Anniversary Meeting of the Royal Society.

THE anniversary meeting of the Royal Society was held on Nov. 30, and the presidential address delivered by Sir Ernest Rutherford. He referred to the loss by death during the past year of fourteen fellows of the Society and one fellow elected under Statute 12, which provides for the admission of persons who have rendered conspicuous service to science, or whose election would be of signal benefit to the Society. Mention was also made of the retirement of Sir David Prain and Sir James Jeans, treasurer and secretary respectively for the past ten years, during which period the number of pages annually in the *Proceedings* has grown from 700 to 3661, an increase in publication effort due mainly to the activity of Sir James Jeans. Sir Henry Lyons succeeds Sir David Prain as treasurer, and Lord Rayleigh becomes foreign secretary in succession to the former. Sir James Jeans is succeeded by Dr. F. E. Smith, well known for his work at the National Physical Laboratory on electrical standards, and until recently Director of the Scientific Research and Experiment Department at the Admiralty. He has recently been appointed Secretary to the Department of Scientific and Industrial Research, in connexion with which Sir Ernest remarked: "The Council feel that it is an advantage, rather than a disadvantage, that Dr. Smith should hold these two posts concurrently; for, although the main spheres of work of the two bodies are distinct, they have many interests in common in fostering the research activities of the nation".

The report of Council records a legacy, subject to a life interest, of £5000 free of duty, for general purposes, under the will of the late Prof. W. H. Perkin. A new research fellowship has been founded in accordance with the wishes of the late Mr. E. W. Smithson, who bequeathed to the Society a reversionary interest in the residue of his estate, now amounting to about £1200 a year. It has been decided to establish a fellowship at Cambridge for a period of four years in the first instance, and renewable annually up to a maximum of eight years in all, at an annual stipend of £800. The appointment is essentially for research, but permission will normally be given for the fellow to undertake a minimum of actual teaching in order to keep in touch with academic work. The award will usually be limited to British subjects.

Sir Ernest then discussed recent work in physics, referring in particular to the Raman effect and the constitution of hydrogen gas, and emphasising the close connexion between theory and experiment characteristic of modern progress; this appears elsewhere in this issue. The presentation of medals followed, and we print below extracts from the remarks made on the recipients' work.

Presentation of Medals.

COPLEY MEDAL, AWARDED TO PROF. MAX PLANCK.

In the first instance, Planck applied the concept of the quantum of action to derive a formula giving quantitatively the distribution of energy in the spectrum of a complete radiator at any temperature, and it was basing upon this that Einstein developed a formula for the atomic heats of solids as a function of the temperature, which laid the foundation for all progress that has been made on this subject in the last twenty years. The concept of quanta of action as applied by Bohr to atomic processes in 1913 has proved of fundamental importance in elucidating the meaning of the complicated spectral series, and it has given an insight into the constitution of the atoms and been able to account for their various properties from first principles. In its most recent developments, Heisenberg has shown that Planck's quanta of action are bound up with an essential indeterminacy of physical measurements, which has the most far-reaching metaphysical consequences. Though his name is not immediately associated with any of these theories, Planck has taken an important part in formulating, clarifying, and criticising these developments of his original idea. It is no exaggeration to say that the development of the idea of the quantum of action, first formulated by Planck nearly thirty years ago, has effected not only a veritable revolution in physics, but also profoundly changed our methods of thought and concepts of philosophy. Quite apart from his work on quanta, Planck's papers and books on other subjects are sufficient to place him in the front rank of physicists.

ROYAL MEDAL, AWARDED TO PROF. JOHN EDENSOR LITTLEWOOD.

The various problems which Prof. Littlewood has successfully attacked are characterised by their extreme difficulty. Into certain properties of primes, in which the Riemann zeta-function is employed, he has penetrated further than any other mathematician. Among the results he has obtained in this domain may be mentioned his proof that a conjectural expression given by Gauss for the number of primes less than a prescribed number is false, although its correctness is supported by all empirical evidence for numbers up to a thousand million. He has also obtained the best-known result giving the number of primes less than a prescribed number. In the general theory of series he has obtained various important results, the most celebrated of which is his Tauberian theorem for power-series. He has done much work on the general theory of functions, the earliest of which relates to integral functions of finite or zero order. His theorem that (roughly) a function of sufficiently low order has associated with it circles on which its minimum is of the same order as its maximum, has led the way to many developments by other mathematicians. Another striking piece of work is his extension to real sub-harmonic functions of the theorem due to Fatou, that an analytic function, bonded in the unit circle, tends to a limiting value almost everywhere on the unit circle. The importance and width of the results which have been published by the partnership of Prof. Hardy and Prof. Littlewood must also be referred to; among the subjects which they have treated are additive number theory, especially Waring and Goldbach problems, the theory of the zeta-function, Diophantine approximation, general theory of series, and Fourier's series.

ROYAL MEDAL, AWARDED TO PROF. ROBERT MUIR.

Prof. Muir is particularly distinguished for his pioneer work in the study of immunity reactions and mechanisms at a time when the foundations of the science of immunology were being laid, and the combining properties of normal and immune sera with antigen were being submitted to analysis by test-tube methods. Hæmolytic systems were chiefly studied and problems concerned with the specificity, constitution, and dissociation of immune bodies and with the combining properties of complements were attacked by accurate quantitative methods. These studies by Muir and his collaborators are of fundamental importance in the history of the development of the science. Muir's interests, however, have not

been confined to immunology. In the field of general and experimental pathology he has made important contributions to knowledge, and his researches on experimental anæmia produced by the injection of hæmolytic serum, and on the regenerative changes in the bone marrow in response to infection, are widely known.

DAVY MEDAL, AWARDED TO PROF. GILBERT NEWTON LEWIS.

Prof. Lewis, of the University of California, is justly regarded as one of the leaders of modern physical chemistry, mainly on account of his remarkable contributions to chemical thermodynamics. He has been responsible for the development of fresh and original methods in attacking the problem of chemical affinity. By the skilful utilisation of appropriate experimental measurements, Lewis and his collaborators have shown how the free energy of a great variety of elements and compounds can be ascertained, and how this quantity is related to the thermal and electro-chemical characteristics of chemical reactions in which these elements and compounds are involved. It is to Lewis that we owe the concepts of 'activity' and 'activity coefficient', and recent advances, more especially in our knowledge of the thermodynamic properties of solutions, are the direct outcome of the introduction and development of these ideas. Further, in the closely related field of electrode potentials, his work, both on the theoretical and practical sides, has been outstanding. Lewis has rendered great service to chemistry by his theoretical work on electron configuration, and the bearing of this on polarity, valency, and cognate matters. His conceptions in this field and his recognition of the fundamental importance of the electron duplet have greatly influenced the development of modern chemical theory.

HUGHES MEDAL, AWARDED TO PROF. HANS GEIGER.

Prof. Geiger, of the University of Tübingen, has made many important contributions to our knowledge of radioactivity. He was the first to examine in detail the scattering of α-particles by matter. His classical investigation, in collaboration with E. Marsden, on the large angle scattering of α-particles in their passage through matter, not only gave a definite experimental foundation to the nuclear theory of the atom, but also led to the suggestion that the properties of an atom are defined by its atomic or ordinal number—a suggestion strikingly verified by the investigations of Moseley. Among many notable researches in radioactivity, special reference may be made to his determination of the ranges of the α-particles from all the radioactive elements with the greatest possible precision. From these measurements we are enabled to deduce the velocity of expulsion of the α-particle from many radioactive bodies. He discovered with Nuttall a remarkable relation between the life of a radioactive element and the velocity of the α-particle ejected from it. This relation, known as the Geiger-Nuttall law, has an intimate bearing on the new theories of the constitution of atomic nuclei. With Sir Ernest Rutherford, Geiger devised an electric method of counting α-particles and determined the number of α-particles emitted by a gram of radium. Later Geiger devised a point detector of great sensibility, which could be used for counting both α-particles and β-particles. Within the last few years he has succeeded in making a new type of detector, by which the liberation of any electron throughout a comparatively large volume is detected. This beautiful device, which has been applied by Geiger himself and by others to the study of the penetrating radiation in the atmosphere, promises to provide a method of great power for extending our knowledge of this radiation.

Forestry in Kenya Colony.[1]

THE Annual Report of the Forest Department in Kenya Colony (to Dec. 31, 1928) directs attention to a fact which is well known in forestry economics, that any serious set-back to the country as a whole, whether due to climate, invasions of pests, disease or other troubles, will at once react on the forest sales and revenue. During the year here reviewed, the rains were everywhere much below the average, and a very serious infestation of locusts affected all parts of the country. The inevitable consequences followed, as stated in the report: "These two factors brought about a considerable restriction in trade and development of the Colony, which seriously affected the sales of timber and the partial drought greatly handicapped the Department's planting schemes". A check came to the continuous rise in revenue shown since 1926, as also in the rate of planting. This check is, however, regarded as purely temporary.

In the 1926 report the Conservator alluded to the fact that, owing to a paucity of staff, it was impossible to judge of the Colony's forest position as they had no data upon which to compare the annual cut with the existing stock of mature timber in the forests. The reviewer of that report in NATURE fully agreed with its author that such a position of affairs was "the most unsatisfactory aspect of the forestry position". In spite of the still existing difficulties due to an inadequate staff, the past two years have witnessed a decided effort to deal with the large amount of work connected with surveys of the forests and also, it is understood, with that important matter of stock mapping, however roughly, the growing stock of the reserves which are subject to fellings.

To the public outside Kenya, the most interesting factor connected with the forestry of the Colony is the well-known so-called pencil cedar (*Juniperus procera*), in which the report shows there was a large export, namely, 39,551 cub. ft., as compared with 13,548 cub. ft. in the previous year.

"The outlook of this trade", says the Conservator, "appears to be bright, provided only carefully selected, accurately sawn, and thoroughly seasoned slats are shipped and the price is moderate. A process has been developed in England for rapid treatment of the slats which appears to be most successful in seasoning and at the same time slightly softening the wood. The process appears to be a valuable one, which should help the trade considerably. Provided, however, the slats are carefully selected and thoroughly air seasoned, *i.e.* scientifically stacked under properly regulated conditions of air and moisture for, say, twelve months, the wood appears to be entirely suitable for pencil manufacture without artificial treatment.

"It is said that the preparatory treatment of cedar substitutes has made such improvement recently that these substitutes now compare very favourably in quality with cedar. It is not believed that these woods can ever be given quite the unique properties of cedar, but there is no doubt that cedar slats will have to be very carefully produced and at a comparatively low price if they are to compete successfully."

[1] Colony and Protectorate of Kenya. Forest Department Annual Report, 1928. Pp. 32. (Nairobi: Forest Department, 1929.)