

GEOPHYSICAL PROSPECTING

THE European Association of Exploration Geophysicists held its third meeting at the Stadthalle, Hanover, during December 3-5. More than a hundred and fifty members and guests from various countries in Europe and the United States attended. At the business meeting held on the first day, the final arrangements for the publication of the Association's journal were announced and approved. The journal will be entitled *Geophysical Prospecting* and will be published quarterly, the first issue appearing, probably, in March. Twenty papers were presented at the technical sessions. They comprised ten on seismic, seven on gravity, one on magnetic and two on electric problems of prospecting.

Few people outside Germany are aware of the remarkable progress which has been made by geophysical firms in that country in the application of seismic methods underground in mines. The location of faults, metalliferous veins, and the accurate mapping of sinuous or faulted veins are problems on which considerable successful work is being done, and one of the papers presented at the meeting, by H. Linsser (Germany), described the interpretation of the seismic sub-surface records by a statistical method designed to improve accuracy. An interesting description was given by H. von Helms and H. W. Maas (Germany) of recent marine seismic observations undertaken in the Baltic Sea. By means of these observations, perhaps the first of their kind to be made off a European coast, it became possible to fill in the gaps of a seismic section observed on land between Flensburg and Kiel.

The existence of multiple reflexions sometimes causes difficulties in the interpretation of seismic reflexion records. It has been the general tendency for these multiples, when they exist, to occur in areas which, structurally, have been little disturbed, but a paper submitted by H. Richard (France) demonstrated the existence of multiples in certain areas marked by steep dips and faulting. A particularly interesting case was the simultaneous recording of multiple reflexions from horizontal beds within a graben, and other oblique multiple reflexions from the steeply inclined beds at the boundaries of the graben. In describing the possible paths traversed by the reflexions, the author made some startling suggestions and introduced conceptions which were novel. The succession of seismograms obtained along a section across the graben, when placed in sequence below each other, furnished an unusual picture of the shape of the geological structure, the vertical lines of reflexions in the early parts of the seismogram depicting the horizontal beds within the graben and the later oblique lines of reflexions, forming overall the shape of a V, depicting the two inclined boundaries of the graben.

The subject of wave-energy return by diffraction from faulted beds, already discussed at a previous meeting in London¹, was again raised through a paper presented by R. Koehler (Germany). A practical example was described which suggested that 'reflexions' caused by diffraction can almost certainly be detected if they arise from shallow beds in a faulted area with wide fracture zone; but the effect from deeper beds is negligible. Two papers, from J. Schoeffler (France) and H. J. Dürbaum (Germany), dealt with the frequently considered problem of

improving seismic interpretation by taking into account the departure of the actual ray-paths from the normally assumed straight-line paths.

The Department of Geophysics of the Amt für Bodenforschung, with the co-operation of the oil companies concerned, is engaged in a compilation of the data furnished by well velocity-surveys carried out in north-west Germany, on the lines of a similar compilation undertaken in the United States which has been of considerable value to American geophysicists. The results of this German work to date, based on seventy-four well velocity-surveys carried out during a period of eighteen years, were described. The data covered depths down to nearly six thousand feet, and interesting comparisons were made with the corresponding data from the United States.

A useful electronic device for overcoming the effects of static on seismic shot signals was described in a paper submitted by A. T. Dennison and F. A. Roberts (Great Britain). Pronounced static can cause serious delays in seismic long-range refraction surveys, and a device such as this should prove invaluable in these circumstances.

The seismic session of the meeting was rounded off with two interesting papers describing methods of ascertaining the velocity of sound waves in rock samples. In a demonstration of the first method, by H. Baule (Germany), supersonic pulses were transmitted through a cylindrical core of the rock specimen by a magnetostrictive driver attached to one end. The pulses were received at any chosen distance along the core by a small crystal pick-up resting on the specimen. The transmitted pulse and the wave form of the received disturbance were displayed stationary on a cathode-ray tube, together with a time scale furnished by a quartz clock, and the travel-time could thus be measured. Observations made at different distances enabled a time-curve to be drawn from which the velocity could be accurately determined. The second method, described by E. Müller (Germany), has the advantage that only quite small specimens of the rock are required. The sample is prepared by making a single cut, so as to produce a plane face, and then it is dipped in a fluid of known sound velocity. On the plane face of the sample a minute explosion is produced by an electric spark, and the two wave-fronts produced in the fluid by the longitudinal and transverse waves propagated through the specimen are photographed by the schlieren method. The angles between each wave-front and the plane surface of the specimen are measured, and the velocities and elastic constants thereby determined.

The session on gravity prospecting opened with a paper by B. J. Hofman (Holland) describing developments in marine gravity surveying. Experience has shown that remote-control underwater instruments have many advantages, and operational costs using such instruments are lower than with other systems utilizing land instruments on tripods or in diving bells.

The uses of the first, second and even higher derivatives of gravity in the interpretation of field observations were considered in papers by V. Baranov (France), O. Rosenbach (co-authors R. Koehler and E. Wirth) and B. Kosbahn (Germany). A particularly interesting contribution by S. Saxov (Denmark) shed considerable light on the relative

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 palaeozoic 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