Perry will probably be chiefly remembered by engineers as the man who broke through the formal defences of mathematics and taught them mathematics through what they knew of machinery. His book on "Practical Mathematics," originating in his Finsbury course, has been translated into many languages, and many generations in many lands will therefore benefit from Perry's determination to teach his own students the fundamental truths of mathematics so well that they could use their knowledge as easily as they could use their mother tongue.

Perry continued his work as professor of mathematics and mechanics at the Royal College of Science, leaving Finsbury in 1896. In those days the professors at the Finsbury Technical College were expected to run an arduous day course, and in addition an evening course as well. His relief at the escape from this double duty was great. In more recent years he guided the fortunes of the British Association for the Advancement of Science as its general treasurer. Perry has done a great work, and his work will live after him.

W. E. D.

PROF. AUGUSTO RIGHI, FOR.MEM. R.S.

PROF. AUGUSTO RIGHI, who died suddenly on June 8 at seventy years of age, is said to have been appointed assistant to the professor of physics in the University of Bologna—his native city—at the age of twenty-one. In 1877 he was *Libero Docente*, and in 1880 was appointed ordinary professor at Padua, whence after a few years he returned to Bologna as head of the physics department.

Righi was a skilled experimenter and an industrious worker. His original investigations lay chiefly in the domain of electricity, magnetism, and light. One of his discoveries was the variation of the resistance of bismuth in a magnetic field, a phenomenon on which an instrument for measuring the intensity of a field has been based. He was led to this discovery by an examination of the Hall effect in different metals in the year 1883. His results were published in the *Journal de Physique* (2), 1883, p. 512, and in the *Comptes rendus*, vol. xcvii., p. 672, as well as in Italian; most fully in Bologna Acad. Sci. Mem., vol. v., 1883, pp. 103–26. An abstract was given in NATURE, vol. xxx., p. 569.

Righi's earliest papers appeared in 1873, and dealt with a variety of topics, many of them connected with electrostatic problems and voltaic electricity. One of the subjects on which at one time he laid stress was the dilatation of the glass or quartz of a Leyden jar, and of insulators in general, under electric stress—what he called "galvanic dilatation": see, for instance, *Comptes rendus*, vol. lxxxviii., 1879, p. 1262. He also examined the changes of length due to magnetisation, and discussed the phenomena of permanent steel magnets. About 1880 Righi began a long series of researches on electric discharge *in vacuo* and in air, and pursued the subject in various forms to the end of his life. He was much interested in photo-electric effects, and contributed some new facts to the discharge of electrified bodies by ultra-violet light. He failed to discover electrons, but he knew that carriers of negative electricity were liberated, and took steps to observe their trajectory in a magnetic field, thus exhibiting the phenomenon as a variety of cathode rays. He also found that the discharge could be stopped by an electric charge of inverse sign, constant in density for a given metal.

Righi was keenly interested in the work of Hertz, and corresponded with the present writer on the subject of electric waves. A special form of Hertz oscillator, known as Righi's pattern, consisting of a couple of spheres with adjacent faces immersed in oil and charged at the back from two other spheres, was used by some people, and is depicted as a form appropriate to wireless telegraphy in Mr. Marconi's first patent, though the connection of the outer spheres to an elevated plate and to ground respectively—a plan efficiently introduced by Mr. Marconi for practical purposes—really converted the spherical oscillator into nothing but a series of spark gaps. It is understood that Mr. Marconi had visited Righi's laboratory and seen his experiments on Hertzian waves, but was not one of his students. Righi, in his correspondence, frequently expressed surprise at the novelty attributed to the invention in its very early days by Sir William Preece and other English officials.

In the Memoirs of the Academy of Sciences of the Institute of Bologna, Righi expounded many of the new discoveries as they were being made in physics—among others an excellent and semi-mathematical exposition of the Zeeman phenomenon (see vol. viii., ser. 5, pp. 59–90, December, 1899). He also wrote on the equations of Hertz and their solution, in vol. ix. of the Memoirs of the same Academy, pp. 3–28 (February, 1901); and, again, on the electromagnetic mass of electrons in vol. iii., ser. 6, pp. 71–84 (February, 1906). These papers show that though chiefly an experimental physicist, he had a sound grasp of general theory, and must have had considerable influence in making known the work of British and other physicists to his countrymen. A memoir on the theory of relativity was contributed by Righi to the Institute of Bologna so recently as April 18 last (vol. vii., ser. 7, pp. 70–82).

An experimental paper of Righi's on the possible existence of magnetic rays, dated May 17, 1908, vol. v., ser. 6, of the same Memoirs, pp. 95–150, deserves mention, because of the cathode ray inquiry there described and the speculation based upon it. The subject is continued in vol. vi., pp. 45–64, and in vol. x., pp. 79–103, also in vol. i., ser. 7, pp. 3–36, where results are described for many different gases. It is taken up again, after a discussion of the paths of electrons in magnetic fields, in vol. ii., ser. 7, pp. 11–41.

Righi describes further experiments in vol. iii.,

pp. 23–42, and he has a paper on ionisation in a magnetic field in vol. iv., ser. 7, pp. 27–44. His chief work, in which he summarises these and other results, is entitled "I fenomeni elettro-atomici sotto l'azione del magnetismo," a work which met with a very cordial reception among Italian physicists, who must, indeed, have been indebted to Righi's activity and clearness of exposition for much of their knowledge of contemporary physics.

Students adequately familiar with Italian—as the writer cannot claim to be—speak of Righi's writings as marked by extraordinary clearness and simplicity of style, so that they can be read by people of average culture, at least in their non-mathematical portions.

Numerous honours were conferred upon Righi, among others a 10,000 lira prize of the Accádemia dei Lincei, and the Hughes medal of the Royal Society. The Royal Society also selected him as a foreign member, and he succeeded Lord Kelvin as foreign member of the Royal Academy of Sciences at Upsala. In 1905 he was elected a Senator of the Italian Parliament.

By Righi's death Italy probably feels that she has lost her foremost physicist. He was anxious, up to the last, for information about every new discovery, and showed himself capable of appreciating results in many departments of physics. He was well known by reputation in this country as a thinker and worker of exceptional keenness and width of outlook. OLIVER LODGE.

A REUTER message from Stockholm announces the death, at seventy-seven years of age, of ADMIRAL A. L. PALANDER, who was in command of Baron Nordenskiöld's vessel, the *Vega*, which completed the navigation of the North-East passage from the Atlantic to the Pacific along the north coast of Asia (1878–79). Admiral Palander was an honorary corresponding member of the Royal Geographical Society and of many other scientific societies both in Sweden and abroad.

Notes.

A MOVEMENT set on foot in the early part of last year for the founding of an institution or society the membership of which should be open to those particularly interested in problems connected with the fields of administration and organisation in relation to industrial enterprises was brought to a head at a public meeting held on April 26 last at the Central Hall, Westminster, by the appointment of a provisional organising committee which was instructed to prepare a draft constitution for such an institution, to be named the Institute of Industrial Administration. This committee presented its report, accompanied by a draft constitution embodying (1) a schedule of objects, (2) the conditions of membership, and (3) the form of government, at a public meeting held at the above-named hall on July 15. This draft constitution was, with slight amendments, adopted on the date last mentioned, and the first board of management, consisting of eighteen members representing a variety of industries, was elected on the same occasion. The objects of the institute as set out in the draft constitution are briefly as follows:—To promote the general advancement of knowledge relative to the principles of industrial administration and their applications; to facilitate the exchange of information and ideas regarding the principles and practice of industrial administration; to collect and publish information and proposals bearing on any aspect of industrial administration; and to co-operate with professional, industrial, or educational societies, organisations, or authorities in pursuance of these objects. The government of the institute is to be vested in an advisory council composed of honorary members and a board of management representing the various classes of membership of the institute. Mr. E. T. Elbourne was elected hon. secretary of the institute, the offices of which are temporarily located at 110 Victoria Street, Westminster, S.W.1.

THE U.S. National Research Council, with headquarters at Washington, has elected the following chairmen of its various divisions for the year beginning July 1, 1920:—Division of Foreign Relations: George E. Hale, director, Mount Wilson Observatory, Carnegie Institution of Washington. Government Division: Charles D. Walcott, secretary of the Smithsonian Institution and president of the National Academy of Sciences. Division of States Relations: John C. Merriam, professor of palæontology, University of California, and president-elect of the Carnegie Institution of Washington. Division of Educational Relations: Vernon Kellogg, professor of entomology, Stanford University, and permanent secretary of the National Research Council. Division of Industrial Relations: Harrison E. Howe. Research Information Service: Robert M. Yerkes. Division of Physical Sciences: Augustus Trowbridge, professor of physics, Princeton University. Division of Engineering: Comfort A. Adams, Lawrence professor of engineering, Harvard University. Division of Chemistry and Chemical Technology: Frederick G. Cottrell, director of the Bureau of Mines. Division of Geology and Geography: E. B. Mathews, professor of mineralogy and petrography, Johns Hopkins University. Division of Medical Sciences: George W. McCoy, director of the U.S. Hygienic Laboratory since 1915. Division of Biology and Agriculture: C. E. McClung, professor of zoology, University of Pennsylvania. Division of Anthropology and Psychology: Clark Wissler, curator of anthropology, American Museum of Natural History, New York.

THE Department of Scientific and Industrial Research has established four Sub-Committees to assist the Radio Research Board in the investigation of certain problems in connection with the work of the Board. The constitution of the Board and its Sub-Committees is at present as follows:—*Radio Research Board:* Admiral of the Fleet Sir Henry B.