UNIVERSITY AND EDUCATIONAL NOTES

ON June 30 Armour Institute of Technology at Chicago brought to a successful close a four months' financial campaign for the raising of a million dollars, one third of which was contributed by the Armour family, as a preliminary move in its affiliation with Northwestern University. The next step in the affiliation calls for the raising of a capital fund of $10,000,000 for endowment and buildings to be erected on the Evanston campus of Northwestern University and on the McKinlock campus at Chicago Avenue and the Lake.

HARVARD UNIVERSITY receives $200,000 by the will of the late Charles Downer, a graduate of the college and of the law school. His native town, Sharon, Vt., also became beneficiary to the extent of $100,000. Some years ago Mr. Downer gave the State of Vermont the Downer State Forest, 300 acres, his ancestral home, to be used for experimental and recreational purposes.

BY the death of Mrs. Mae Manford Bridge the contingent bequest of $6,000,000 left by Dr. Norman Bridge to various hospitals and universities is released. By the will of Mrs. Bridge the further sum of $500,000 is left to various institutions.

CHARLES P. HOWLAND, of New York City, who administered the $50,000,000 fund raised by the League of Nations to aid the Greek refugees, has accepted appointment as a trustee of the Johns Hopkins University to assist in carrying out the plan for a new departure in higher education by which Johns Hopkins will devote itself to research and advanced work.

DR. WILLIAM L. MACHMER, instructor in mathematics at the Massachusetts Agricultural College since 1911, has been made dean of the college.

THE following changes in the titles of appointments have been made at the Bussey Institution of Harvard University: William Ernest Castle, professor of genetics, from professor of zoology; Edward Murray East, professor of genetics, from professor of experimental plant morphology; William Morton Wheeler, Ph.D., S.D., professor of entomology, from professor of economic entomology. Dr. Charles Thomas Brues has been promoted to an associate professorship of economic entomology.

ELTON MAYO, formerly professor of psychology in the University of Queenstown and from 1923 to 1925 research associate in industry in the University of Pennsylvania, has been appointed associate professor of industrial research at Harvard University.

DR. ARTHUR L. BLOOMFIELD, of the Johns Hopkins medical faculty, has been appointed professor of medicine in the Stanford Medical School. Dr. Bloomfield fills the vacancy created by the recent death of Dr. A. W. Hewlett, who had held the position since 1916.

DONALD B. KEYES, who has been associated with the U. S. Industrial Alcohol Company for the past eight years serving as director of the research and development department for the past two years, has been appointed professor of industrial chemistry and head of the department at the University of Illinois.

DR. MAJOR GREENWOOD has been appointed professor of epidemiology and vital statistics in the school of hygiene and tropical medicine of the University of London and Dr. W. W. C. Topley, professor of bacteriology in the University of Manchester, has been appointed to the university chair of bacteriology and immunology.

DR. W. E. CURTIS has been appointed professor of physics and director of the physics department at Armstrong College, Newcastle-on-Tyne, in succession to Professor Henry Stroud, who retires at the end of the present session. Dr. Curtis is at present reader in physics in King's College, London.

DISCUSSION

THE REVERSAL OF THE HYDROGEN SERIES IN THE EXTREME ULTRA-VIOLET

IN the course of the presentation of a paper on the spectrum of neon at the spring meeting of the American Physical Society a year ago, I mentioned that I had been able to obtain the first three members of the hydrogen series in the extreme ultra-violet reversed. Recently I have repeated the experiment with the purpose of improving the technique and confirming the results.

In the first place it is necessary to produce a continuous spectrum in the region in question; I have already described briefly how this may be accomplished. (*Astrophysical Journal*, LX, July, 1924, p. 2.) The procedure consists in charging a condenser of about 1/2 micro-farad capacity with a direct current and then discharging it through a vacuum tube of the internal capillary type arranged in series with a half centimeter spark gap. The best results are obtained with a discharge tube of common glass; it is important that the capillary be not too large. I have found a diameter of about a millimeter satisfactory. The material of the electrodes is not important; I have employed tungsten.

The continuous spectrum seems to owe its existence to the disintegration products of the glass set free by the erosive action of the discharge; its strength depends hardly at all on the nature of the gas in the discharge tube. The experiment is not without mechanical difficulties, for the slit of the spectroscope frequently becomes plugged up by glass dust the removal of which involves a troublesome process.

Once the conditions for producing the continuous background have been secured the best results were obtained by admitting hydrogen into the discharge tube at a pressure of about one millimeter. Upon applying the explosive condenser discharge, the first four members of the series; 1215.6; 1025.8; 972.5 and 949.7 appear on the photographic plate sharply reversed. It is not necessary to employ pure hydrogen, however, the first two members of the series have been obtained with helium containing a trace of hydrogen. The nature of the apparatus is such (*Astrophysical Journal*, LX, p. 8, 1924) that a distance of about one centimeter separates the end of the capillary from the slit of the spectroscope while the gas which fills the discharge tube is removed from the light-path by a pump whose inlet lies two centimeters on the grating side of the slit. The path length available for absorption is thus of the order of three centimeters. It seems certain that a very small quantity of hydrogen is sufficient to produce the reversal of the lines.

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THE CLEAVING OF CILIATES BY AMOEBA

MAST and Root[1] and the writer[2] record cases of Amoeba feeding on Paramecium and Frontonia by cleaving the ciliates in half. They express the opinion that Amoeba actually pinches the ciliates into two by means of pseudopodial pressure.

Schaeffer,[3] on the contrary, calls attention to the fact that ciliates not infrequently constrict themselves into two as a result of injuries received when making their way through débris. He regards it as more likely that the ciliates seized by Amoeba also tear themselves into halves when a slight injury is initiated by the mechanical pressure of the pseudopods. Chambers[4] expresses a similar view, stating that the pseudopodial pressure of the amoeba is of little or no importance in the halving of the ciliate. He is led to this conclusion by the observation that slight injuries made in the ectoplasm of Paramecium with a microneedle often result in the ciliate's pinching itself into two.

However, my observations on the cleaving of *Frontonia leucas* by Amoeba do not substantiate the view that the ciliates in all instances tear themselves into halves. In the two cases recorded[2] the frontonia was not pinched into two by the pressure exerted by apposed pseudopods, but was literally stretched into two by the pseudopods of the amoeba. In the process one half of the frontonia was enclosed in a food cup, the free edges of which produced a marked constriction in the middle of the ciliate and constituted a sort of protoplasmic collar around this narrowed region. The pseudopodial collar then streamed toward the free half of the frontonia, actual movement in this direction of the granules of the amoeboid protoplasm being observed. As the streaming progressed, the free half of the ciliate was pressed into the shape of a sphere, and the constricted region connecting the halves became much elongated. When the ciliate was finally stretched into two by this means, the free half assumed its normal shape. In one instance a frontonia was stretched in the process from a length of 0.25 mm to a length of 0.31 mm, as ascertained from camera lucida drawings.

Kepner and Whitlock[5] record a similar case of the stretching of a paramecium to nearly twice its normal length, the pressure exerted by the pseudopodial collar being sufficient to force the free half of the ciliate into a spherical shape. At this stage the amoeba began the ingestion of a specimen of Cyclidium and released the paramecium.

No doubt in some instances ciliates when captured and constricted by Amoeba actually tear themselves into halves. But the complex food reactions described by Kepner and Whitlock and by the writer are not to be accounted for on these grounds. When the cleaving of the ciliate involves a conspicuous elongation of the constricted portion and the compressing of the free half into a spherical shape, and when the actual streaming of the protoplasm in the pseudopodial collar is observed and the stretching of ciliate is demonstrated by measurements, little doubt remains that the ciliate is halved by mechanical pressure of the pseudopods of the amoeba.

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[1] Mast, S. O., and Root, F. M., 1916, *Jour. Exp. Zool.*, Vol. 21, pp. 33–49.

[2] Beers, C. D., 1924, *Brit. Jour. Exp. Biol.*, Vol. 1, pp. 335–341.

[3] Schaeffer, A. A., 1926, *Qt. Rev. Biol.*, Vol. 1, pp. 95–118.

[4] Chambers, R., 1924, "General Cytology," Cowdry, pp. 237–309.

[5] Kepner, W. A., and Whitlock, W. C., 1921, *Jour. Exp. Zool.*, Vol. 32, pp. 397–426.