK A. *Physics of the Home.* Pp. xiv + 397. 221 figs. McGraw-Hill. $3.00.

PATTON, WALTER SCOTT, and ALWEN M. EVANS. *Insects, Ticks, Mites and Venomous Animals of Medical and Veterinary Importance.* Part I. Medical. Pp. x + 786. 374 figs. 60 plates. Published by author, at Liverpool School of Tropical Medicine. $5.00.

RANDALL, HARRISON M., NEIL H. WILLIAMS and WALTER F. COLBY. *General College Physics.* Pp. xii + 540. 310 figs. Harper. $3.50.

SMITH, DAVID EUGENE. *A Source Book in Mathematics.* Pp. xvii + 701. McGraw-Hill. $5.00.

THOM, BURTON PETER. *Dust to Life.* Pp. xv + 409. Ill. Dutton. $5.00.