values of the various derivative methods in emphasizing structural anomalies at different depths.

Prof. J. Goguel (France) described certain features of the geological interpretation of the gravity map of the Paris basin, and Prof. O. Vecchia (Italy) gave a detailed account of the regional structure of northern Italy deduced from gravity measurements. The results of magnetic investigations over the palæozoic massif of Serpont, in Belgium, were described by C. Gaibar-Puertas (Spain) and E. Hoge (Belgium). The applications of conformal representation in the interpretation of the results of telluric current surveys were considered in a detailed communication by G. Kunetz and J. C. de Gery (France). The final paper at the meeting dealt with the application of geophysics in the search for further supplies of drinking-water in Western Germany, and it is interesting to learn that considerable success has attended the application of geoelectrical measurements in quite a number of the hydrological problems which are involved. D. T. GERMAIN-JONES

[1] *Nature*, **170**, 230 (1952).

SCIENCE MASTERS' ASSOCIATION

ANNUAL MEETING

THE annual meeting of the Science Masters' Association was held in the Chemical Department of the Royal College of Science, London, S.W.7, during December 30, 1952–January 2, 1953. The general theme of the meeting was "Science in the Service of the Community", and, with the co-operation of the heads of the science departments of the Imperial College of Science and Technology, the Science Museum, the Metropolitan Police Forensic Laboratory, the scientific departments of the London County Council and members of the Association, the widespread use of science in the modern world was adequately and realistically displayed.

In his presidential address, Sir Graham Savage, until recently the education officer to the London County Council and previously for many years chief staff inspector to the Board of Education, made a survey of the teaching of science during the past hundred years. He illustrated his talk by quotations from many sources not usually met with in the normal educational circles, and concluded by looking forward to a possible expansion of scientific teaching, expressing the hope that greater freedom would be granted to the qualified teacher to enable him to make the most of the material at his disposal or of that which he might be allowed to acquire.

Mr. L. C. Nickolls, director of the Metropolitan Police Forensic Laboratory at New Scotland Yard, London, in a lecture enlivened by many touches of humour, described the application of scientific methods dealt with by his Department. Illustrating his lecture by examples taken from his own wide experience, he emphasized the necessity for wisdom or common sense, as well as for highly skilled technical knowledge, in the solution of practical problems. He appealed to science masters to try to instil into their students the need for wisdom. At present, he said, too many highly skilled workers are becoming technicians, and too few are becoming scientists. Forensic science demands the use of a little science but a lot of common sense as, for example, when a member of his staff identified by means of detailed analysis two specimens of paint as containing the same metallic elements and declared them identical, while omitting to observe that one was green and the other brown. Mr. Nickolls described the work of his Department as falling under four headings: to tell whether a crime has actually been committed; to say who did it; to supply corroborating evidence; and to increase the weight of the evidence when the cases are presented before the courts. These points were most adequately illustrated by photographs of activities which had been brought to the notice of the Laboratory.

The heads of the Departments of Botany, Physics and Organic Chemistry of the Imperial College of Science and Technology—Prof. W. Brown, Prof. S. Devons and Prof. R. P. Linstead, respectively—described work done recently in their Departments. Prof. Brown, in dealing with the problem of plant diseases, said that it would be possible only to skate lightly over the field of study of pathology in plants. His aim, therefore, would be to give the main lines along which one proceeds to deal with the problem. As contrasted with veterinary, and especially medical, work, the methods of plant pathology have to deal almost entirely with populations and not with individuals. Inasmuch as a plant disease almost invariably damages the plant so that it rarely recovers, the plant pathologist is more concerned to ward off disease than to deal with it once it is fully established: the adage, 'prevention is better than cure', appeals to him with particularly strong force. The lines of defence include such things as improved cultural practice, protective fungicides and bactericides, breeding of resistant types of plants and the control of the spread of infective material. In connexion with the last-named, there exists considerable legislative repercussions for the unwary. Prof. Brown's lecture was illustrated by museum specimens, cultures of pathogenic organisms and with lantern slides. Prof. Devons dealt with the electromagnetic radiation from the nuclei, discussing the factors involved and the methods used in investigating the phenomenon. Prof. R. P. Linstead discussed the oxidation-reduction systems and, in particular, the hydrogen transfer from donor to acceptor molecules, giving as the most remarkable those changes which take place in the living cell. The mechanism of some transfers of hydrogen and the energy changes involved were discussed.

Mr. F. A. Meier, of the University of London Institute of Education, gave one of his customary lecture demonstrations, this time on a theoretical and experimental approach in the teaching of the M.K.S. systems of electrical units. Mr. Meier can always be relied upon to attract and hold the attention of a large audience of physicists, and this year was no exception to the rule.

New semi-micro experiments and their application to qualitative analysis were described by Mr. H. Holness, of the South West Essex Technical College. This was followed by a visit to the College, where students demonstrated the new techniques and apparatus, and where members were given an opportunity of using some semi-micro apparatus for themselves. Dr. F. Sherwood Taylor, director of the Science Museum, South Kensington, outlined the work there, both in a lecture and by a tour of the Museum. He described his efforts to increase the co-operation between the schools and the Museum, and to display to the general and to the specialized

and informed public alike how scientific achievements have and can impinge upon the life of mankind. Dr. Sherwood Taylor also indicated that were there a suitable demand he would be prepared to consider following the lead of the National Gallery and organize exhibitions of museum material outside London.

Dr. T. P. Colclough, of the British Iron and Steel Federation, showed how increased efficiency in the manufacture of steel depends upon the skilful use of the scientific worker, and that the industry, with its equipment costing millions of pounds, can only function successfully if science is applied at every stage and in every process; there is therefore a need and an opening for more, and for more highly trained, scientists.

The Departments of the Medical Officer of Health and of the County Engineer of the London County Council provided lecturers and demonstrations of the direct application of science in modern life. An informative lecture upon the drainage of London from the earliest times to the present day, with a discussion of the many problems involved, showed how life in a congested city can be maintained and also the risks to which those who are involved in the sewerage system are exposed. A colour film of this work was shown in the County Hall, London, after which the laboratories of the Chemist-in-Chief were inspected. In these laboratories more than twenty-five thousand samples are investigated annually, including samples of air from the London tunnels, water from the rivers, from the wells in the Council's institutions, from swimming pools and baths, paints and building materials, laundry materials and fabrics with their resistance to washing, and the control of all stages of sewage treatment. Time permitted only a brief inspection of the extensive display set out by the twenty-six graduate chemists and their twenty-eight assistants.

However, the most spectacular lecture of the meeting was undoubtedly that given by Dr. C. W. W. Read, director of education for West Sussex and chairman of the West Sussex Beekeepers Association, who showed how a method has been devised for inseminating instrumentally the virgin queen honey-bee while still in captivity. Hitherto mating has been done on the wing and therefore beyond human control. A special micro technique is involved, and this was demonstrated both by means of the apparatus and by a coloured film of all the processes involved. By suitable sized screens in the hives, the queen bees and the males can be separated from the 'workers'. The drones can then be marked for identification purposes, so that the males used may be those carrying known breeding characteristics. The virgin queen honey-bee and the drones are anæsthetized in carbon dioxide under suitable conditions, the semen collected from the males and, by the use of micro seekers and a micro pipette, 5 cu.mm. of semen is injected into the virgin queen bee. In this way complete control is exercised, and any type or strain can be bred. As five generations a year can be obtained, the purity of the strains produced can be recognized in a short time. The film which illustrated the lecture deserved all those adjectives that are often reserved for the commercial cinema.

As usual, one of the most useful features of the meeting was the display of apparatus and teaching devices made by the members, which extended from cotton reels and their uses in physics to "Nuclear Disintegration by Cosmic Rays". The programme for each afternoon consisted of visits to laboratories, institutions and works, all of which had a high scientific value. A reception was held in the County Hall, London, on the evening of January 1.

Nearly nine hundred signed the register of attendance, every part of the British Isles and many countries overseas being represented.

INDUSTRIAL CHEMICAL EQUIPMENT IN THE UNITED STATES

IT is an accepted fact that during the present century the chemical industry has developed at a far greater rate in the United States than it has in Europe. At the beginning of the First World War, Europe was the main centre for the production of chemicals, and the output in the United States was comparatively small; at present it is estimated that two-thirds of the world's supply of synthetic organic chemicals originates in the United States. It is to be noted, however, that Europe still excels in the making of original scientific discoveries; it is in the rapid development of these discoveries to industrial processes that the United States appear to show such marked superiority. Typical examples are detergents, penicillin, streptomycin, many plastics, silicones and chemicals made from petroleum, all of which could be bought in the United States before being made on the eastern side of the Atlantic. The main reason for this is usually ascribed to the very large number of chemical engineers available in the United States for development work, and the very small number trained elsewhere, the ratio being of the order 20 to 1 so far as Great Britain is concerned. During the past few years numerous reports and discussions have emphasized this state of affairs, and many recommendations have been made for training chemical engineers in much larger numbers.

The latest approach to the subject is wider in scope and is a report* entitled "Chemical Apparatus in the U.S.A." made to the Office of European Economic Co-operation by a group of experts who visited a number of American firms. The title is not a happy one, as it fails to convey the expressed object of the mission, which was to investigate so far as possible the reasons for the great development of the American chemical industry. It is obvious that such a task would be beyond the powers of any small body of men in a reasonable time, and consequently the mission has been forced merely to mention some of the causes of development and, after contact with some twenty manufacturing firms, to write more detailed accounts of a few selected operations. The result is bound to be unbalanced, but it is, none the less, very readable. Another difficulty with which the mission had to contend was the use of the term 'Europe' as the antithesis of 'United States'. Europe is still far from being one country, especially where chemical engineering is concerned, so that to state that a process or machine is not commonly used in Europe may be quite accurate where some of the component countries are concerned, but incorrect in other cases. This is particularly noticeable in the

* Chemical Apparatus in the U.S.A. Technical Assistance Mission No. 23. Report by a Group of European Experts. Pp. 224. (Paris: O.E.E.C.; London: H.M.S.O., 1952.) 20*s.* net.