News and Views

Sir Norman Lockyer, 1836–1920

No centenary can be mentioned more appropriately in NATURE than that of Sir Norman Lockyer, who founded this journal in 1869. Joseph Norman Lockyer was born at Rugby on May 17, 1836, so that the centenary of his birth falls on Sunday next. Throughout his career he worked with unceasing energy for the advancement of natural knowledge, and his spectroscopic researches, as well as his imaginative insight, place him in a high position among pioneers of modern science. The records of his contributions to astrophysics, and the recollection of the stimulating influence he exerted upon the progress of science for so many years, have increased in strength and value since his death on August 16, 1920; and they will command admiration so long as the pursuit of knowledge is regarded as worthy human endeavour. In the issue of NATURE of November 6, 1919, published to celebrate the jubilee of the foundation of this journal, Sir Norman Lockyer was the subject of an article in the series of "Scientific Worthies", and Dr. Henri Deslandres then referred to him as "one of the great men of science of England and one of the greatest astronomers of all time". How well he earned this high tribute of praise may be judged from the fine volume recording his "Life and Work" published in 1928.

Helium

THE discovery of Sir Norman Lockyer's which stands out as one of the most romantic events in the history of science is that of helium. In 1866, Lockyer suggested that, with large enough dispersion, it should be possible to observe solar prominences in full daylight without waiting for the sun to be obscured in a total eclipse. Two years later, he became possessed of a spectroscope of sufficient power to make this observation, and he then noticed a strange yellow line in the spectra of solar prominences. This was at first supposed to be due to hydrogen, but experiments failed to confirm this opinion. After satisfying himself that the line could not be produced by any element then known on the earth, Sir Norman Lockyer called the unknown substance 'helium'. Not until twenty-seven years later was terrestrial helium extracted from cleveite by Sir William Ramsay, and since then it has proved to be one of the most interesting elements in both pure and applied science. For an element first discovered by an astronomer to prove in the course of time to have so many scientific and industrial contacts is a reward which few investigators can hope to obtain, and a tribute to an achievement which occupies a leading position in the archives of science.

Guthrie Lecture: Prof. F. A. Lindemann, F.R.S.

THE Guthrie Lecture for this year of the Physical Society is being delivered at the Imperial College of Science and Technology, South Kensington, at 5 p.m. on May 15 by Prof. F. A. Lindemann, professor of experimental philosophy in the University of Oxford, whose subject is "Physical Ultimates". Prof. Lindemann has carried out theoretical and experimental researches in various branches of physics. Before the Great War he was distinguished for his work on the specific heat of solids at low temperatures; the Nernst–Lindemann formula was a pioneer attempt to connect the specific heat of a substance with its characteristic frequencies. During the War he was attached to the Royal Air Force, and the apparatus which he evolved and the experiments he performed himself in actual flight on the causes and elimination of spin were recognised as of the highest importance. In 1919, at a very early age, Prof. Lindemann was appointed to the chair which he now occupies at Oxford. He has written papers on the origin and nature of magnetic storms, and his research work on meteors gave the first indication of the then unsuspected rise of temperature at heights of about 50 km. in the upper atmosphere, which has since been verified in other ways. His development of photo-electric cells and the electrometer which bears his name have been of incalculable service, not only to the solution of the astronomical problems which interested him and his father, who had his own observatory at Sidmouth, but also to physicists in general. Recently he has turned his attention to the more philosophical aspects of physics, and in his book on the "Physical Significance of the Quantum Theory", he has attempted to clear up certain difficulties connected therewith.

Bicentenary of the Duke of Bridgewater, 1736–1803

ON May 21 the bicentenary occurs of the birth of Francis Egerton, third and last Duke of Bridgewater, who has been called "the Father of British inland navigation", and to whom a monument exists at Ashridge bearing an inscription which says that "by devoting the energies of his mind to the accomplishments of the most splendid works of inland navigation, [he] opened a new field of national industry and rendered the most important services to the commercial interests of this country". A sickly, neglected boy, and an ignorant, awkward and unruly youth, the Duke was only twelve years of age when he succeeded to the title, and there was little promise in his early life that he would become one of the country's benefactors. A disagreement at the age of twenty-two with the widowed Elizabeth, Duchess of Hamilton, led to his leaving London for his home at Worsley near Manchester, and his whole life was henceforth devoted to the management of his collieries and estates. Obtaining an Act of Parliament in 1759 for a canal from Worsley to Manchester, he engaged the services of James Brindley (1716–72), and the next few years saw the construction of the

Worsley to Manchester Canal with its famous Barton Aqueduct over the River Irwell, and also the Bridgewater Canal from Longford Bridge to the Mersey at Runcorn, by which craft could proceed from Manchester to Liverpool. While he exercised the greatest possible economy in his private affairs, the Duke spent some £220,000 on his canals, which, however, ultimately yielded an annual revenue of £80,000. The Bridgewater Canal was sold in 1887 to the Manchester Ship Canal Company for £1,710,000. The Duke died in London on March 8, 1803, and was buried in the family vault at Ashridge. The monument to which reference has been made now belongs to the National Trust.

British Patents

WHILE the fifty-third Report of the Comptroller-General of the Patent Office (London: H.M. Stationery Office. 4*d*. net) is of academic interest as reminding us of the diversity of modern scientific research, its tabular appendixes reveal a gradual change in the destination of patent grants which is of over-riding industrial importance to Great Britain. Of the grants made in 1933, the last year for which final figures are available, 9,000 were made to residents within the British Empire as against 8,100 to foreigners. The figures for applications made during last year show a drop in British applications of six per cent since 1933, while those from outside the Empire have increased more than seven per cent. On this basis, grants made directly to foreigners in respect of applications made in 1935 will clearly exceed those made to British subjects. When it is realised that 1,796 of the applications made in 1935 by residents in Great Britain were made on behalf of inventors residing abroad, it becomes clear that foreign patentees are well on the way to outnumbering Britishers. If figures for purely scientific inventions were available, they would probably be even more striking, and it is disquieting to realise that patentees with no real compulsion on them to manufacture in Great Britain are increasing rapidly; German applications, for example, increased from 4,050 in 1933 to 4,481 in 1935, while in the same time applications from the United States grew from 3,194 to 3,612, these two countries being responsible for well over sixty per cent of the total foreign applications. There were no requests made in 1935 for the grant of a compulsory licence, but there were 789 for indorsement of patents "Licences of Right". The report is silent as to the results of the experimental extension of the search recently introduced, but the proportion of patents granted to applications made is apparently unaffected by it. The office surplus of receipts for 1935 over expenditure was £232,307, and must surely be a record.

Development of Rockets for High Altitude Exploration

OUR readers who are interested in the development of rocket propulsion, and may have read a review in NATURE of March 14 of a somewhat premature book on the possibilities of using rockets for interplanetary travel, will be glad to hear that an authoritative statement has been issued by the Smithsonian Institution concerning the researches carried out by Dr. Robert H. Goddard, who has been experimenting at Roswell, New Mexico. Dr. Goddard has produced a rocket weighing five pounds which is capable of developing 1,030 horse-power for a period of twenty seconds by the combustion of a mixture of gasolene and liquid oxygen. Difficulties were experienced with the steadiness of direction of the rocket, which is now controlled by gyroscopic means. So far, the rocket has not attained an altitude of more than 7,500 feet, but the altitude has been purposely limited for experimental reasons. It is hoped that it will be possible to develop rockets capable of carrying recording apparatus which will serve as scientific instruments for exploring the upper atmosphere. It is good to hear that such experiments are being carried out, and the sober objectivity of Dr. Goddard's work presents a sharp contrast to the unscientific imagination exhibited by those who seek to direct attention to the advent of interplanetary travel long before the preliminary investigations that might throw light upon its possibility or otherwise have been completed.

Archæological Investigation in the Irish Free State

UNDER a scheme of the Irish Free State for the relief of unemployment, in 1935 excavations were carried out on eleven sites, those on five being in continuation of work initiated in 1934. The results for 1935 are summarised by Dr. S. P. O'Riordan of the National Museum of Ireland in *Discovery* of April. Sites partly examined in 1934 are described first. In a cairn near Baltinglass, Co. Wicklow, additional stones carved with spiral ornament were found, with sherds of bronze age pottery and evidence of cremated burials. At Agnaskeagh, Co. Louth, the second of a group of megalithic cairns was examined and evidence again found of association with Early Iron Age. There was a considerable amount of iron and a cremation in a Hallstatt urn against the collapsed slab of a burial chamber. The most important investigation, again producing surprising results, was that of the complicated series of earthworks at Cush, Co. Limerick. Corroboration of the previous season's results, dating ring-forts with souterrains back to Late Bronze Age, was found in the discovery that the fort containing the burials was not the earliest, but had been built later than that adjoining it, and further that occupation had continued over a long period. House sites, not yet clear in all detail, show the plan of a distinctive Irish house-type. At Dunshaughlin, Co. Meath, a crannog produced evidence of a much larger area for this early Christian site (8–10th centuries) than was previously thought. Enormous quantities of bones of wild and domestic animals were found. The monastic site of Gallen Offaly continued to produce important evidence for the evolution of Irish art. Burial mounds at Lug, near Tullamore, Carrowjames, Co. Mayo, and Pollacarragune, Co. Galway, produced interesting material of bronze and iron age date, including what is probably the finest known razor as regards decoration, from the last-named.