accessible to pupils who have had no other opportunities of previous education than those which the free public schools afford.''

3. Admission. Inasmuch as the entrance examinations to Harvard College now admit freely boys from good high schools, the requirements for admission to the engineering school shall be the same as for admission to Harvard College. Admission to advanced standing and special study shall be administered by the engineering faculty.

4. Fees. The fees of students in the school shall be the same as for students in Harvard College, except that supplementary fees for additional or for laboratory courses may be charged.

5. Class rooms and laboratories. The work of the school shall be carried on in the class rooms and laboratories of the university, but arrangements may be made from time to time for the use of the facilities of other institutions for any part of the work (in its advanced technical courses) when the needs, financial resources and best interests of the school so require.

Arrangements for the use of facilities of other institutions, or the interchange of instruction, shall be made for a period of only one year at a time.

When there shall be income from the funds of the McKay endowment available, in the judgment of the president and fellows, for the construction of new buildings for the engineering school, containing offices, laboratories, workrooms and classrooms, such buildings are to be constructed on Harvard University grounds and bear the name of Gordon McKay.

6. Faculty. The faculty of the school shall consist of the president of the university and of those professors, associate professors, assistant professors and instructors appointed for more than one year, the greater part of whose work of instruction is done in the school, and of a limited number of other teachers of subjects offered in the school to be appointed in the usual way. The term of appointment of a teacher from any other institution who gives instruction in the school shall be for one year only; his title shall be lecturer, instructor or assistant.

The faculty shall, under the direction of the corporation, have control of all instruction given in the school wherever the instruction may be given.

7. Degrees. A student satisfactorily fulfilling the requirements of a prescribed four-year program in any of the engineering fields shall be awarded the degree of bachelor of science in that field.

The degree of master of science, or an equivalent degree, shall be awarded upon the successful completion of at least one additional year of study. For the doctor's degree the requirements shall be similar to those in the graduate school of arts and sciences.

8. Credit for instruction elsewhere. As in the case of every faculty the faculty of the engineering school may, in its discretion from time to time, allow credit towards the degree under its control for instruction received at another institution or by other instructors.

9. Courses in the school, or the services of its staff, may be made available to qualified students of other institutions.

10. This plan shall be submitted to the Supreme Judicial Court of Massachusetts, or a justice thereof, for approval.

The faculty of the school of engineering is as follows:

A. Lawrence Lowell, president; George F. Swain, Gordon McKay professor of civil engineering; George S. Raymer, assistant professor of mining; Arthur E. Kennelly, professor of electrical engineering; Henry L. Smyth, professor of mining and metallurgy, and director of the mining and metallurgical laboratories; Harry E. Clifford, Gordon McKay professor of electrical engineering; Lewis J. Johnson, professor of civil engineering; Albert Sauver, professor of metallurgy and metallography; George C. Whipple, Gordon McKay professor of sanitary engineering; Comfort A. Adams, Abbott and James Lawrence professor of electrical engineering; Frank A. Kennedy, associate professor of engineering drawing; Lionel S. Marks, professor of mechanical engineering; George W. Pierce, professor of physics and director of the Cruft Memorial Laboratory; Hector J. Hughes, professor of civil engineering and director of the engineering camp; Edward V. Huntington, associate professor of mathematics; Gregory P. Baxter, professor of chemistry; Lawrence J. Henderson, assistant professor of biological chemistry; Louis C. Graton, professor of economic geology; Arthur E. Norton, assistant professor of mechanical engineering; Harvey N. Davis, assistant professor of physics; Grinnell Jones, assistant professor of chemistry; Emory L. Chaffee, assistant professor of physics.

THE MEDALLISTS OF THE ROYAL SOCIETY

AT the anniversary meeting of the Royal Society on November 30, medals were pre-

sented by the president, Sir J. J. Thomson, as announced in last week's issue of SCIENCE. The characterization of the work of the medallists, as printed in *Nature,* was as follows:

The Copley Medal is awarded to Hendrik Antoon Lorentz, For. Mem. R. S. Lorentz is generally recognized as one of the most distinguished mathematical physicists of the present time. His researches have covered many fields of investigation, but his principal work deals with the theory of electrons and the constitution of matter considered as an electro-dynamic problem. When Zeeman had discovered the effect of magnets on spectroscopic lines, he perceived at once the theoretical bearing of the effect, which led to the discovery of the circular polarization of the components of the lines split up by magnetic force. Lorentz's name is also associated with that of Fitzgerald in the independent explanation of the Michelson-Morley effect, from which far-reaching consequences have been derived. An important optical relationship between the density of a medium and its index of refraction (independently by L. Lorentz) was published in 1878, and he has been an active and fruitful investigator ever since.

A Royal Medal is awarded to Professor Alfred Fowler. Professor Fowler's investigations have been, in the main, on spectroscopy, and one of his specialties has been the identification and reproduction of celestial spectra in the laboratory. His extraordinary success in identification of this kind is attributable in part no doubt to a special intuition, but also to a great and laboriously acquired knowledge of detail. For instance the origin of the bands dominating the spectra of stars of Secchi's third class remained a mystery for many years. Fowler showed that they were due to titanium oxide. He accounted for many of the band-lines in the sun-spot spectrum by showing that they belonged to "magnesium hydride," and several other instances of scarcely less importance might readily be given. Another important branch of his work is connected with spectrum series. The lines of many elements which appear in the arc spectrum have long been classified into series, and empirical relations have been obtained between the position of a line in the series and its frequency of oscillation. Those lines which are characteristic of the spark, and require higher stimulation, were not included in the scheme. Fowler was the first to show that the spark-lines form series at all. For this purpose he had first to work out experimentally the conditions for obtaining an adequate number of lines belonging to these series. Helium and magnesium were the elements chiefly studied. It was found that the spark-line series could be represented by formulæ similar to those which hold good for the arc lines, but with a fourfold value of the universal constant holding for the arc-line series of all the elements.

Apart from these investigations, leading to results so simple and definite, there is much descriptive work on spectra standing to the credit of Professor Fowler and his pupils, which is highly appreciated by specialists for its accuracy and technical value.

A Royal Medal is awarded to Professor Frederick Gowland Hopkins. Professor Hopkins was among the very earliest, if not actually the earliest, to recognize and announce that minute quantities of certain bodies, the nutritive value of which had hitherto been unsuspected, exert an enormous influence upon growth and upon normal adult nutrition. He showed that without these accessory factors—vitamines—a diet otherwise full and seemingly complete is incapable of allowing growth, and even of maintaining body-weight or life. He has also made important researches into what may be styled the determination of the specific nutritive values of individual main components of the protein molecule; he has, for example, shown that when, from a certain diet which was proved to maintain nutrition satisfactorily, the two amino-acids, arginine and histidine, were together removed, the diet, though amply sufficient in energy and fully assimilable, failed to maintain life. More recently Hopkins has attacked the question whether an animal's life can be maintained under the condition that, in place of protein or of the entire set of amino-acids constituting protein, a limited few of the several representative types of these constituents are provided in the diet. He shows that when, instead of the eighteen different amino-acids composing the protein, five only are administered, death rapidly ensues if those five be selected from the simpler aliphatic components, *e. g.,* lucine, valine, alanine, glycine and glutamic acid, but that, on the other hand, nutrition and life are satisfactorily maintained, at least for a considerable period, if the five amino-acids given be chosen from the more complex types, such as tyrosine, tryptophane, histidine, lysine and cystine, which experiment has shown to lie outside the range of the synthetic power of the animal body.

The Rumford Medal is awarded to Dr. A. Perot and Professor Charles Fabry. MM. Perot and Fabry have introduced a new method of measuring

wave-lengths by an ingenious method of utilizing the luminous rings formed by interference between two reflecting plates. Their researches have proved of fundamental importance: (1) In comparing accurately the wave-lengths of different spectroscopic lines with that of some standard line. (2) In comparing directly the wave-length of the standard line with that of the standard unit of length. This comparison has confirmed in a remarkable way the previous measurements of Michelson, whose method is less direct and more liable to certain errors. The independent confirmation thus obtained has therefore placed the subject on a much firmer basis.

The Davy Medal is awarded to Professor F. Stanley Kipping. Professor Kipping has worked with distinction during the past thirty years on a great variety of problems connected with organic chemistry, involving fatty acids, derivatives of hydrindone, camphoric acid and its halogen compounds, the π-derivatives of camphor, racemism and pseudo-racemism, derivatives of quinquevalent nitrogen, organic compounds of silicon, including derivatives having optical activity due to the asymmetry of the silicon atom.

The Darwin Medal is awarded to Dr. Henry Fairfield Osborn. Dr. Osborn's chief work has been in paleontology, and, in connection with it, he has organized many collecting expeditions to the early Tertiary rocks of the west. One of the results of his work is the more precise determination of the relative ages of the extinct mammals in North America, and that has led to a correlation between the order of succession of the Mammalia in Europe and in America. A good deal of this work was summarized in his book, "The Age of Mammals in Europe, Asia and North America," published in 1910. In 1900 Osborn had come to the conclusion that the common ancestors of Proboscidia, Eirenia and Hyracoidea would be found in Africa; and the correctness of this view has since been confirmed by Dr. Andrew's discoveries in the Egyptian Fayum. Amongst the more important of Osborn's contributions to our knowledge of extinct vertebrata are his memoirs on the rhinoceroses, the horses, the titanotheres and the dinosaurs. In addition to all the work he has done personally, Dr. Osborn has had a wide and most beneficial influence upon biological research in North America, and he has produced a flourishing school of younger vertebrate paleontologists.

The Hughes Medal is awarded to Mr. Irving Langmuir. Mr. Irving Langmuir is a distinguished worker in the physics and methods of production of high vacua. He has studied the vapor pressure of platinum and molybdenum by heating fine wires *in vacuo* and noting the loss of weight. He has investigated the speeds of chemical reaction of different gases on various metals at very low pressures. He has investigated also the dissociation of hydrogen and its apparent abnormal heat conductivity, and the dissociation of chlorine and oxygen; also the chemical activity of dissociated hydrogen. His work on the emission of electrons from hot metals in high vacua led to the evolution of the "kenotron" and "pliotron," and of the "half-watt" lamp. His determination of the melting-point of tungsten is generally accepted. Much of his work, such as the investigation of the cause of blackening of tungsten lamps, is of commercial as well as of academic scientific value.

SCIENTIFIC EVENTS

THE BRITISH MEDICAL RESEARCH COMMITTEE[1]

UNDER the regulations for the Medical Research Fund Major Waldorf Astor, M.P., Dr. A. K. Chalmers (M.O.H. Glasgow), and Dr. George Murray, professor of medicine in the University of Manchester, retired last August. Major Astor was reappointed Chairman, and Dr. Henry Head, F.R.S., physician to the London Hospital and to the Royal Air Force Central Hospital, and Dr. Noël Paton, F.R.S., regius professor of physiology in the University of Glasgow, were appointed members of the Committee. It now consists, in addition to Major Astor (Chairman), Viscount Goschen (Treasurer), and Sir Walter Fletcher, M.D., F.R.S. (Secretary), of Dr. Addison M.P., Mr. C. J. Bond, of Leicester, Professor William Bulloch, F.R.S., Professor F. G. Hopkins, F.R.S., of Cambridge, Colonel Sir William Leishman, K.C.M.G., F.R.S., Dr. Henry Head, and Professor Noël Paton. Reference is made elsewhere (p. 579) to some of the chief points in the annual report. We may note in addition the statement that the committee has acted jointly with various government departments or other bodies, either in appointment or in nomination, with a view to meeting particular administrative needs demanding research work. The committee has in fact a

[1] From the *British Medical Journal*.