

### The Japanese Earthquake of September 1.

OWING perhaps to the destruction of printing presses in Tokyo, no printed reports on the earthquake seem to have reached Great Britain. The following details are given in a letter from Prof. S. Fujiwhara, of the Central Meteorological Observatory at Tokyo, to Sir Napier Shaw, who kindly lent the letter.

The area of destructive motion is about one degree square. The area swept by fire was about 12 square miles in Tokyo and 3 square miles in Yokohama. The number of houses burnt in Tokyo was about 320,000. As Prof. Fujiwhara remarks, it was probably the greatest fire that has ever occurred in the world. In all probability, there will never be another like it, for there now exists no great wooden city such as Tokyo was before the earthquake. Wooden houses suffered little from the actual earthquake, while brick buildings proved unusually dangerous. Iron-concrete buildings, however, resisted both earthquake and fire, and the Tokyo of the future will probably be a city of iron-concrete material.

It has been ascertained by actual soundings that the floor of Sagami Bay has sunk by from 70 to 100 fathoms, while the coast has risen by from 1 to 5 metres, the area in which these changes of elevation occurred being nearly the same as the area of destructive shock.

The first and greatest shock occurred at 11 h. 58 m. 44 s. A.M. During the daytime, the wind was from the S.W., and the observatory for the time was safe. But about 8 P.M. the wind shifted to the W. and then to the N.N.W., and at 11.55 P.M. the main building caught fire and burnt out in less than two hours. Most of the recording instruments had already been broken by the shock. "I think," says Prof. Fujiwhara, "it would be worth to report that our brave observers continued the hourly observations during the fire. No single observation was lost." The air temperature rose 5° to 6° C. above the value otherwise expected. At 11 P.M. the maximum wind velocity was about fifty miles an hour. The maximum temperature in the screen, about 40 metres from the main building, was 42.4° C. "From the data we can easily see that the furious wind, which blew from N.N.W. and so intense that nearly all important buildings in this vicinity were lost during this wind, was caused by the fire." It is satisfactory to be able to add that, though the losses in books and material are serious, the members of the observatory staff are all safe.

Since the above was written, the *Monthly Bulletin* for last September of the Imperial Marine Observatory at Kobe (Japan) has been received. It contains the times and other elements of 107 after-shocks of the great earthquake which occurred during that month. The most important of these after-shocks were recorded on September 1 at 5 h. 23 m. 28 s. (G.M.T.), September 2, at 2 h. 47 m. 44 s. (the greatest of all) and 9 h. 28 m. 0 s. C. D.

### Photoelectric Conductivity of Crystals.

IN the *Zeitschrift für Physik* of June 29, B. Gudden and R. Pohl describe additional work done by them on crystal conductivity. Crystals are divided into two groups: (1) those with optical dispersion pointing to considerable mobility of the electrons, and having, in the region of transparency, a refractive index greater than two; (2) those in which photoelectric action takes place only when impurities are present, which may exist as single

molecules or as colloidal particles; examples of this are blue or green fluor spar, quartz as yellow citrine or violet amethyst, rock salt. Group (1) is divided into two sub-groups: (a) the active absorption of light takes place only in the "ground" material (diamond, zinc blende, sulphur, selenium, etc.); in (b) it takes place partly in the ground material and partly in the impurities (alkaline earths and zinc sulphide with centres of phosphorescence).

In their previous papers the authors have shown the importance of the so-called primary current, due to the starting of a movement of the released electrons towards the anode, without any "inertia" effect, such as is caused at a later stage by the space charge produced by the almost stationary positive ions. With pure flawless crystals of group (1a) the mechanism appears to be as follows: the electrons travel quickly to the anode, possibly jumping from atom to atom. The positions of the positive charges change gradually in the electric field, under the action of thermal movements or of light of long wave-length, towards the cathode. The time required for the completion of this change is measured by hours in the case of diamond, and by seconds in the case of zinc blende. The double layers at the electrodes remain unchanged for several hours in the dark; but disappear when illuminated, owing to a photoelectric current in the reverse direction. Current passes into or out of the electrodes only after a certain density of the surface charge has been reached.

In group (1) impurities diminish the photoelectric effect and make it impossible to distinguish between primary and secondary current; the current diminishes with the time, increases slower than the incident light energy, and cannot be saturated by increased voltage; the "output" is less than the quantum equivalent, while the authors find these quantities are equal for group (1a); the additive law which holds for group (1a) does not do so for group (1b). In the case of a twin crystal the dividing surface interferes with the flow of the primary current.

In the second division of group (2) there is no positive space charge, no law of addition, and the number of electrons is less by several orders of magnitude than the quantum equivalent of the absorbed light energy. It is possible to imagine that an electron broken off from a particle starts to move towards the anode, but unites with another impurity particle after going a short distance, instead of reaching the anode as in group (1a). It may be that in pure crystals of group (2), electrons, if produced by X-rays, can travel to the anode. Experiments in this direction are in progress.

### University and Educational Intelligence.

BIRMINGHAM.—Dr. W. J. Hickinbottom has been appointed assistant lecturer in chemistry.

The Council has approved of the establishment of a Board of Mining Research.

The secretaryship will shortly become vacant, owing to the retirement of Mr. G. H. Morley, who was appointed in 1880. Applications for the post, accompanied by twelve copies of not more than three testimonials, must be received by the present secretary by, at latest, February 28. The person appointed will begin his duties on June 1.

CAMBRIDGE.—Mr. F. J. W. Roughton, Trinity College, has been elected University lecturer in biochemistry. The following grants have been made by the Special Board of Biology and Geology from

the Gordon Wigan Fund: to the Philosophical Society, 35*l.* for illustrations; to Dr. A. Harker, 30*l.* for a cabinet and slides of rock sections for teaching purposes; to Prof. R. C. Punnett, 50*l.* for plant breeding; to the Museum of Zoology, 50*l.* for a case; to Prof. J. S. Gardiner, 30*l.* for an incubator; and to Prof. A. C. Seward, 25*l.* for sections of fossil plants.

The professor of pathology is to be assigned to the Special Board for Biology and Geology instead of to the Special Board for Medicine.

Applications are invited for the John Lucas Walker studentship in pathology, which is of the annual value of 300*l.*, and tenable, under certain conditions, for three years. The applications, accompanied by copies of papers containing published work, testimonials and references, should be sent before May 1 to Prof. H. R. Dean, the Pathological Laboratory of the Medical School.

EDINBURGH.—Following quickly on the announcement last month of the offer of a gift of 50,000*l.* from the Rockefeller Trustees for the purpose of financing a clinical laboratory, are intimations of two bequests which were reported at the last meeting of the University Court: (1) A bequest by the late Mr. Thomas McKie, who died in 1909, of the residue of his estate, amounting to about 48,000*l.*, to develop and encourage scientific, medical, and surgical research, the teaching and study of the English language and literature, and the teaching and study of modern languages, particularly French, German, and Italian. (2) A bequest by the late Miss J. L. Small, daughter of Mr. John Small, a former librarian of the University, of 5000*l.*, one half of the income of which is to be applied in the purchase of books for the Library, and the remaining half for the general purposes of the Library.

LEEDS.—Mr. H. G. Evelyn White, lecturer in classics and classical archæology, has been invited to undertake for the season 1924-25 the field-direction of an archæological expedition in Egypt. The expedition is promoted by the University of Michigan and the Smithsonian Institution of Washington as part of a comprehensive programme for research in the Near East, and will carry out excavations on Græco-Roman sites in the Fayyûm and Middle Egypt.

LONDON.—Applications are invited for the Graham scholarship in pathology, value 300*l.* per annum and tenable in the first instance for two years. The scholarship was established to enable "a young man to continue his pathological researches and at the same time to secure his services to the School of Advanced Medical Studies connected with University College Hospital as a teacher under the direction of the professor of pathology." Candidates (who need not be connected with any medical school of the University of London) can obtain further information as to the scholarship from Prof. A. E. Boycott, University College Hospital Medical School, after having made an appointment. Applications for the scholarship, marked "Graham Scholarship," should be received by, at latest, the first post of March 3, by the Principal Officer, University of London, South Kensington, S.W.7.

A course of six free public lectures on "Practical Hydraulic Engineering Problems in connexion with Navigation" will be given at the Institution of Civil Engineers at 5 o'clock on February 25, 27 and 29 and March 17, 19 and 21, by Mr. O. C. A. Van Lidth de Jeude. The lectures will be in English.

MANCHESTER.—On Friday, February 1, a bust of Prof. H. B. Dixon was unveiled in the Chemical Theatre by Dr. H. G. Colman. The bust is the work of Mr. John Millard and has been fixed to the wall

of the theatre, which also carries the plaques of Sir Edward Frankland and Sir Henry Roscoe.

A large number of old students of Prof. Dixon have subscribed to a testimonial fund, the bulk of which is to be devoted to establishing bursaries for the assistance of students of chemistry in the University who need help in completing their courses.

THE "Colonial University," inaugurated at Antwerp on November 22 by the King of the Belgians, originated as the *École Coloniale Supérieure* in 1920. It comprises three faculties: political and administrative sciences, tropical medicine, and natural sciences. The first of these is based on the already existing courses of the *École Coloniale*; the school of tropical medicine, at Brussels, is to be moved to Antwerp to form the second; while the third will find its nucleus in the group of scientific workers attached to the *Musée de Tervueren*.

A SEYMOUR COMAN research fund for the purpose of bridging the gap between laboratory research in the fundamental sciences as applied to medicine, and clinical investigations, has been established in the University of Chicago, as the result of a bequest of Seymour Coman, of Chicago, who left the residue of his estate to the University. According to *Science*, the income will be used for the institution of three Seymour Coman research fellowships of 400*l.*-600*l.* a year each, one in the domain of chemistry applied to medicine, one in preventive medicine, and one in physiology. Candidates for these fellowships must have attained their doctorates.

THE annual distribution of prizes was held at the Sir John Cass Technical Institute on Wednesday, January 30, when the prizes and certificates were distributed by Sir William Bragg, the Director of the Royal Institution. The chairman of the governing body, the Rev. J. F. Marr, in giving a summary of the work of the Institute, stated that an outstanding characteristic of the past session had been the earnestness of the students and the regularity of their attendance. A total of 41 students had been successful at the examinations of the University of London, 5 of whom obtained the degree of M.Sc. by research carried out at the Institute. Twenty-two students had been engaged in research work during the session and 17 original investigations had been published, bringing the total number of papers issued from the Institute to 137. Following the distribution of the awards, Sir William Bragg delivered an address on "Research Work and its Applications." The address was devoted particularly to the nature and objects of research. Emphasis was laid on the new era of research work marked by munificent gifts such as those of Sir Alfred Yarrow to the Royal Society, of the Rockefeller Trustees to University College, and by the stimulus given by the Government Department of Scientific and Industrial Research. Research work brings out self-reliance, the faculty of selection and judgment of evidence, and develops a sound study of previous investigations. The valuable faculty of selection is one of the most important lessons to be learnt in connexion with research. A good research student may be likened to a fire which, on a match being put to it, burns without being touched again. Those who devote their time to research are always hoping to add something to human knowledge and to human interest. It is our duty and our gain always to explore, and the spirit of research therefore is something which we should try to foster and incorporate in the nation's life. Concluding, Sir William Bragg said that research is not a religion, but the act of one. It implies a certain faith in the beauty and the purpose of the universe; that whatever there is in the world is really meant for us to see if only we can see it.