Faraday and Marine Boilers.

FARADAY was probably the first man of science in Great Britain to be called upon to give advice on the working of marine boilers. There is little to show that his views affected marine engineering practice at the time, for his evidence was hidden away in a Government report which few engineers read, but it is not without interest to find that subsequent experience led to the adoption of methods the germs of which are to be found in what he said.

The circumstances in which Faraday came to be associated with the matter of marine boilers were as follow. In 1822 a Select Committee of the House of Commons was appointed to consider the question of steam navigation as relating to the communication between Great Britain and Ireland by steam. The committee, of which Sir Henry Parnell, Bt., was the chairman, became known as the Holyhead Roads Committee, and it sat when Telford was busy with the great Holyhead road and the suspension bridge over the Menai Straits. At the time the inquiry was held, ten years had elapsed since Bell's *Comet* had inaugurated regular steam navigation in Europe, and in Great Britain alone there were about 150 steam vessels afloat. Most of these were running on the rivers, but the eminent marine engineer, David Napier, had proved that steam vessels could be built for work in the open sea and had successfully established services between Dover and Calais, Holyhead and Dublin, and between Glasgow and Belfast. This success in turn led to the dispatch of mails to France by steam, and in 1821 the Post Office decided to have its own steam boats. That year, therefore, the *Dasher* and *Arrow* were built for running between Dover and Calais, and the *Royal Sovereign* and *Meteor*, somewhat larger vessels, for the Holyhead and Dublin route. As these were the first steam vessels owned by any Government department, they were regarded with great interest, and the committee of 1822 was mainly concerned with the construction, maintenance, and running of the *Royal Sovereign* and *Meteor* and other vessels which it might be decided to build.

The committee sat on various days between March 21 and June 1, 1822. Among the witnesses examined were officials of the Post Office, captains of steam vessels, and well-known engineers such as Joshua Field, Bryan Donkin, Timothy Bramah, James Brown, and others. These all gave valuable information as to the size and construction of the boats, the types of engines and boilers, the staffing of the engine rooms and such matters, but it was left to Faraday, who described himself as "chemical assistant at the Royal Institution to Mr. Brande", to enlighten the committee on the chemistry of steam raising. He had to tell the committee all about the composition of sea water, what salts it contained, what happened to the salts when the water was evaporated, what action the salts had upon iron and copper, what was the effect of incrustation, what could be done to prevent deposits forming, how fires in bunkers could be avoided, and so forth.

In 1822, and for many years afterwards, marine boilers were just great rectangular tanks with internal furnaces and flues of square or rectangular section, and they were invariably fed with sea water. The engines had jet condensers, not surface condensers, and there was no way of keeping the boiler water fresh even if the boilers were filled with shore water before starting on a voyage. As, however, the steam pressure was only about 2 lb. or 3 lb. per sq. in., by taking proper precautions the density of the boiler water could be kept down, and engineers who knew their work could keep their boilers remarkably clean. In other cases there was much incrustation, while corrosion was rampant. Iron boilers in some vessels only lasted two years, and so a good many engineers adopted copper for the material for boilers.

These facts were all known to Faraday, who had prepared a long memorandum for the committee, dated from the Royal Institution, May 7, 1822, and it was in this and in his evidence he made his many valuable suggestions. One of these was that engineers should be provided with hydrometers, another that the density of the water in the boiler could be kept down by a continuous system of brining, and a third that the action of acids could be neutralised by the use of lime, potash, or soda. If copper boilers were to be used, iron bolts and fastenings should not be used, while if there was fear of fire in bunkers it would be an easy matter to fit horizontal temperature tubes of iron through which thermometers could be passed. Many strange practices were in vogue among marine engineers in the early days. Dung, potatoes, and oatmeal were all put into boilers for stopping leaks, and other substances were used with the idea of preventing incrustation. It therefore occasions no surprise to find that Faraday was asked, "Would a dry holly or thorn bush introduced, if practicable, into the boiler take off a part of the crystallisation which would otherwise adhere to the bottom of the boiler?"

News and Views.

DEC. 12 was the thirtieth anniversary of Marchese Marconi's first successful attempt to transmit a radio signal across the Atlantic. In 1901 there were no valves, no amplifiers, no sensitive receivers, and no means of making continuous waves. All that was available for transmission was a system of damped waves produced by irregular spark discharges; the coherers then used for reception were very insensitive. In 1900 a station was erected at Poldhu in Cornwall and another at Cape Cod, Mass. In designing these stations, Marconi had the help of Sir Ambrose Fleming, R. N. Vyvyan, and W. S. Entwistle. When the

Poldhu station was nearly completed, a terrific gale wrecked the tall masts that had been erected. Although greatly discouraged, Marconi erected a much less ambitious aerial system. In November 1901 another gale destroyed the antenna system at the Cape Cod station. Marconi then determined to try aerials suspended by kites and balloons. As the letter 's' is easy to transmit, he arranged that a series of these signals should be emitted at a prearranged speed from the Poldhu station during certain hours of the day. After several unsuccessful trials, Marconi heard three faint clicks in the telephone at 12.30 P.M. on Dec. 12. They were also heard by his assistant. These signals led to the building of the high-power radio station at Glace Bay in 1902, and at the beginning of 1903 commercial radio communication across the Atlantic was established. Remembering that in those days physicists and mathematicians did not know of the existence of a conducting layer in the upper atmosphere, and that consequently most of them anticipated that no result would follow from these costly experiments—and did not hesitate to say so—it will be seen how much indebted we are to Marconi's pioneering work.

IN an article in the *Nineteenth Century* for December, on Erasmus Darwin, 1731–1802, the bicentenary of whose birth was referred to in NATURE of Dec. 5, Mr. H. Pearson refers to him as the greatest English doctor of his time. No one, perhaps, knew better than Darwin the futility of many of the notions prevalent, and much of his own success depended on his insight into human nature. His methods were often experimental and sometimes risky, but a man who never tried an experiment he declared to be a fool. His great originality of mind, his independence of character, and his versatility were shown in many ways, and he was every bit as interested in human progress and the sciences and arts as he was in the ailments of his patients. Wells and witches, canals and candlesticks, pumps and ploughs were only a few of the things on which he had ideas. He was certainly a pioneer in the use of electricity for medical purposes, and when Priestley discovered oxygen, he at once envisaged the submarine vessel which "Buoy'd with pure air shall endless tracks pursue". Then, too, as Dr. Krause said, he was the first who proposed and persistently carried out a well-rounded theory of evolution. Like some of the other members of the Lunar Society, which he founded, Darwin was a sympathiser with the French revolutionists and the American colonists. Mr. Pearson gives brief biographical notes on some of the most distinguished members of that small but influential society: Keir, Galton, Wedgwood, Watt, Priestley, and others, all of whom owed something to the free and stimulating conversation of Darwin. In person, as Mr. Pearson says, he was somewhat corpulent, his face was marked by smallpox, he was clumsy in his gait, careless in his dress, and stammered excessively. Like his famous contemporary Johnson, with whom he had some resemblances, he practised an unbounded benevolence.

THE Prince of Wales was the guest at the tercentenary dinner of the Clockmakers' Company, held on Dec. 9 in Merchant Taylors' Hall to commemorate the three-hundredth anniversary of the incorporation of the Company by charter. The Master, Sir Frank Dyson, Astronomer Royal, presided. The charter was granted on Aug. 22, 1631, when the Company was styled "The Master, Wardens, and Fellowship of the Art or Mystery of Clockmaking of the City of London". It was constituted a livery company in 1766. Though to-day the Company does not exercise the same control over the trade as of old, it serves its interests in many ways. Its library of works on horology and its collection of clocks and watches are deposited in the Library and Museum of the Corporation of the City of London in Guildhall, where they are open to inspection by visitors. David Ramsey was the first Master of the Company, while among his successors have been Edward East; the Fromantels, father and son; Thomas Tompion and George Graham, both of whom are buried in Westminster Abbey; John Harris, Daniel Quare, and Thomas Earnshaw. When proposing "The Clockmakers' Company", His Royal Highness said that he was proud that the clockmakers had selected him, as the first master of the Master Mariners' Company, to propose the toast. There is no doubt, he said, that we have always been first in the field as regards chronometers, or machines for finding longitude. Some of the members of the Master Mariners' Company would be able to say what splendid instruments English chronometers are, and he expressed the hope that the Clockmakers' Company will continue to flourish and maintain the high standards for which English skill and workmanship have so long been renowned.

THE Humber ports are the largest fishing centre in the world and it was intended from the first that the Department of Zoology in the University College of Hull should co-operate with the fishing industry. To this end, A. C. Hardy, who served as marine biologist on the *Discovery* Expedition of 1925–27, was appointed as the first professor of zoology and oceanography in the College. A scheme for fisheries research was drawn up by Prof. Hardy and additional accommodation has now been provided by the College. The interest of the fishing industry in this development was shown by Sir John Marsden, president of the British Trawlers' Federation, when he formally opened the new department on Dec. 8. Sir John commented on the fact that, in the past, the fishing industry paid little attention to scientific investigations, partly because the industry itself consisted of a number of individual units working independently. This has now been changed and the Federation over which he presides represents ninety-nine per cent of the steam trawlers of Britain. The Federation, he said, is ever vigilant of its members' interests, and, we may add, is fortunate in having as its leader one who appreciates the importance of scientific research. Sir John commended the good work already being undertaken by Prof. Hardy and his staff, and said that even closer co-operation between the College and trawler owners

would be to the lasting benefit of the fishing industry. The capital cost of the new laboratories has been borne by the College, but the greater part of the maintenance will be met by a Government grant, on the recommendation of the Development Commissioners. The work to be undertaken—in brief, the distribution of the plankton of the North Sea in relation to the movements of fish, particularly the herring—was described in an article which appeared in NATURE of June 13, page 911.

THE Fourth Pacific Science Congress met at Batavia - Bandoeng, Java, in 1929, with Dr. O. de Vries as general president, and five bulky volumes of proceedings—general part and reports on oceanography, physical papers (two vols.), biological papers, agricultural papers (The Hague: Martinus Nijhoff, 1930, 60 guilders)—have recently been published. The idea of conferences for the joint discussion of Pacific problems was first mooted at the meeting of the British Association in Australia in 1914, and came to fruition in the Congress in Honolulu in 1920. Eventually the Pacific Science Association was formed as a permanent organisation of the institutions and individuals engaged in research on the scientific problems of the Pacific region, and the Java conference in 1929 was the first to meet under its auspices. Discussions and papers were confined strictly to problems of Pacific interest, and agricultural science was included for the first time. The agricultural division, however, scarcely supplies any problem of circum-Pacific scope, the Pacific Ocean being in this respect rather a barrier than a link between the countries west and east of its waters, the range of climates extending from the arctic and antarctic to the tropical types, and agriculture, therefore, may find it more suitable in the future to organise along other lines.

A WIDE range of subjects was dealt with in the physical, biological, and agricultural sections of the Fourth Pacific Science Congress. The papers, numbering about 270, were mostly short but comprehensive, and touched on problems of fundamental and practical importance. Some twenty-six countries were represented, and the foreign members were given the opportunity of joining excursions to make first-hand acquaintance with the conditions and problems under discussion. The advantages of personal contact offered by the Congress were enhanced by the facts that a total eclipse of the sun occurred during May and the Third Congress of the International Society of Sugar Cane Technologists met during June, which brought together a number of other scientific workers, who found the Pacific Science Congress a suitable meeting-place to exchange views and results.

DR. M. MCCLINTOCK, of Harvard University, gave an interesting radio talk over the Columbia Broadcasting System on Oct. 30, on street traffic engineering. He pointed out that the safe and orderly movement of traffic over streets and highways is a great national problem in America. It is estimated that more than two million pounds are wasted annually in the United States because of the delays occurring from traffic congestion. Every year there are more than 32,000 fatalities and more than a million personal injuries owing to motor-car accidents. There is an urgent demand for the mitigation of this evil. Dr. McClintock thinks that one of the most promising remedies is to be found in properly designed motor vehicles. The modern motor-car has made great strides in this direction during the last ten years. We have now four-wheel brakes, splinter-proof glass, shock absorbers, more flexible power plants, stronger bodies, and better headlights. Statistics prove that the motor of to-day is four times safer than the motor of ten years ago, but it is not yet ideally designed to function in modern traffic. Great progress has been made in securing national uniformity in the rules of the road. In the installation of 'stop' and 'go' visual signals there is still much room for improvement. Many engineers assumed that they were a panacea for all traffic difficulties. The result is that they have been installed in many cities in places where nothing but added delay, increased risk, and irritation of the driver can result. When the problem has been properly studied and all the facts obtained by statistical researches taken beforehand, smooth running has resulted. The knowledge recently gained as to the best systems of automatic control leads to the belief that in the future there will be very few traffic policemen. It has to be remembered always that, no matter how perfect the scientific control of traffic may become, the most important element is still the human one.

IN a report just issued by Steatite and Porcelain Products, Ltd., of Stourport, Worcestershire, many experiments are described which prove the value of modern research methods in improving the devices used in industry. The report discusses the design of protective fittings for the long strings of insulators used in connexion with the National Grid in Great Britain. Many have wondered why large metal rings are put at the ends of these sets of insulators. Apparently the original idea was that they would level down the voltage stresses between the individual units and thus diminish the maximum electric stress on the set. In practice the insulators when clean and dry provide an insulation far in excess of the maximum permissible. It is found that when soiled and wet the stress distribution is automatically altered for the better, and so this detracts from the usefulness of rings for this purpose. They are, however, of great use in protecting the insulators from damage when a low frequency arc occurs, as it is kept at a distance from them. Well-designed insulators withstand transient flash-overs, but a prolonged arc will damage any insulator. The report shows photographs of arcs taking place at 400 kilovolts between arcing horns, and many cinematograph and oscillograph records of arcs and flash-overs between arcing horns protecting strain insulator sets under all kinds of atmospheric conditions. These prove conclusively that the double horn type of protector serves the purpose of keeping the arc away from the insulator set and also breaks the arc. When the insulator set is used horizontally, protectors for it are much easier to design. In this

case the arc is kept clear of the insulator by the convection currents of hot air. Horns in conjunction with an arcing ring were found very satisfactory. The arc started between the horns and the ring, and then rose and broke very quickly.

THE Smoke Abatement Handbook recently issued by the National Smoke Abatement Society gives a concise but comprehensive summary of information relating to smoke abatement. The numerous facts cited include data not only on the composition and deposition of soot, the production of smoke, its effect on health, vegetation, and buildings, but also on the various smokeless fuels, their production and sources of supply, together with a directory of associations, and a list of local authorities represented on the Council of the National Smoke Abatement Society. Estimates are given of the cost of smoke to various towns; for London this is given as £6,815,000; for Manchester, £2,900,000; for Birmingham, £2,350,000; for Liverpool, £2,308,000, and for Glasgow, £1,809,000. A useful summary of both the English and the Scottish law relating to smoke emission reveals the absence of any legislation concerned with the domestic smoke which is responsible for upwards of seventy-five per cent of atmospheric pollution. Other sections on industrial smoke abatement and the domestic smoke nuisance are included, in which the factors tending to produce smoke are analysed and methods of dealing with the domestic problem are outlined. The British Electrical Development Association contributes a note on "Electricity and Smoke Abatement", and a further section outlines the contribution of the gas industry. Gas coke is fully discussed, and reference is made to the new portable inset grate which facilitates its use in open fires. The measurement of atmospheric pollution is described, and also the measurement of the obstruction of light by atmospheric pollution. The booklet provides, in accessible form, information indispensable to all who may have occasion to speak or write on the subject.

THE requirements of artificial illumination for grading grain fall under three heads: (1) colour or composition of the light; (2) intensity of illumination; (3) diffuseness of the illumination. D. C. Rose (*Canadian Journal of Research*, vol. 5, p. 64; 1931) has tested various combinations of lighting units, and finds satisfactory working from two Ivanhoe Glassteel Diffuser fixtures of 500 watts each, with a 'Trutint' glass globe, and from certain arrangements of a Cooper Hewitt mercury vapour lamp, *M* Tube type, a Cooper Hewitt hot cathode neon lamp, and a General Electric Type *S*1 sun lamp. The colour of the light is, if anything, less important than its intensity and diffusion, provided it does not differ too greatly from that of noon sunlight, which is adopted as the standard white light, with a colour temperature of from 5000° K. to 5400° K. Certain precautions need to be observed by the inspectors using the lamps to ensure accuracy of grading, but if the instructions given are duly carried out, it becomes possible to grade wheat throughout the day and night during rush periods, instead of only during a few hours with ordinary daylight. Various methods of increasing the intensity of reflected light have been tried for grading wheat by physical means, but so far none has given results of any value. Chemical tests are too lengthy, and in any case the protein content of wheat does not seem to follow the grade in any regular manner. It would seem, therefore, that the only improvement in method that is possible at present is the use of artificial light for examination as indicated above.

DR. FREDERICK V. COVILLE, botanist of the United States Department of Agriculture, and chairman of the Research Committee of the National Geographic Society of America, has been awarded the George Robert White Gold Medal of Honor, the highest horticultural award in the United States, made by the Massachusetts Horticultural Society. Dr. Coville is known for a series of botanical discoveries and experiments. For example, his adaptation of the wild blueberry to the pine barrens of New Jersey has covered hitherto desolate areas with highly productive crops. Other studies he made, such as that of a method of restricting sheep grazing in national forests, have conserved vast tracts of valuable forage. Dr. Coville is joint author of "Standardised Plant Names", which gives authoritative names and spellings of 20,000 species and varieties of plants of the United States. While experimenting with the blueberry, Dr. Coville demonstrated the effect of cold in stimulating the growth of plants, and found that the wild crab, the cranberry bush, the tamarack, trailing arbutus, and the seeds of the bunchberry would not grow until chilled. He is acting director of the National Arboretum in Washington, for which the Government has already acquired 190 acres at Mt. Hamilton, and is negotiating for more. He is a former president of the Biological Society of Washington, the Botanical Society of America, and the Washington Academy of Sciences. Forty years ago he made the first botanical survey of Death Valley, publishing his findings, which ever since have been the standard work on the plant life of that region. He has also made several other botanical surveys. Other recipients of the George White medal have included Charles S. Sargent, for many years director of the Arnold Arboretum in Boston; George Forrest, of Edinburgh, who explored Tibet and western China to bring ornamental plants back to Europe; and Dr. Liberty Hyde Bailey, the well-known writer on horticulture, of Cornell.

THE extensive museum formed by Dr. William Hunter, court physician to Queen Charlotte, consort of George III., and bequeathed by him to the University of Glasgow, contains a number of specimens of insects. Particular interest and importance is attached to these, since many of them are the actual types of species founded by the great systematist, J. C. Fabricius. In order to make these Fabrician types more accessible to systematic entomologists throughout the world, it was deemed desirable that the specimens should be accurately figured and provided with up-to-date technical descriptions. This project has been rendered possible through the generosity of the Carnegie Trustees for the Universities of Scotland,

and the first instalment of the scheme has taken shape as a volume entitled "The Fabrician Types of Insects in the Hunterian Collection at Glasgow University. Coleoptera, Part I.", by Mr. Robert A. Staig, lecturer in zoology (entomology), University of Glasgow, and published by the Cambridge University Press, 1931, price 25*s*. net. This book is well illustrated by 28 three-colour process plates with appropriate letterpress. The Fabrician specimens, it may be added, are more than one hundred and fifty years old, but the great majority are still in a remarkably good state of preservation. The coloured plates and descriptions in Mr. Staig's book are based upon the actual specimens, without attempts being made to rectify defects, etc., due to age.

THE *Comptes rendus de l'Assemblée de Stockholm*, held on Aug. 15–23, 1930, for the Section of Terrestrial Magnetism and Electricity of the International Union for Geodesy and Geophysics, is a bulky volume of 479 pages. The major part of the volume consists of reports of national committees (170 pages) and communications from individuals and institutions (184 pages). Nineteen countries contribute national reports, including Germany, which was represented, by invitation, at the Assembly, though Germany does not at present adhere to the Union; among the countries not reported on are India, South Africa, New Zealand, and the South American republics; fortunately the absence of a report does not necessarily imply inactivity in this branch of science. Among the individual communications of special interest may be mentioned an account of Swedish methods of geo-electrical prospecting, and a discussion by H. W. Fisk, of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, of the secular magnetic variation in recent years. These are among the few contributions that exceed ten pages in length, the volume being in the main made up of very short reports and papers. The portrait of the late Dr. Chree, former president of the Section, forms the frontispiece.

PROF. P. LANGEVIN, of the Collège de France, Paris, who has been in China for some time on an international educational mission on behalf of the League of Nations, has accepted the joint invitation of the National Academy of Peiping, the National University of Peking, and the National Tsing-Hwa University in Peiping, China, to give a series of lectures to physicists and advanced students of physics there. The lectures were scheduled to start about the middle of December and will probably last for one month. The subject chosen by Prof. Langevin is "Les nouvelles dynamiques de relativité et des quanta et leurs applications à quelques problèmes de la théorie du magnétisme." It is hoped that the presence of Prof. Langevin, and his lectures, will serve as stimuli to the creation of an atmosphere and an active centre for research in physical science in that region. In Peiping there are six universities having physics as a department, besides one institution purely for research on that subject. Steps are also under way towards the formation of a physical society, with its aim and its organisation along the lines of those existing in other countries.

AN interesting glimpse of primitiveness in a civilised society is afforded by a cutting from the *Age*, sent to us by Prof. W. A. Osborne, of Melbourne University. The article describes the hearing of an appeal in the High Court by the Australian Pastoral Co., Ltd., against taxation imposed by the Commissioner of Land Tax. Evidence by the general manager of the company revealed the fact that the company suffered so much from the depredation of emus in the Maranoa district that at one period head money was paid for the destruction of the birds. The company used to pay 2*s*. each for grey heads (old birds), 1*s*. 6*d*. for black heads (young emus), and 1*s*. for each egg secured. They were obliged to discontinue the payments, not because of scarcity of emus, but because the company's employees would do nothing but look for emus. The interesting feature is that the standard rate of value of emus' heads during the period of proscription led to their becoming a sort of currency. Bets were made with the heads, and they were often brought into use in the making of purchases, so that they came to be looked upon as a common means of exchange.

SIR JAMES BARRETT writes from Melbourne in reference to our article "Nationalism and Science in China" (NATURE, Sept. 19, p. 469) confirming from his own knowledge and experience the extension of Chinese anti-foreign nationalism to scientific matters. "Personally", he says, "my contact with Chinese surgeons, both men and women, could not have been more pleasant, but one cannot shut one's eyes to the intensity of national feeling." He quotes, as an example, from remarks made by a Chinese surgeon at the recent Pan-Pacific Surgical Congress at Honolulu. While cordially agreeing with Sir James in certain remarks that he had made about science having no national boundaries, he deplored the fact that for three hundred and twenty to four hundred million Chinese there were only about five thousand properly qualified Chinese medical men, and went on to say that there were in effect three medical schools only in China—the Union College, Pekin, the South Manchurian Japanese Medical School, and the Hong-Kong British Medical School.

THE *Chemiker-Zeitung* for Nov. 25 directs attention to two new reagents called 'intrammon' and 'locron', which have been introduced by the I. G. Farbenindustrie Aktien-Gesellschaft for rendering wood and various textile materials fireproof. Intrammon is used for impregnating wood, and is said to be superior to other preparations of the kind, since it can be very uniformly distributed throughout the mass of the material when applied under pressure, instead of merely saturating the outer layers. This property is due to an important constituent which the manufacturers call an activator. Intrammon provides a safeguard not only against fire but also against dry-rot and mildew. Locron, on the other hand, is applied to the surface of the material, and is not brittle like preparations containing water-glass. Under the action of radiant heat, locron swells

into a voluminous, frothy crust, which acts as an insulating layer, thus protecting the underlying fibres from ignition. It can be applied to textile fibres by means of a spray.

How greatly the work of the Hawaiian Volcano Observatory is growing is shown by the appointment of two additional assistants during the last few months. In a recent *Volcano Letter* (No. 351, Sept. 17), Prof. T. A. Jaggar describes the organisation of the work at the observatory, and especially two lines of investigation on which the Volcano Association is now engaged. One is the study of the local tiltings of the ground in Hawaii in connexion with faults, earthquakes, etc., and the outlining of the boundaries of the various fault-blocks. The other is the determination of the surface-positions and depths of the foci of Hawaiian earthquakes from the duration of the preliminary tremors at three stations. The method adopted is one that has been in use for some years in Japan, but the labour of applying it is lessened by new and simple apparatus.

DR. H. R. LANG, acting secretary of the Institute of Physics, has been appointed secretary of the Institute and editor of the *Journal of Scientific Instruments*. Dr. Lang carried out research with the late Prof. H. L. Callendar, and was afterwards demonstrator in physics at the Imperial College of Science and research fellow of the Institution of Petroleum Technologists.

A SERIES of lectures on "Mycorrhiza", "Mycorrhiza in Relation to Forestry", and "Recent Researches on Tree Mycorrhiza" were given by Dr. M. C. Rayner at a number of American universities and research stations during the months of October and November. Lecture engagements at several of the Canadian universities and at various universities and research stations in the western United States were cancelled, with the intention of including them in a more extended tour during the autumn of next year.

IN connexion with the twenty-second annual Exhibition of Electrical, Optical, and other Physical Apparatus arranged by the Physical and Optical Societies to be held on Jan. 5–7 at the Imperial College of Science and Technology, South Kensington, discourses have been arranged for each evening at 8 P.M. On Jan. 5, Mr. C. C. Paterson will lecture on photocells; on Jan. 6, Mr. T. Smith will speak on photographic shutters; and on Jan. 7, the discourse will be given by Sir Oliver Lodge, on "Reminiscences".

DR. BURGESS BARNETT, who has been appointed by the Council of the Zoological Society of London to succeed the late Miss Joan Procter as Curator of Reptiles, is an old student of St. Bartholomew's Hospital. He qualified in medicine and surgery in 1915, and served as a captain in the R.A.M.C. during the War. On being demobilised, he returned to take up the post of house-physician at his old hospital, after which he was appointed medical officer to the Lobitos oil-fields in Peru. Since he has been in South America, he has collected and sent home several valuable collections of living reptiles to the Zoological Gardens. In this way he became acquainted with Miss Procter, and when on leave used frequently to help her in the treatment of difficult cases of reptilian disease. Dr. Barnett is still in Peru, and will not take up his appointment until May 1932.

WE commend to those whom it may concern, and they are many, the pamphlet on "Rats and Mice as Enemies of Mankind", by M. A. C. Hinton, issued by the British Museum (Natural History). Ten years have passed since the second edition appeared, and the third contains additional information and marks a progressive step in the national view of the rat plague, for it records the provisions of the Rats and Mice Destruction Act of 1919, which was passed while the former edition was in the press.

VOL. 2 of the *Veterinary Bulletin* will be issued monthly from Jan. 1, 1932, and will run to about 864 pages, including the index for each monthly issue and the final classified volume index. It will cover the same ground as vol. 1, but will be much more complete and will include references to all important British and foreign scientific work relating to veterinary research, administration, public health, and education. Although it was originally intended that the issues for 1932 and onwards should cover only 600 pages annually, expansion has been necessary in order to deal with the amount of material available. All communications should be addressed to the Imperial Bureau of Animal Health, Veterinary Laboratory, Ministry of Agriculture and Fisheries, Weybridge, Surrey, England.

MR. J. H. KNOWLES, 23a Beulah Hill, Upper Norwood, S.E.19, offers, in list No. 18, some two hundred second-hand books of botanical and zoological interest.

WE have received from Messrs. Bernard Quaritch, Ltd., 11 Grafton Street, W.1, a copy of catalogue No. 450, giving particulars of some 1150 second-hand works having reference to botany, agriculture, forestry, fruit-culture, gardens and gardening, herbals, early medicine and surgery, and tobacco. The catalogue is interesting and valuable in that it contains bibliographic notes on many of the volumes listed.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned:—An assistant at the Mining and Technical Institute and Junior Technical Day School (Boys), Bridgend—The Director of Education, County Hall, Cardiff (Dec. 22). An inspector of schools under the City of Liverpool Education Committee—The Director of Education, 14 Sir Thomas Street, Liverpool (Dec. 31). A director of education for the Urban District of Rhondda—The Clerk of the Council, Council Offices, Pentre, Rhondda (Jan. 1). A principal of the Thomason Civil Engineering College, Roorkee, India—The High Commissioner for India, General Department, India House, Aldwych, W.C.2 (Jan. 9).