ALBERT COLLEGE, at Glasnevin, Ireland, with which is combined the Free State's agricultural experiment station, has been handed over to Dublin University as a step in the government's efforts to promote the use of modern farming methods. The transfer was arranged by Patrick Hogan, Minister for Agriculture. The college and experiment farm will be administered through the newly formed agricultural department of Dublin University. It consists of approximately 350 acres of land, of which 40 per cent. is under tillage. It was organized in 1926 for the purpose of demonstrating practical farming methods, carrying out research work and disseminating a knowledge of farm management, including the commercial aspect of Irish agriculture. The buildings have been remodeled recently to provide facilities for research. The central building provides residential accommodations for about fifty students and a house staff. It includes a large refectory, lecture halls, a library well stocked with the most up-to-date works and laboratories for agricultural chemistry. A new wing has been added to the main block to provide laboratories for plant pathology, agricultural bacteriology, botany and zoology.

ONE of the objects of the British Science Guild, founded twenty-three years ago by the late Sir Norman Lockyer, is to educate public opinion by spreading the knowledge of scientific achievements and the results of scientific contemplation. With the view of furthering this particular aim, there was recently instituted the Norman Lockyer Lecture, and the fourth of this annual series of these lectures was delivered in London by Professor J. Arthur Thomson, of the University of Aberdeen. The subject of the address was "The Cultural Value of Natural History." According to *Nature* seven contributions of natural history to human culture were reviewed by Professor Thomson. Power is added to our vision of the world —"the eye sees what it brings with it the power of seeing; and well-informed vision is richest and clearest." The esthetic sense is cultivated—"there is no risk of the cold light of science hurting the esthetic emotion, for the more we know of a beautiful thing the greater is our enjoyment." Interest is stimulated —"natural history gives us glimpses of a dramatic world." Big ideas, such as evolution and the interrelations of living things of world-wide significance, are its progeny. Its problems present infinite variety of mental discipline and resolute thinking; and the deep impressions made by even superficial contact with nature are of fundamental value in moulding outlook. Finally, there is guidance in human affairs to be found in a rational study of animate nature—"a society that dispenses with sifting is working its own doom"; "success attends the small families among animals well-equipped in body and mind"; "in bygone days we heard much about original sin, we need to hear more about original righteousness," and so on. This address has been printed by the British Science Guild and may be obtained from the offices, 6 John Street, Adelphi, W.C.2. The Guild requires financial support to enable it to carry on and extend its useful work for the public good, and an appeal is made for new members.

UNIVERSITY AND EDUCATIONAL NOTES

Nature reports that the new laboratory at the University of Sheffield for research on the cold-working of steel, opened on July 6, has been established in consequence of a gift from the Worshipful Company of Ironmongers of London, which made a grant of £800 a year for seven years to endow a fellowship and two scholarships in the cold-working of steel. To make this gift available, the firms connected with the cold-working industry have, through the Cutlers' Company of Hallamshire, presented the university with the necessary plant.

PROFESSOR R. D. CARMICHAEL has been appointed administrative head of the department of mathematics at the University of Illinois as successor to Professor E. J. Townsend, who was granted his own request to be allowed to retire on September 1 of the present year.

AT the University of Chicago, Dr. Samuel K. Allison, of the University of California, has been appointed associate professor of physics. Dr. I. S. Falk, hygiene and bacteriology; Dr. G. K. K. Link, botany, and Dr. Sewall Wright, zoology, have been promoted to full professorships.

DR. HAROLD ST. JOHN, associate professor of botany and curator of the herbarium at the State College of Washington, has been appointed professor of botany at the University of Hawaii and on the botanical staff of the B. P. Bishop Museum. Otis W. Barrett, agricultural director of the Insular Department of Agriculture and Labor of Porto Rico since 1923, has been appointed to the chair of horticulture.

AT the University of South Carolina, Dr. W. E. Hoy, Jr., has been appointed professor of biology and head of the department, and Dr. J. T. Penney associate professor of zoology.

PROFESSOR W. E. MILNE, of the University of Oregon, who has been on leave as professor of mathematics at Stanford University this year, will return

to the University of Oregon next fall. During his absence Dr. H. C. Hicks has served as assistant professor of mathematics at the University of Oregon. Dr. Hicks has recently been elected professor of mathematics and aeronautics at Texas Technological College.

R. A. ROBERTSON, reader in botany in the United College, St. Andrews, has been appointed to the newly established chair of botany in the University of St. Andrews, which places him at the head of the departments of botany in the United College, St. Andrews, and in University College, Dundee.

DISCUSSION

ATMOSPHERIC ELECTRICITY DURING SAND STORMS[1]

THE observations of Canfield[2] that sand storms cause atmospheric electrical disturbances and that during the storm an arc will pass between the points of an aerial wire and a ground wire may be explained as analogous to the "Dorn effect"[3] in liquid systems.

Colloid chemists have recently devoted considerable attention to methods for the study of the electrokinetic potential, *i.e.*, the absolute magnitude of the electrical charge on the surface of colloid particles. The methods usually employed are cataphoresis or electroendosmosis. Cataphoresis is the migration of a suspended particle through a liquid under an impressed electrical potential, the particle migrating toward the electrode having the opposite sign to the electrical charge on the particle. The rate of migration under a constant electrical potential is proportional to the magnitude of the electrokinetic potential on the surface of the particle, or

$$\zeta = \frac{4\pi V\eta}{E\varepsilon} \qquad (1)$$

where ζ = the electrokinetic potential; V = the velocity of migration; η = the viscosity of the medium; E = the applied E.M.F. per unit length between electrodes, and ε = the dielectric constant of the medium.

Electroendosmosis is similar to cataphoresis except that in this instance the material under investigation is a gel or a porous membrane. When the pores of such a membrane are filled with liquid and electrodes are inserted in the liquid on opposite sides of the membrane, a streaming of liquid takes place through the membrane toward the electrode having the same sign as the charge on the surface of the membrane. The rate of flow of liquid through the pores of the membrane under a constant electrical potential is proportional to the magnitude of the electrokinetic potential on the surfaces of the capillaries, or for a bundle of capillaries of cross-section q,

$$\zeta = \frac{4\pi v\eta l}{q H \varepsilon} \qquad (2)$$

where v = the volume of liquid transported in unit time and l = the length of the capillaries, the other quantities having the same values as in equation (1).

The streaming potential is the converse of electroendosmosis and has been studied by Freundlich,[4] Kruyt[5] and Briggs.[6] It must be obvious that if an electrical potential produces streaming through a membrane, then streaming a liquid through a membrane by hydrostatic pressure will set up an electrical potential difference between electrodes immersed in the liquid on the opposite sides of the membrane. This potential difference may be of considerable magnitude. Thus, Martin[7] has observed a potential difference in excess of 1.25 volts when nitrobenzene was streamed through a cellulose membrane under a hydrostatic pressure of approximately 19 cm of mercury.

The electrokinetic potential at the interface of such a system may be calculated by the formula,

$$\zeta = \frac{4\pi\eta\kappa_s H}{P\varepsilon} \qquad (3)$$

or

$$H = \frac{\zeta P \varepsilon}{4\pi\eta\kappa_s} \qquad (4)$$

where κ_s = the specific electrical conductivity of the liquid as it exists in the pores of the diaphragm; H = the E.M.F. developed between the electrodes, due to the streaming of the liquid, and P = the hydrostatic pressure under which the liquid flows through the diaphragm, the other quantities being as in equations (1) and (2).

The Dorn effect is the converse of cataphoresis, *i.e.*, if an electrical potential gradient will cause the movement of charged particles through a medium, then the movement of charged particles will set up an

[1] Published with the approval of the director as Paper No. 870, Journal Series, Minnesota Agricultural Experiment Station.

[2] R. H. Canfield, SCIENCE, 69: 474–475, 1929.

[3] E. Dorn, *Ann. Physik.*, 5: 20–44, 1878; 9: 513–552, 1880; 10: 46–76, 1880.

[4] Freundlich and Rona, *Sitzber., preuss. Akad. Wiss.*, 20: 397–402, 1920.

[5] H. R. Kruyt, *Koll. Z.*, 22: 81–98, 1918; 45: 307–319, 1928.

[6] D. R. Briggs, *J. Phys. Chem.*, 32: 641–675, 1646–1662, 1928; *J. Am. Chem. Soc.*, 50: 2358–2363, 1928.

[7] W. McK. Martin, unpublished data taken from Ph.D. thesis filed in Library of the University of Minnesota, June, 1929.