

News and Views

Nobel Prizes for Quantum Theory Investigations

THE Nobel prize for physics for 1933 has been awarded jointly to Prof. P. A. M. Dirac and Prof. E. Schrödinger, both of whom have earned international reputations for their work on the quantum theory. The prize for 1932 has been awarded to Prof. W. Heisenberg, of the University of Leipzig. Prof. Schrödinger who, at the time of the publication of his paper on "Quantisation as a Problem of Proper Values", was at the University of Zurich, has since occupied a chair in the University of Berlin and is now at Magdalen College, Oxford. He had previously written a number of papers on various subjects in physics. Amongst them are works on the theory of pigments and on colour measurement, while one, "On the Coherence of Wide Bundles of Rays", is of an experimental character. One of his contributions in 1914 is of particular interest in that it seems to foreshadow his important work. This is on "The Dynamics of Elastically Coupled Systems", in which he considers a system of mass points which, in the limit, gives the partial differential equation of a vibrating string and in which considerations of group velocity play a part. Influenced by the ideas of de Broglie, Schrödinger developed wave mechanics as a coherent theory, the centre of which was the wave equation. The nature of the atomic problem appeared in a new guise, showing mathematically more resemblance to the vibrating string than to the planetary system. The methods of the new theory were classical in character, and gave the hope that the quantum theory might finally be absorbed into the classical doctrine. Schrödinger seems to have been imbued with this idea. The theory met at once with an enthusiastic welcome and made rapid strides. An important step was made when Schrödinger showed the relation of his theory to that of Heisenberg, and henceforth it was possible for the two theories to draw from each other in spite of the difference in their philosophic outlook.

PROF. DIRAC, who is Lucasian professor of mathematics in the University of Cambridge, approached the quantum problem from an entirely different point of view, his work being more closely allied to the Heisenberg matrix mechanics. His first great service was to establish the elements of the theory by an examination of the Poisson bracket expressions of generalised dynamics. Guided by their properties, he laid the foundations of an independent quantum algebra. Dirac stands out amongst his contemporaries in this field for his originality. Heisenberg originally proposed to banish from his equations the unobserved quantities that had come into atomic theory with mechanical models. He proposed to include in his theory only such quantities as could be observed. This was in effect a bid for freedom from old rules. Dirac went still further from earlier methods. He refused to be cramped by his symbols, holding that, if exact physical counterparts can be found for them, the time is not yet. Thus he builds up a mathematical

analysis which is wider and more flexible than existing systems. It is this feature of the work which is peculiarly Dirac's. In his book "Quantum Mechanics" he gives what has been described as an adequate philosophy, as a background to his theory. This book will surely stand out as one of the monuments of mathematical physics of this generation. The actual details of his work, the problems he has conceived and the solutions he has given, are well known, but there can be no doubt that his greatest contribution is his discovery of the first order equations of the quantum theory. The discovery of these equations, known everywhere by his name, marks the greatest advance since the introduction of de Broglie's theory. The best-known result of their formulation is the inclusion of the 'spin term'. The particular degree of freedom, which is described in the model as the spin, finds a natural place in the theory. This is, however, merely an important detail in an advance which discloses new fields of research and may have far-reaching consequences in the theory of relativity.

Sir Richard Tangye (1833-1906)

ON November 24 the centenary occurs of the birth of Sir Richard Tangye, the most prominent of the five brothers who founded the well-known engineering firm of Messrs. Tangye, Ltd., of the Cornwall Works, Birmingham. From the humblest beginnings, the business, begun in one small workroom in Birmingham in 1855, grew into a great concern employing 2,500 persons supplying machinery to all parts of the world. Like his brothers, Tangye was born in Illogan, Cornwall, the parish in which Richard Trevithick was born, and was the son of a Quaker farmer of strong character. Through an accident he was debarred from mechanical pursuits, but during the greater part of his life he was the most active and enterprising of the family. Success first came to the firm when it supplied hydraulic jacks to Brunel for the purpose of pushing the *Great Eastern* into the Thames. The jacks were of an improved type invented by James and Joseph Tangye, and Sir Richard Tangye used to say, "We launched the *Great Eastern* and she launched us." Similar jacks were afterwards used for raising Cleopatra's Needle.

VARIOUS machines were brought out by the firm; it introduced into works the differential pulley block invented by Weston, and later on steam-engines and pumping plant were manufactured. From 1881, the concern was carried on as a limited company by Sir Richard Tangye and his younger brother George Tangye (1835-1920). Sir Richard, who was knighted in 1894, was also well known for his interest in social, educational and political matters, his travels and his benefactions to Birmingham. Among his hobbies was the collection of relics of Oliver Cromwell, resulting in the publication of his book "The Two Protectors—Oliver and Richard Cromwell". In a little book entitled "One and All", published in 1889, he gave an entertaining account of the growth of

the firm and of his own career. A biography of him by Dr. S. J. Reid appeared in 1909. He died at his house at Kingston-on-Thames on October 14, 1906, and was buried in Putney Vale Cemetery.

Protection of the Fauna and Flora of Africa

THE international conference which met recently in London for the consideration of measures "For the Protection of the Fauna and Flora of Africa" has completed its deliberations. At the moment, however, it is impossible to summarise the results arrived at. The need for such a conference has long been apparent. For the creation of reservations and the enactment of legislation by individual governments, have been, it must be admitted, no more than partially successful. The difficulties in the path of those charged with the enforcement of the regulations laid down have been many; and those who have found profit in the exploitation of big game have shown a high degree of ingenuity in evading these regulations, or by specious arguments have succeeded, on occasions, in securing their modification to enable them to achieve private ends. How far the present conference will defeat opposition of this sort will be seen when its deliberations have been carefully analysed. But we trust that, among other things, some means will have been devised to put an end to the exploitation of this game by professional hunters, who organise 'Safari trips' for the pleasure of amateur hunters, and the trophy hunter. We trust, too, that much closer scrutiny will be given to requests to shoot elephants, zebra and antelopes on the plea that they are damaging crops, or carrying disease; for such pleas have been advanced more than once, as a cover for obtaining the highly marketable commodities, ivory and hides.

AN urgent appeal has already been made by the French Government for some sort of control over aeroplanes flying above the haunts of big game with deplorable results; and it also complains, as the British Government has done, of shooting game from motor-cars. The fact that at long last a serious and determined effort has been made to retain what is left of the fauna of Africa, inspires us to hope for great things. For in this fauna we have a great heritage, and a grave responsibility rests upon all who have its control within their grasp. The formation of game reserves by the Governments of Great Britain, France, and Belgium was followed by the formation of the great Kruger Park at Pretoria, the largest of its kind in the world. It would seem that this generous and carefully considered scheme, thought out by men resident in Africa, is to be followed up after a similar fashion, so far as is possible, in other parts of Africa. Only thus, indeed, can these animals be saved from extermination.

Physico-Psychical Experiments

In the third Frederic W. H. Myers memorial lecture, which was delivered before the Society for Psychical Research on October 25, and of which an English edition has just been issued ("Supernormal

Aspects of Energy and Matter": London, 1933), Dr. Eugène Osty, the director of the Institut Méta-psychique, Paris, reviewed the recent experiments with the medium, Mr. R. Schneider. He described the nature of the apparatus employed through the use of which it is claimed that the medium is capable of demonstrating his power of externalising a 'force', or substance, the effects of which can be registered at a distance from him. In the course of the address, the speaker maintained that Mr. Schneider possessed exceptional powers, which he was able to exercise over the material world when in a special physiological state designated as *trance*. In this condition his behaviour is as if he knew and could control "the primordial resources of life and processes of creation". The method of demonstrating this alleged action at a distance was to study its effect on infra-red rays which occupied a certain area. Interruptions and absorptions occurred which were registered photographically, and shown to be connected with the respirations of the medium. Attempts were made to photograph the invisible substance, but were not successful; Dr. Osty is of the opinion that plates sensitive enough to the radiations have not yet been produced.

IN defending the experiments against those who have ventured to criticise them, Dr. Osty is at pains to explain the reasons for his suppression of facts considered by his critics to be of some importance. He states that any attempt at fraud on the part of the medium would have been followed by an exposure *in flagrante delicto*. Moreover, the reliability of the results indicated that the publication of the full details was unnecessary. A tall screen cut off the apparatus and the infra-red field from all those present. If doubts were expressed, the experiments could be repeated and the results verified. In conclusion, Dr. Osty touched upon the philosophical significance of the phenomena of the occultation of the infra-red; and stated that it was the same as that suggested by the materialisations of other mediums, such as the late Mr. Guzik, although he can scarcely be unaware that this medium was caught *in flagrante delicto* and repeatedly exposed. In order to assist the reader to understand the disposition of the apparatus used in the experiments, a diagram of the laboratory is printed, although no scale is given and the position of the tall screen is not indicated.

Improvements in the Autogiro

AN improved model of the autogiro, demonstrated at Hanworth aerodrome recently, marks a decided advance towards the simplification of ordinary straightforward flying, landing in small areas, and safety in emergency landings. Change of orientation of the machine in any direction is obtained by tilting the universally-mounted rotating planes, there being no ailerons, elevators, or rudder. The machine swings pendulum fashion beneath the rotors as they are tilted, bringing the propeller thrust-line into any desired direction. Correct bank for a turn is thus quite automatic. The rotor universal joint is carried