

THE first awards from the Benjamin Franklin Fund, which was established in 1759, are announced. The awards are as follows:

MAJOR AWARD.—P. W. Banning, of Los Angeles, on published work, "Mental and spiritual healing; all schools and methods; a text-book for physicians and metaphysicians." £2,500 scholarship.

AWARD.—C. P. Steinmetz, of Schenectady, privately published treatise, "The nervous system as a conductor of electrical energy." £1,000 and republication of treatise.

MINOR AWARD.—Fusakichi Omori, of Tokyo, unpublished treatise, "The rotary knife in surgery." £500 and publication of treatise.

Benjamin Franklin spent much time in England from 1757 to 1762 representing the American Colonies. While there he placed £100 in the hands of members of the Society of Friends as a trust, to be invested with accumulations, for not less than 150 years. Thereafter, at the discretion of the trustees, awards were to be made from time to time for the most valuable contributions to science considered by them, either manuscript or published, on the subject of cures, but particularly in relation to surgery, the nervous system, and the part "mind treating" has in the recovery and preservation of health.

A FUND is being collected for an endowment in honor of Angelo Mosso, emeritus professor of physiology at Turin, founder of the Monte Rosa laboratory for research on effect of altitude. The endowment is to benefit students and war orphans.

AN appeal was made last summer for funds to establish in London a Ross Institute for Tropical Diseases in commemoration of the twenty-fifth anniversary of Sir Ronald Ross's work on malaria. The executive committee has now the opportunity of acquiring suitable premises which, with the necessary alterations, would make a permanent memorial of the kind required. The cost will be £30,000. Contributions should be sent to the hon. treasurer, addressed to the Institute's temporary offices, 56, Queen Anne-street, London, W.1, or to the manager of the Westminster Bank, 1, Stratford-place, London, W.1.

As has been noted here *Discovery*, the English journal of popular science, has been revived through the support of a guarantor who prefers to remain anonymous, and the cooperation of an educational trust with which he is associated. Mr. R. J. V. Pulvertaft succeeds Mr. E. J. Liveing as editor.

A NEW journal devoted to the interests of teachers of chemistry has been founded by the Section of Chemical Education of the American Chemical Society. This journal is to be known as the *Journal of Chemical Education*, the first number of which has been mailed. It has been made possible by the coopera-

tion of members of this section under the active leadership of Neil E. Gordon, its secretary. Dr. Gordon, the editor-in-chief, will be assisted by the following departmental editors: H. C. Sherman, Columbia University, New York, N. Y. (*Undergraduate Chemistry*); William McPherson, Ohio State University, Columbus, Ohio (*Graduate Chemistry*); R. E. Rose, duPont de Nemours & Co., Wilmington, Del. (*Industrial Chemistry*); Wilhelm Segerblom, Phillips Exeter Academy, Exeter, N. H. (*High School Chemistry*). Contributing editors from about thirty states are aiding in the project.

### UNIVERSITY AND EDUCATIONAL NOTES

THE laboratory building on the campus of the California Institute of Technology at Pasadena has been completed and the apparatus is being installed. Four 250,000-volt transformers, with a capacity of 1,000 kw., are being set up. This million-volt laboratory, the first to be established in the West, was made possible through the cooperative effort of the Southern California Edison Company and the California Institute of Technology. The power company furnished the building and the school is furnishing the equipment. The research work will be carried on under the direction of Dr. Robert A. Millikan.

THE home minister of Japan has notified the Rockefeller Institute that they would prefer a hygiene and sanitation laboratory to be erected at a cost of 5,000,000 yen (\$2,500,000) following the offer of the Rockefeller Institute of New York to make a present of some scientific institution to that country. A committee of establishment of the Rockefeller Oriental Hygiene and Sanitation Laboratory will be formed on the arrival of the Rockefeller mission from the United States. On completion of the laboratory, St. Luke's Hospital will become affiliated with it and the government will be asked to bear the expenses of maintaining both institutions.

DR. F. B. KILMER, of New Brunswick, N. J., has established a research fellowship in pharmaceutical botany at the Philadelphia College of Pharmacy and Science.

PROFESSOR J. B. SHAW, department of ceramics, Alfred University, Alfred, N. Y., has resigned to become head of the new department of ceramic engineering established at the Pennsylvania State College, State College, Pa.

PROFESSOR W. A. HAMILTON, who resigned his position at Beloit College because of the manner of dismissal of one of his colleagues, has been appointed lecturer in mathematics at the University of Wisconsin for the coming year.

PROFESSOR P. J. DANIELL, of the Rice Institute, has been appointed to the Town Trust chair of mathematics at the University of Sheffield.

## DISCUSSION AND CORRESPONDENCE

### THE TERMS ANODE AND CATHODE

THERE is a common statement about these two terms which is to be found in most text-books and which is frequently retailed by lecturers upon electrical and electrochemical subjects to the effect that the word anode, derived from the Greek terms for "up" and "a way," indicates the way "up into the cell" and that the word cathode, coined similarly from "down" and "a way," denotes the way "down out of the cell." The responsibility for this terminology is put upon Faraday.

The truth is that such statements do the great physicist and chemist an injustice. In order to establish a conventional idea of electrolysis that would not commit him to any hypothesis, the overthrow of which would render obsolete a system of nomenclature dependent upon it, Faraday sought some natural and permanent standard to which he might refer the proposed system. He decided upon the earth whose magnetism he considered the result of electric currents passing around the sphere from east to west. Establishing this as the conventional direction of his electric current, the anode became the eastern and the cathode the western terminus of the path of the current; the anode, then, was towards the rising sun and the cathode towards the setting sun. The sun rises "up" and sets "down." This is the conception upon which Faraday based his new terminology.

Another common deviation from the intentions of Faraday is the use of the terms anode and cathode to designate the electrodes of a cell whereby each becomes either positive or negative according to the portion of the circuit that is under discussion. In its original sense the term electrode indicated simply that conductor of the first class which is in contact with the anode or the cathode, and these latter are defined as the surfaces which bound the electrolytic solution at the electrodes. This idea removes a source of ambiguity which has been very confusing to students. If we accept this, Faraday's explicit definition, then the cathode will always be the positive extremity of the electrolytic liquid and the electrode in contact with it will always be negative while the corresponding pole will always be the positive pole of the cell; the anode will ever be the negative extremity of the electrolytic fluid, its electrode will always be positive and the corresponding pole will be negative. A clear statement of these relationships should remove the source of much of the confusion which has enveloped the subject.

Faraday's statement is as follows:<sup>1</sup>

In place of the term pole, I propose using that of *Electrode* ( $\eta\lambda\epsilon\kappa\tau\rho\omicron\nu$  and  $\delta\delta\omicron\varsigma$  a way), and I mean thereby that substance, or rather surface, whether of air, water, metal, or any other body, which bounds the extent of the decomposing matter in the direction of the electric current.

663. The surfaces at which, according to common phraseology, the electric current enters and leaves a decomposing body, are the most important places of action, and require to be distinguished apart from the poles, with which they are mostly, and the electrodes, with which they are always, in contact. Wishing for a natural standard of electric direction to which I might refer these, expressive of their difference and at the same time free from all theory, I have thought it might be found in the earth. If the magnetism of the earth be due to electric currents passing around it, the latter must be in a constant direction, which, according to the present usage of speech, would be from east to west, or, which will strengthen this help to the memory, that in which the sun appears to move. If in any case of electro-decomposition we consider the decomposing body as placed so that the current passing through it shall be in the same direction, and parallel to that supposed to exist in the earth, then the surfaces at which the electricity is passing into and out of the substance would have an invariable reference, and exhibit constantly the same relations of powers. Upon this notion we purpose calling that towards the east the *anode* ( $\alpha\nu\omega$  upwards, and  $\delta\delta\omicron\varsigma$  a way; the way which the sun rises), and that towards the west the *cathode* ( $\kappa\alpha\tau\alpha$  downwards, and  $\delta\delta\omicron\varsigma$  a way; the way which the sun sets); and whatever changes may take place in our views of the nature of electricity and electrical action, as they must affect the *natural standard* referred to, in the same direction, and to an equal amount with any decomposing substances to which these terms may at any time be applied, there seems no reason to expect that they will lead to confusion, or tend in any way to support false views. The *anode* is therefore that surface at which the electric current, according to our present expression, enters: it is the negative extremity of the decomposing body; is where oxygen, chlorine, acids, etc., are evolved, and is against or opposite the positive electrode. The *cathode* is that surface at which the current leaves the decomposing body, and is its positive extremity; the combustible bodies, metals, alkalies and bases, are evolved there, and it is in contact with the negative electrode.

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### THE SYNCHRONOUS FLASHING OF FIREFLIES

SEVERAL years ago I published in *SCIENCE* a few brief letters on the synchronous flashing of fireflies which led to other observations and discussions on the subject. In the magazine *Asia* for February, 1924, is an article by Carveth Wells on his experiences in the

<sup>1</sup> "Experimental Researches in Electricity," 1, 196-7, 1839.