defects; but other even isotopes (mercury-202) have recently been separated[14], as a more abundant supply, and krypton-84 has been used for similar purposes[15].

Medical applications. The high cost of separation makes stable isotopes too expensive an item for most medical experiments; one application, however, is a promising exception. Natural iron (iron-54, 56, 57 and 58), when irradiated in a pile, produces radioactive iron-55 and 59. Iron-59 has a half-life (46 days) which makes it suitable as a tracer in experiments with human beings; iron-55, while satisfactory for general biological experiments, has a half-life (four years) which makes it a hazard in experiments on humans. Attempts to obtain iron-59 from pile-irradiated cobalt have proved difficult, owing to the high concentration of cobalt-60. If, however, one forms a 'source' of iron-58, from which the exclusion of iron-54 by electromagnetic separation is easy, then the iron-59 produced by pile irradiation can be extracted by a Szilard–Chalmers process, and the bulk of the iron-58, by repeated irradiation, is eventually converted to iron-59. In this way an adequate supply of suitable radioactive iron is made possible.

Superconductivity. Isotopic effects are usually confined to nuclear interactions, but a recent discovery by Serin, Reynolds and Nesbitt[16] has shown a variation in the superconductive transition temperature of mercury with variation in mean isotopic mass. This effect has been confirmed in Britain and in America[17] by using the separated isotopes of tin, and the theoretical prediction, $T \times m^{1/2} =$ constant, has been approximately confirmed. The British results suggest that possibly the exponent of the mass factor is slightly less than $\frac{1}{2}$.

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OBITUARIES

Dr. Yoshio Nishina

THE death occurred on January 10, at the age of sixty, of Dr. Yoshio Nishina, president of the Scientific Research Institute, Ltd. By his death, the Japanese scientific world lost an eminent leader.

Dr. Nishina was born on December 6, 1890. Graduating from Tokyo Imperial University in 1918, he entered the Institute of Physical and Chemical Research. In 1921 he went to Europe to study at the Cavendish Laboratory, Cambridge, under Lord Rutherford, then at the University of Göttingen, and later at Copenhagen under Prof. N. Bohr. While working in Copenhagen during 1923–27, he published several important papers, such as "Study on *L*-series X-ray Absorption Spectra of the Elements from Sn to W", "Study on the Effect of Chemical Combination upon X-ray Spectra", and "Study on Quantitative Chemical Analysis by X-ray Spectroscopic Method". Collaborating with Dr. O. Klein, he calculated the scattering cross-section of hard X-rays by a free electron and deduced the well-known Klein–Nishina formula in 1928. In November 1928, he returned to the Institute of Physical and Chemical Research by way of the United States and initiated the pioneer work in the fields of cosmic rays and nuclear physics in Japan.

In 1937 Nishina constructed a 27-in. cyclotron to pursue nuclear research. One of his investigations in this field was to assign the elements ruthenium, rhodium, palladium, silver, cadmium, indium, tin and antimony to fission products of uranium and thorium. He showed that uranium-237 is produced from uranium-238 and uranium Y from thorium-232 by the $(n, 2n)$ reaction. The mechanism of metabolism of plants and animals was studied, using radiosodium and radiophosphorus as tracer. In 1944 a 60-in. cyclotron was constructed by which 18-MeV. deuterons could be produced. Nishina flew to Hiroshima and Nagasaki to investigate the effects of the atomic bombs just after the explosion in 1945.

He was also interested in cosmic ray research. He measured the intensity of cosmic rays in 1944 in the Shimizu Tunnel at a depth equivalent to 1,400 m. of water. The continuous measurement of cosmic ray intensity which is still being carried on was started by him in 1935.

Theoretical physics in Japan also owes much to his leadership.

Dr. Nishina was appointed as the first president when the Institute of Physical and Chemical Research was reorganized as the Science Research Institute, Ltd., in 1948. In 1949 and 1950 he visited Copenhagen and the United States as a representative of the Japan Science Council. As president of the Scientific Research Institute, Ltd., as vice-president of the Japan Science Council and as president of the Japan Federation of Unesco Cooperative Associations, his activities were many and varied.

His death is a great loss not only for the rehabilitation of science and technology in Japan but also for her progress in general. KENJIRO KIMURA

Sir Frank Lindley, C.B.

SIR FRANK LINDLEY, who died at Ditchling on August 15 at the age of seventy, spent practically the whole of his working life in the service of the Patent Office, of which he was comptroller-general from December 1932 to September 1944.

He was educated at Brighton Science School and graduated with an honours degree in physics at University College, London. After entering the Patent Office in 1903 he studied law and also found time to take part in student activities at Birkbeck College. When reading for the Bar he was elected Barstow Law Scholar, took a University scholarship in the LL.B. examination, and became a King Edward VII research scholar of the Middle Temple He became a senior examiner in the Patent Office in 1922, transferred to the Trade Marks side as assistant comptroller in 1926, and succeeded Sir William Jarratt as Comptroller-General of Patents, Designs, and Trade Marks in 1932.

The earlier period of Sir Frank's comptrollership was dominated by the dual tasks of administering the recently passed Patents Act of 1932, which