terminals should be connected by convenient underground lines; all goods depots should be removed to carefully selected centres served by roads restricted to commercial vehicles at certain times; horse-drawn traffic should be banned from heavily used roads; hours of work should be staggered; above all, a prompt start should be made on the vast amount of investigation and design which was needed.

Mr. E. Colston Shepherd, secretary-general of the Air League of the British Empire, presented a paper on air transport which, in his absence, was read by Wing-Commander T. R. Cave-Browne-Cave. He discussed the trend of the load passing through Heathrow and Northolt, and the expectation concerning European services alone was that there would be a traffic between them, taken together, and London of 6,000 persons per day in 1948 rising to 8,000 per day in 1951. Discounting helicopters as offering no immediate substantial relief, the choice of transport to and from the airports lay between roads and railways. As there was little evidence that the western approaches to London would be rapidly improved, the balance was in favour of railway transport, and, further, adjustment to underground facilities leading to Earl's Court appeared to be relatively more simple than adjustment of main-line tracks. This conclusion led Mr. Shepherd to advocate that the Government should reconsider a decision to reserve for trade exhibitions the buildings at Earl's Court, which were considered to be admirably suited for a central terminus for air traffic.

In a paper on sub-surface works, Mr. H. F. Cronin, chief engineer of the Metropolitan Water Board, described the congestion of existing underground services for supplying water, gas, electricity, telephones, and so on, all of which must be taken into account not only by those who would solve overhead congestion by going underground, but also by any who planned diversion of existing streets or the sinking or raising of their level. Removal of these services was both costly and slow, and he thought that the proposals in the various London Plans should be considered from this angle. He supported the proposal that a committee of engineers might well be appointed to examine and report on the engineering implications of the London Plan.

The second session concluded with a paper by Mr. J. C. Martin of the London Passenger Transport Board, who dealt with underground railways and who, in the light of very long experience in the construction of the present underground system, analysed the engineering implications of proposals that underground tunnels and stations should be constructed for main-line rolling stock and traffic. He was inclined to believe that much could be done without drastic modification of existing services to improve the present facilities, and strongly supported the proposal that a co-ordinating technical body should be appointed to work continuously on the problem.

The third session was devoted to free discussion, which was opened in a lively and provocative manner by Colonel Mervyn O'Gorman, and continued by many other speakers, including Dr. R. V. Southwell, Sir Frederick Cook, Prof. Cave-Browne-Cave and Mr. J. S. Wilson.

The full proceedings will be published in the *Advancement of Science*, and in the meantime the report of the Conference will be studied by officers of the Engineering Section with the view of deciding on what points further action should be recommended.

D. N. Lowe

ROYAL PHOTOGRAPHIC SOCIETY EXHIBITION

THE ninety-first Exhibition of the Royal Photographic Society was opened on September 14 by Sir Henry Dale. This exhibition, which is open to the public, can be regarded as the first fully post-war exhibition of the Society, and a great effort has been made to make it an outstanding occasion, to compensate for the previous six lean years during which time acute shortage of photographic materials and security measures had a marked effect on the quantity and quality of the exhibits. Contrary to the usual practice the exhibition is being held in a gallery of the Science Museum, Exhibition Road, London, S.W.7, where there is much more accommodation than is available at the Society's house in Prince's Gate. A special effort has been made to obtain more material, particularly in the Scientific and Technical Section, and some of the research carried out during the War and held up for security reasons has been released. This section is undoubtedly of a higher standard and contains more material than has ever before been shown in the Society's exhibition. The organisers as well as the exhibitors are to be congratulated on the result, which is well worth a visit. The exhibition is open on Monday to Friday 10 a.m.–8 p.m., Saturday 10 a.m.–6 p.m., Sunday 2.30 p.m.–6 p.m., until October 26.

In a short space it is not possible to mention all the exhibits of scientific interest, and it is difficult to make a selection because of the great variety of different subjects illustrated. There are, however, a number of exhibits which will attract special attention either because they illustrate relatively recent developments in which photography has played an important part, or because of the striking nature of the illustrations of quite well-known techniques. In the first category may be placed a number of electron micrographs. One from the Kodak Laboratories is of particular interest to photographers as it shows the filaments of silver produced by development of silver grains in photographic emulsions. A later technique is beautifully illustrated by the exhibit from the Department of Biomolecular Structure of the University of Leeds. The technique was developed by Williams and Wyckoff and consists in projecting a beam of atomic gold at a very small angle towards the plane of the thin collodion membrane supporting the specimen. The film and specimen become coated with a thin film of gold except for the 'shadow' portions protected by the raised parts of the specimen. Gold, being a dense metal, gives a contrasty record when examined in the electron microscope, and the resultant picture has more the appearance of a normal photograph showing modelling than a conventional electron micrograph. Bacilli and the tobacco mosaic virus are among the examples; the magnification in the electron microscope is in all cases 9,500 times, and the enlargements bring the overall magnification up to as much as 57,000 times.

An exhibit of topical as well as scientific interest is that shown by Dr. C. F. Powell and others from the H. H. Wills Physical Laboratory, University of Bristol. This illustrates, by means of many prints, the use of the photographic technique of recording the tracks of fast-moving charged atomic particles. When a charged atomic particle traverses a photographic emulsion, it renders at least some of the silver

halide grains through which it passes developable. The quality of the resulting track depends upon the nature of the particle and upon the characteristics of the particular photographic emulsion used. All the photographs in this exhibit were made from tracks obtained in Nuclear Research Plates specially made for use with this technique by Ilford, Ltd. The exhibit contains examples of records of alpha particles, protons, tritons, and the products of disintegration and fission. Neutrons cannot, of course, be recorded by this means because of the absence of charge, but protons ejected by neutron bombardment provide enlarged tracks some 3 ft. long (1·4 mm. actual). Alpha-particle tracks are produced both by bombarding the plate at grazing incidence with alpha-particles from polonium, and by bathing the plate in a solution of a thorium compound. Alpha-particle and triton tracks are produced by disintegration of lithium atoms incorporated in the emulsion during manufacture and bombarded with 9 MeV. neutrons. Uranium fission tracks are produced by bathing and bombarding with slow neutrons. The photographs are accompanied by adequate captions, and the whole exhibit is covered by an excellent descriptive folder attached to the case.

The exhibit of Mlle. Y. Cauchois from the Laboratoire de Chemie Physique, Paris, illustrates a new technique in the production of X-ray spectra. A crystal is bent into the arc of a cylinder and acts towards X-rays in the manner of a cylindrical lens. This provides the possibility of focusing a beam of X-rays, and the technique is illustrated with X-ray emission and absorption spectra and X-ray shadowgraphs of small objects irradiated by X-rays and 'imaged' on a photographic material by means of such a 'lens'.

The Kodak Laboratories show a picture of molecules of hexamethyl benzene and phthalocyanine by an X-ray diffraction method at a magnification of 250 million. The details of the method used are not specified; but the groups of which the molecules are composed are shown as diffuse dark areas in a clear ground.

In the X-ray field must be mentioned the exhibit by J. A. Fairfax Fozzard, which has been awarded the Rodman Medal. This illustrates, by means of a series of X-ray studies, the shell deposition in the egg of the domestic fowl. Radiographs have been made at intervals during the period of about twenty-six hours between the laying of one egg and the next. The shell of the egg has a greater opacity to X-rays than the surroundings, particularly around the circumference where the distance traversed through the shell material is greatest, so that the boundary of the egg is clearly seen.

High-speed photography is nearly always represented in the Exhibition, and this year there are several particularly interesting examples. The National Physical Laboratory shows a shadowgraph of a modern wing section in a 650 m.p.h. air stream at an exposure of one microsecond; also a series of shadowgraphs of a projectile in flight at different velocities. The latter shows the variation of wave pattern with velocity, from 0·86 to 2·51 times the velocity of sound, in five stages. There are two interesting high-speed radiographs shown by the Research Laboratories of the Westinghouse Electric Corporation. One shows a 20-mm. shell and the other a model bomb both just after bursting. The distribution pattern of the fragments is clearly shown.

Some of the research in air photography carried out during the War is illustrated by a number of exhibits from the Royal Aircraft Establishment, Farnborough. The value of movement compensation in night photography is illustrated. The film is moved in the focal plane at a rate based upon the speed and altitude of the aircraft, so that the image remains substantially stationary during exposure. This technique is particularly valuable for night photography since it permits longer exposures. The same principle is used in very low-altitude air photography in daylight, when the image movement is so great that exceedingly short exposures would be required to give sharp pictures. In the exhibits shown the image moves over a slit in the focal plane and the film is moved at the appropriate speed behind the slit. No camera shutter is required.

These are but few of the one hundred and sixty-four exhibits in the Scientific Section. The Natural History Section contains more than one hundred and fifty prints, and for relaxation there are some two hundred prints in the Pictorial Section, also lantern slides and stereoscopic photographs, etc. There is no doubt that this is the finest exhibition the Royal Photographic Society has organised, at least for many years. It is partly due to the increased space available, to the release of material after the War, and to the convenience of the lay-out which has been made possible by holding it in a gallery of the Science Museum.

During the period of the Exhibition there are six lectures and film shows open to the public. Admission to these is free but by ticket only. Particulars and tickets may be obtained from the secretary of the Royal Photographic Society, 16 Prince's Gate, London, S.W.7.

OBITUARIES

Dr. William Payman

WILLIAM PAYMAN, a principal scientific officer of the Safety in Mines Research Board and known at home and abroad for his researches on flame and explosives, died on August 10 at the age of fifty after a short illness. He leaves a widow and two sons.

After graduating at the Manchester College of Technology in 1915, Payman began a post-graduate study of the inflammation of gas mixtures under the guidance of Dr. H. F. Coward, with whom he was again to become associated in later years. He pursued this field when in 1917 he joined the staff of the Home Office Experimental Station at Eskmeals, Cumberland, an organisation devoted to an examination of the explosion hazards in coal mines and later expanding into the Safety in Mines Research Board, with stations at Buxton and Sheffield. During his early years at Eskmeals, Payman developed rapidly under the stimulating direction of the late Prof. R. V. Wheeler, and here was formed the nucleus of what was to become the Sheffield school of flame research when Wheeler became also professor of fuel technology at Sheffield. Payman's contributions are recorded in numerous papers in the *Journal of the Chemical Society*, notably in the years 1919–22, and he formulated his 'law of flame speeds in mixed gases', the cause of a sharp controversy with the school which had grown up under the late Prof. W. A. Bone at the Imperial College.