

Leguminous plants, whether first used as fodder for animals or simply left to decay in the soil, have their albumen changed in the first instance to amides, which under the influence of ammonia-ferments are decomposed with formation of ammonium-carbonate. The saltpetre bacillus then converts the ammonium-carbonate (and probably also amides) into saltpetre, *i.e.* into the best form of nitrogen plant-food.

Unfortunately the whole of the nitrate thus formed is never available for plants, on account of the destructive action of the nitrate-destroying bacilli, which decompose the nitrates with evolution of free nitrogen, and so complete the nitrogen cycle.

The nitrate destroyers are usually present in stable-manure, and cause a deplorable loss to agriculture, amounting in Germany to a sum of several million pounds annually.

Efforts which, as Prof. Maercker assured the German Chemical Society, are likely to meet with success at an early date, are being made to avoid this loss; and for this purpose special bacteriological investigations are now being conducted at many agricultural stations in Germany.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Dr. Langley, F.R.S., has been appointed Chairman of the Examiners for the Natural Sciences Tripos.

Mr. E. A. N. Arber, of Trinity, has been appointed Demonstrator in Palaeobotany.

Mr. W. F. Cooper, of Clare, has been nominated to the occupation of the University table in the Naples Zoological Station.

Mr. H. H. W. Pearson, of Gonville and Caius, and Mr. J. Barcroft, Fellow of King's, have been awarded the Walsingham medals for research in botany and in physiology, respectively.

The degree of Master of Surgery was on November 23 conferred on Mr. Timothy Holmes for his distinguished contributions to the art and science of surgery.

Sir Ernest Clarke has been re-appointed Gilbey Lecturer in Agricultural History and Economics for the ensuing year.

Prof. Woodhead, and Drs. Anningson, Collingridge, Notter, and Stevenson, have been appointed Examiners in State Medicine.

Dr. Somerville, Professor of Agriculture, has been elected a Fellow of King's College.

THE Lawrence Scientific School of Harvard University has received a gift of twenty thousand dollars to be used to equip the mining and metallurgical laboratories.

DR. PAUL STAECKEL, assistant professor of mathematics at Kiel, has been appointed professor ordinarius. Dr. J. Traube, privatdocent in physical chemistry at the Berlin Technical High School, has been appointed professor.

THE new leather industries buildings in connection with the Yorkshire College, Leeds, which have been erected by the Skippers' Company of London at a cost of 5000*l.*, were opened on Monday by the Master of the Guild, Mr. J. Colman. In addition to the gift of the buildings the Company has granted an endowment of 250*l.* a year for ten years, thus placing the instruction in the branches connected with the leather industry on a solid foundation.

THE Canadian *Educational Review* announces that Sir W. C. McDonald, of Montreal, whose magnificent gifts to McGill University have made him justly celebrated as a public benefactor to education in Canada, has placed in the hands of Prof. Robertson, Dominion Agricultural Commissioner, sufficient funds to establish for three years technical schools in various centres throughout the Dominion. The nature of the plan is to take one city or town in each province in which to establish regular classes in some of the ordinary schools on one or two days a week, in which scholars between nine and thirteen years of age shall spend a portion of the day in actual work with tools. This will be supplemented whenever desired by more advanced and special evening classes in manual training and technical instruction.

A COPY of the *Magnet*, the magazine of University College, Bristol, has been received. There are several noteworthy articles and items of information in the magazine, not the least

interesting being the editorial note on the appointment of Dr. Ryan, professor of engineering, to the principalship of the Woolwich Polytechnic. Dr. Ryan has been at the College for fourteen years, and has devoted his best energies to bringing the engineering department to its present satisfactory position. He would have done much more if the funds at his disposal had permitted him to develop the work of the department; but, unfortunately, the College possesses only a small endowment, and Bristol manufacturers are not so actively interested in the progress of their University College as are many commercial men in Liverpool, Birmingham, and other cities. Leaving this point, attention may be called to an article in the *Magnet* on life in a mediæval university, by Dr. Hastings Rashdall. The description of the ceremonies through which the freshman or bejannus of the middle ages had to pass before he could call himself a student of the university would suggest many comparisons to an ethnologist. It must be remarked that the periodical does not show the signs of active interest in scientific work which are given in the form of notes and articles in some other magazines of the same type.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, November 24.—Prof. G. Carey Foster, F.R.S., Vice-President, in the chair.—A paper on the conductivities of certain heterogeneous media for a steady flux having a potential was read by Dr. C. H. Lees. Two formulæ have already been proposed to express the conductivity of a mixture in terms of the conductivities of its constituents. In the first formula the conductivity is represented as the sum of a number of terms, each one of which is the product of the conductivity of any constituent and the fractional part of the mixture which is made up of that constituent. In the second formula the resistivity of a mixture is expressed in the same way with respect to the resistivities and percentages of its constituents. In general, the first of these suppositions gives results which are above the experimental values, while the second gives results which are below. If we suppose that the mixture is made up of a series of columns of the separate parts stretching normally between two equipotential surfaces, then the conductivity would be accurately represented by the first formula. If, however, we assume that the constituents are arranged in parallel layers, then the second formula would apply. In the present paper the author has attacked the problem two-dimensionally, and has investigated the relation which holds between the conductivities, when the constituents are arranged in the mixture alternately like the squares on a draughts board. Dealing first with two components it is easily shown that the problem reduces itself to finding the form of the equipotential curves and of the stream lines in a square which is divided by a diagonal into two parts of different material. By means of conformal representation Dr. Lees has referred the square under consideration to a kite-shaped quadrilateral with two opposite angles right angles, and the other two so determined by the conductivities of the constituents as to give straight equipotential lines in the two portions of the figure which represent the two materials and which are separated the one from the other by the axis of symmetry. The general relation which exists between the vector co-ordinates in the two systems has been proved by Love to consist of elliptic functions; but near the angular points of the figures a close approximation can be obtained by the use of a simple exponential expression. Taking the known solution to the problem in the case of the kite-shaped quadrilateral, it is easy to calculate the result for the square under consideration. This leads to the conclusion that the conductivity of the square is the geometric mean of the conductivities of the constituents. Allowing the medium to become fine-grained and introducing new materials, it follows at once that the logarithm of the conductivity of a mixture is equal to the sum of a number of terms, each one of which is the product of the logarithm of the conductivity of any constituent and the fractional part of the mixture which is made up of that constituent. By a superposition of fluxes, the author has shown that the above law holds for flows in four directions, and he therefore considers that with the assumed structure the formula represents the conductivity for any flux.—Dr. Lees then read a second paper on the thermal conductivities of mixtures and their constituents.