

him five Japanese youths to be housed and started in educational courses akin to English ideas and outlook. Thereupon Williamson undertook the necessary supervision, and he discharged his responsibilities thoroughly. It is sufficient to mention the after careers of these students of English methods to show this. One, who became the Marquis Ito, framed, in course of time, his country's constitution; a second, afterwards Count Inouye, aroused and developed commerce; a third, Viscount Inouye, inaugurated the Japanese railway system; a fourth, Viscount Yamao, became the first Minister of Public Works, and initiated a scheme of technological training, assisted by workers drawn from British sources. In all this early planning Williamson had a share, through his disinterested activity. The first contingent of youths was followed by a party of sixteen from Tokyo, sent by the Prince of Satsuma, also placed under Williamson's watchful eye. Among these were Mori, Yoshima, and Sameshima. Finally, just over half a century ago (1880), we find Williamson engaged in a research with Sakurai, the Japanese chemist, and others of his nationality.

Imported Scientific Films and Museum Specimens

By the Finance Act of 1925, a customs duty of 33½ per cent was placed upon films imported into Great Britain. During the debate on the Finance Act of 1928, Capt. Ian Fraser, M.P., moved an amendment exempting from duty "cinematograph films . . . certified by the Royal Society of London for promoting Natural Knowledge to be solely an illustration of scientific investigation for exhibition before members of a recognised scientific body and imported only for the purpose of such exhibition free of charge". This amendment was accepted, and proved to be a small but much appreciated boon to scientific workers and others, who obviously benefit by the free international exchange of films recording their investigations. The new Import Duties Bill did not include such films in its list of imports exempt from duty, and Capt. Fraser put down an amendment the object of which was to retain the privilege. This amendment has now been taken over by the Chancellor of the Exchequer as an official amendment, and was incorporated in the Bill on report stage on Feb. 25. In a letter in the *Times* of Feb. 27, Sir Henry Wellcome refers to the position of material for exhibition in museums. A clause has been added to the Import Duties Bill exempting such material when it is more than a hundred years old, but this will not cover natural history, ethnographical, and other specimens required by research workers. The Museums Association, in a letter from its honorary secretary, Mr. D. W. Herdman, has endorsed Sir Henry Wellcome's statement, adding that its views have already been communicated to the Chancellor of the Exchequer. Museum material is clearly on the same footing as printed books, and we hope that it will be possible similarly to exempt it from import duty.

Prof. C. V. Boys's Apparatus at the Science Museum

PROF. C. V. BOYS has recently presented to the Science Museum, South Kensington, some very interest-

ing examples of his early experimental work. His use of quartz is shown in one case, where the bow which he employed in 1889 in the preparation of quartz fibres by the well-known 'bow-and-arrow' method is exhibited, together with examples of arrows used with it. Several of the fibres made by him in this way are exhibited, as well as the first quartz bulb ever blown. Soon after his successful production of quartz fibres, Prof. Boys utilised this material in an attempt to determine the constant of gravitation with a modified form of the Cavendish apparatus. He showed that increase of sensitivity could be accompanied by a considerable reduction in size, thus greatly reducing convection troubles. A small experimental apparatus made in 1889 served to demonstrate that consistent and accurate results could be obtained in this way, and as a result of the experience thus gained, a somewhat larger apparatus was made and used between 1889 and 1894 for the determination of the gravitational constant. Both instruments are now exhibited together, and form a permanent record of Boys's classical determination of this most important constant. In addition to the above, the following pieces of apparatus due to Prof. Boys are also on exhibition: the original experimental radio-micrometer, a portion of a new form of difference engine, and two electrometers, both dating from about 1891.

Scientific Research at the British Museum

By the establishment in April 1931 of the Research Laboratory at the British Museum as a permanent institution under the control of the Trustees, the experimental stage of the undertaking, which had been continued by the Treasury and the Department of Scientific and Industrial Research for no less than eleven years, was brought to a successful conclusion. In a paper read before the Royal Society of Arts on Feb. 24, the Director of Scientific Research, Dr. Alexander Scott, indicated the nature and variety of the work carried out in his laboratory and described some of the results which have been obtained. In discovering the best means of restoring and preserving museum objects, it is essential first to learn all that is possible regarding the previous history of each specimen; neglect of this essential has, in the past, led to many failures and has earned scientific men an evil reputation. The establishment of the research department on a permanent basis, however, is clear proof that the custodians of the nation's treasures have confidence in the methods which have been devised with so much care and applied with so much success.

Restoration and Preservation in Museums

DR. SCOTT referred to the disintegration of stone objects arising from the crystallisation of salts contained in the porous material, and to the extraction of the salts by means of wet paper pulp; salts are also removed from fragile brick tablets by first applying a celluloid coating, and then diffusing the salts into distilled water. Stains on old manuscripts can frequently be removed by the application of pyridine, and brown marks on water-colour pictures by the application of a solution of chloramine-*T*. The treatment of 'bronze

disease', a condition due to the presence of chlorine, by soaking in sodium sesquicarbonate solution followed by copious washing will often remove all the chlorine without attacking the patina, whilst in aggravated cases, soaking in citric acid solution or the use of an electrolytic process may be necessary. Fourteenth century glass from Wells Cathedral was found to be coated with material derived from the combined action of an impalpable powder arising from the limestone floor and sulphuric acid provided by the combustion of gas. Other problems the successful solutions of which were described by Dr. Scott included the corrosion of a silver chalice, the unrolling of a manuscript on fragile leather, and the cleaning of marble busts.

Chemical and Photochemical Reactivity

ON Dec. 17, 1931, the Chemical Society devoted an ordinary scientific meeting to a discussion on the critical increment of homogeneous reactions. It was immediately apparent that the material then presented and the observations then offered should be put on permanent record in an accessible form, and this has since been done by the publication of a separate pamphlet (1s. 6d.) bearing the imprint of the Society and following the form of its *Journal*. The discussion was opened by Mr. C. N. Hinshelwood, whose subject was the energy of activation of chemical reactions. The magnitude and nature of activation energy, catalytic phenomena, and the contributions of quantum mechanics to the problem were among the matters considered. Mr. E. J. Bowen followed with a paper on photochemistry and chemical reactivity, referring to photosensitisation, the phenomenon of 'predissociation' discovered by Henri, and the direct reaction of excited and normal molecules. Prof. A. J. Allmand's contribution dealt with the variation of quantum efficiency with wave-length in photochemical reactions; five different types of effect are distinguished, and their incidence in affecting the quantum yield was examined. Prof. E. K. Rideal discussed transition reactions, while Dr. F. G. Soper gave an account of researches on the effect of solvents on reaction velocity. Dr. T. Iredale communicated a short contribution dealing with the heat of activation of hydrogen iodide. In the spontaneous discussion which followed, Dr. R. G. W. Norrish, Mr. C. R. Bailey, Prof. Allmand, Mr. H. W. Thompson, and Mr. Hinshelwood took part. Their observations, together with the full text of the principal contributions, are to be found in the publication already mentioned.

Preservation of the Fauna of the Empire

IN a short address at the general meeting of the Society for the Preservation of the Fauna of the Empire, the chairman, Sir Peter Chalmers Mitchell, made a strong appeal for the consolidation of the position in regard to animal reserves within the Empire. At present the continued existence of faunal reserves depends upon the goodwill of individual governments or individual parliaments. The discovery of mineral deposits, the demand for timber, and other possible eventualities, may lead to particular

reserves being thrown open to traffic or trade, with disastrous effects to the animal population, which cannot be herded into new areas at the will of man. What is needed for the permanent protection of those faunas, which are rapidly becoming relict faunas, is the raising of the status of their native territory in certain cases from temporary reserves to permanent national parks. The Society, which since its foundation has worked so strenuously on behalf of the Empire's threatened animals, has often appealed, with reasoned arguments founded upon the reports of its own observers, to the Colonial Office, but so far without success. The alteration would involve no extra expenditure; ultimately, indeed, the national parks by proper administration would bring in a certain amount of revenue; the surplus earned by the Game Department of Kenya, under strictly regulated conditions, was £15,022 in 1930. At present their creation would cost nothing, and would mean permanent security for the animals and plants in the reserved regions.

WE strongly commend the campaign which the Society has launched for the spread of news relating to wild life. A short time ago we read in a northern newspaper an account of life in the forests of British Guiana; and the article was to be followed in the course of a few days by a lecture. It is excellent propaganda, the educational value of which must be appreciated by everyone interested in Nature and its preservation. The Society has in all 867 members; it deserves and ought to have many more. May we suggest that somewhere, say on the blank cover of the *Journal*, from the December number of which we have quoted, a note should appear of the conditions of membership and of the amount of the annual subscription.

Frequency Range of Broadcast Receivers

IN opening a discussion on the selectivity of broadcast receivers at the Institution of Electrical Engineers on Feb. 24, Prof. C. L. Fortescue said that as the apparatus tested becomes more and more sensitive, components of higher and higher frequencies are found in it. The female voice is known to have components having frequencies so high as 10,000, and footfalls, hand-clapping, and the operation of typewriters are observed to have components of frequencies approaching 16,000. In broadcast transmitters provision is not usually made for such a wide range, and nearly every receiver has a much more limited range. A lower frequency limit of 50 and an upper limit of 5000 are usually considered to give good results. In the production of talking films, the audio-frequency output is, perhaps, subjected to the most careful scrutiny. In this case there is a noticeable tendency to try to get a full response up to a frequency of 10,000.

THE problem of getting uniformity of response over the whole audible range is more difficult. A highly trained observer detects, at particular frequencies, increases or diminutions in the loudness which the ordinary person does not notice. 'Musical' people are sometimes even the least critical of all in this