

interrupted sinuous line of light, in which the rise of the curve was somewhat slower than the steeper fall of the same. On introducing a coil into the circuit the curve showed no change as long as the telephone was in front of the coil; when it came behind the coil, the curve described was almost a sine-curve. On putting an electro-magnet into the circuit the amplitude of the curves was less; so also when self-induction existed in the circuit, while at the same time the rise and fall of each part of the curve was less steep. A condenser gave rise to a curve with very sharp-pointed sinuosities. An apparatus for producing alternating currents gave rise to a regular sine-curve, which was affected by a coil electro-magnet and condenser in the same way as was the curve due to a battery current. Lastly, experiments were made with an induction-coil. On placing the telephone in the primary circuit, the vibrations of its plate gave rise to uniform sine-waves, whose height was less when the telephone was introduced into the secondary circuit, while at the same time they showed a phasic difference of $\frac{1}{4}$ wave-length. This change of phase due to induction, as exhibited in most striking manner to the large assembled audience, can be recorded by photography of the curves and thus submitted to exact measurement.—Prof. Gad gave a short account of researches made, in conjunction with Dr. Heymans, on the effect of temperature upon muscular contraction. These are to be the subject of a more extended communication to the Physiological Society.

Physiological Society, June 28.—Prof. du Bois-Reymond, President, in the chair.—Prof. Gad gave an account of experiments which he had made, in conjunction with Dr. Heymans, on the influence of temperature upon the working-power of muscles. In accordance with Fick's procedure, the muscles were experimented upon not only in an isotonic condition, where there is no change of initial tension, and stimulation leads merely to a shortening of the muscle, but also in an isometric condition, where there can be no change of length in the muscle, and stimulation produces only a change of its tension. Various muscles from frogs were examined at temperatures of 36° , 30° , 13° , 5° , 0° , and -5° C., being freely suspended in a metallic cylinder immersed in a water-bath. The muscles were stimulated electrically by maximal and super-maximal induction-shocks due to breaking the primary circuit, these being single or repeated or tetanizing. The curve of the isotonic muscle was symmetrical at 19° C.; at 5° C. it rose much more slowly, and was both higher and longer than at 19° C. At temperatures down to and below 0° C. the rise of the curve was still slower and its height less than at 5° C., but on the other hand its length was greater. At higher temperatures the height of contraction was greater than at 5° C., the duration less than at 19° C., and the curve of contraction was symmetrical. At still higher temperatures there was a very considerable fall in the height of contraction, and its duration was still shorter than before. Irritability disappears immediately before the occurrence of heat-rigor. The curves of a muscle in the isometric condition were an exact reversal of those for the isotonic: low and short at 40° C. to 36° C., they were longer and very high at 30° C. At 19° C. there was a very marked diminution in height, while the length was slightly greater; at 5° C. the curve was again higher than at 19° C. and much longer, and below 0° C. lower and longer. When stimulated by a tetanizing current the curve of the isotonic muscle was highest at 30° C., but fell very rapidly from this height, a sign of rapid exhaustion. At 19° C. the curve rose to a less height, and less precipitately, and fell quite suddenly on the cessation of the stimulus. At 5° C. the curve rose more gradually to a less height, and was prolonged considerably after the stimulus was removed, and this was also the case at temperatures below 5° C. The curve of tetanus for an isometric muscle was again, as in the case of single contractions, an exact reversal of that obtained from an isotonic muscle. When discussing the results of the above experiments, the author gave special prominence to the facts that the height of the curve of contraction is least at 19° C. (the temperature of the room) and is increased by either warming or cooling the muscle; further that the duration of the contraction, which is about $0.1-0.2$ second at 19° C., increases rapidly as the temperature falls, and is as much as 2.6 seconds at -5° C. In explanation of the first fact the author assumed that, in accordance with Fick's hypothesis, during the combustion of carbohydrates and fats to carbon-dioxide and water some intermediate product (? lactic acid) is formed, and acts as a stimulus: the various temperatures under which the muscle works must then be supposed to have varying influences upon the formation and subsequent final oxidation of this intermediate product.—Dr. Obermüller described a new

reaction for cholesterin which he had discovered. It consists in treating cholesterin with propionic-anhydride; this leads to the formation of a compound of propionic acid and cholesterin, which on being fused and allowed to cool shows, even in minute traces of the substance, a fine play of colours from violet through blue and green to red. In the green stage the compound consists of minute spheroidal crystals, which are larger in the red stage, and show a black cross when examined between crossed Nicols.

VIENNA.

Imperial Academy of Sciences, April 11.—The following papers were read:—On the constitution of the quinine-alkaloids, by H. Skraup.—On some aldehyde-like products of the condensation of urea and their tests, by E. Luedy.—Remarks on the comet discovered by Barnard on March 31, by E. Weiss.—On the diffusion of bases and acids, by E. Stefan.—On desiccative oleic acids, by K. Hazura.—On oxidation of non-saturated fatty acids by potassium permanganate, by A. Gruessner and K. Hazura.—Contribution to the flora of the East (on the plants collected in 1885 in Pamphylia by Dr. Heider), by R. von Wettstein.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Matriculation Directory, No. 6, June 1889 (Clive).—A Text-book of General Therapeutics: W. Hale White (Macmillan).—Lord Howe Island, its Zoology, Geology, and Physical Characters (Sydney, Potter).—Fallow and Fodder Crops: J. Wrightson (Chapman and Hall).—The Fauna of British India, including Ceylon and Burma; Fishes, vol. i.: F. Day (Taylor and Francis).—Veröffentlichungen der Grossherzoglichen Sternwarte zu Karlsruhe, Drittes Heft: Dr. W. Valentiner (Karlsruhe).—Annalen der k. k. Universitäts-Sternwarte in Wien (Währing), v. and vi. Band (Williams and Norgate).—Ancient Art of the Province of Chiriqui, U.S. of Columbia; W. H. Holmes (Washington).—A Study of the Textile Art: W. H. Holmes (Washington).—The Cave Fauna of North America, with Remarks on the Anatomy of the Brain and Origin of the Blind Species (National Academy of Sciences, vol. iv., First Memoir).—Who are the American Indians: H. W. Henshaw (Washington).—Journal of Anatomy and Physiology, July (Williams and Norgate).

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