

The officers of the laboratory have carried out numerous investigations in connection with animal diseases. Much of the research work deals with the study of rinderpest, and the results of Dr. Lingard and Major Holmes (the present director of the laboratory) in this field have found practical application in the preparation of rinderpest antiserum. Investigations on surra were commenced by Lingard at Poona, and continued by him until 1907, when he retired from the service. Holmes directed his attention to the problem of the treatment of surra in equines, and a method has been discovered which, in his hands, has given 75 per cent. of recoveries. The treatment has been successful in animals experimentally inoculated with the disease, and also in cases in which the disease has been contracted naturally. Various other subjects have been studied, and the results of the investigations have been published in scientific journals in India and Europe.

The problem of dealing with infectious diseases of animals in India presents many difficulties which arise from the somewhat peculiar local conditions. Measures of treatment, segregation, and disinfection cannot be imposed without the permission of each individual owner. Formerly a good deal of opposition to serum inoculation for rinderpest was encountered, but this has now almost disappeared, a result which is largely due to the repeated practical demonstrations of the efficacy of serum inoculation in the control of rinderpest epidemics. In dealing with an outbreak of disease it is essential that the measures adopted shall be free from all danger to the lives of the animals treated, and shall in no way interfere with their work. Under these conditions serum therapy has proved to be the safest and most efficient method of operation. Dead vaccines are also used as a preventive measure in districts where disease is seasonally prevalent. Vaccination by means of living or attenuated organisms is not practised, except in the case of black quarter.

A consideration of the subject matter of this pamphlet, and a study of the thirty full-page illustrations, shows that a successful attempt has been made to deal with a subject of great economic importance, viz., the health and well-being of the stock of a great agricultural country. The rapidity of the progress made, since the establishment of the laboratory some twenty years ago, is remarkable, and especially so when one considers the nature of the difficulties which have been encountered.

PERCIVAL HARTLEY.

PROF. J. H. POYNTING, F.R.S.

ON the evening of Monday, March 30, surrounded by his family, John Henry Poynting passed quietly away. A memorial service was held in Birmingham on the Thursday following, and was attended by representatives of many universities and learned societies, including Sir J. J. Thomson, Sir Joseph Larmor, Dr. Glazebrook, Sir William Tilden, Prof. W. M. Hicks, Dr. W. N. Shaw, and of course by many colleagues

and councillors of the University in which he occupied a chair, as well as by a large number of private citizens and friends. For he was a man universally beloved.

He was born on September 9, 1852, at Monton, near Manchester, son of the unitarian minister of that place. His first education was at home, but the years 1867 to 1872 he passed at Owens College, Manchester, graduating B.Sc. at the London University, and proceeding, in 1872, to Trinity College, Cambridge, where he was bracketed third wrangler in 1876.

He was then appointed demonstrator at Owens College by Balfour Stewart, and began a life-long friendship with Sir J. J. Thomson, who was at that time a student. In due time Poynting became a fellow of Trinity, and in 1880 was appointed to the professorship of physics at Birmingham, which he held to the day of his death.

The four first professors of the Mason College, which was opened by Huxley in 1880 (who delivered, on this occasion, a notable address, reprinted as the first of his collected essays), were Sir Wm. Tilden, Prof. M. J. M. Hill, Dr. T. W. Bridge, who died a few years ago, and Poynting. In this same year Poynting married Miss M. A. Cropper, daughter of the Rev. J. Cropper, of Stand, near Manchester. In 1887 he received the Sc.D. of Cambridge, and in 1888 the fellowship of the Royal Society. In 1891 the Adams prize was awarded to him, and in 1899 he presided over Section A of the British Association at Dover. This meeting was memorable for the clear discovery of the separate existence of electrons, which was announced to Section A by Sir J. J. Thomson on an occasion when many members of the French Association, meeting simultaneously at Boulogne, had come over for friendly fraternisation.

In 1905 Poynting became president of the Physical Society, and was awarded a Royal medal by the Royal Society "for his researches in physical science, especially in connection with the constant of gravitation and the theories of electro-dynamics and radiation." In this brief summary an immense amount of work is referred to. The work for which he is locally best known was his determination of the Newtonian constant of gravitation by the very accurate use of an ordinary balance with an adjustable mass under one or other of the pans—a determination which is popularly called "weighing the earth." His account of it appears in the *Phil. Trans.* for 1891. It is a classical memoir of its kind, and very instructive to the physical student, but the papers on electro-dynamics eclipse it in value. These were "communicated" to the Royal Society in 1884 and 1885 respectively, their titles being "On the Transfer of Energy in the Electromagnetic Field," and "On the Connection between Electric Current and the Electric and Magnetic Inductions in the Surrounding Field."

The memoir on the transfer of energy aroused universal attention. The paths by which energy travels from an electromotive source to various

parts of a circuit were displayed, and their intricacies unravelled, for the first time; *identity* of energy might legitimately be urged as a supplement to *conservation*; and it is to these papers that we owe that fundamental generalisation, connecting mechanical motion with electric and magnetic forces, which is known all over the world as "Poynting's Theorem."

The work on radiation appeared partly in the *Phil. Trans.* for 1904 and partly in the *Phil. Mag.* for 1905. In these memoirs the tangential pressure of radiation is analysed and demonstrated; and it is shown, both theoretically and experimentally, that a beam of light behaves essentially as a stream of momentum, and gives all the mechanical results which may thus be expected, though of a magnitude exceedingly minute. Nevertheless, he goes on to show that these radiation-pressures, however small, are of much consequence in astronomy, and have many interesting and some conspicuous results. A noteworthy part of his radiation memoirs, however, is independent of considerations of pressure or momentum, and gives a means of determining the absolute temperatures of sun and planets, and of space, in a singularly clear and conclusive manner.

It is impossible, in a brief notice like this, to do justice to these great treatises, or to the rest of Poynting's scientific work; it must suffice to mention the titles of a few of his other papers:—"Change of State Solid-Liquid" (*Phil. Mag.*, 1881); "A Double Image Micrometer" (*Monthly Notices, R.A.S.*, 1892); "Osmotic Pressure" (*Phil. Mag.*, 1896); "On a Simple Form of Saccharimeter" (*Proc. Phys. Soc.*, 1881).

Among his publications is a series of text-books on physics, written in conjunction with his friend, Sir J. J. Thomson; but he has also produced smaller and more popular books, one on "The Pressure of Light" (S.P.C.K.), and one on "The Earth" (Camb. Univ. Press). He also took an interest in statistical science, and wrote on "Fluctuations in the Price of Wheat," and on "Drunkenness Statistics of Large Towns."

His public spirit was shown by his accepting the position of a justice of the peace.

He took some interest also in the philosophical aspects of physical science, and his help is acknowledged by Prof. James Ward in connection with the publication of a series of Gifford Lectures. Poynting was strongly inclined, almost unduly, to limit the province of science to *description*, and to regard a law of nature as nothing but a formulation of observed similarities. He wished to abolish the idea of *cause* in physics. In some of this he may have gone too far, but his rebellion against an excessive anthropomorphism which had begun to cling around the notion of natural laws, as if they were really legal enactments to be obeyed or disobeyed by inert matter almost as if it possessed will-power and could exercise choice, some substances being praised as good radiators while others are stigmatised as bad—most gases being admittedly unable to reach a standard of

perfection held out to them as Boyle's law, though a few of excessive merit might surpass it,—Poynting's revolt against this kind of attitude to laws of nature, though doubtless more than half humorous, was in itself wholesome. His philosophic views may be read, as a Presidential Address to Section A, in the Reports of the British Association for 1899.

But I must not delay further on his scientific work; the man himself was even more than his work. When the Mason College became the University of Birmingham Poynting was elected Dean of the Faculty of Science; in that capacity his quiet wisdom and efficiency were very manifest, and keen was the regret of all his colleagues when, some twelve years later, failing health necessitated his yielding this office to another. His judgment was as sound as his knowledge, and his conspicuous fairness endeared him to colleagues and the members of his staff. By the latter it is not too much to say that he was regarded with affectionate veneration; one of them writes to me as follows:—

"As to his character it is impossible to give the right impression to those who did not know him well. I consider him a man of very extraordinary ability, which might have carried him much farther if it had been associated with more self-assertion. But it was largely this modesty and self-suppression which created a very unusual degree of affection in those who had the privilege of knowing him intimately. I always associate him in my mind with Faraday and Stokes."

As a lecturer and teacher he was admirable, and the respect in which he was held by his peers was noteworthy. I am glad to remember that so recently as the last meeting of the British Association, some of the greatest physicists in the world, who were staying with me—Prof. H. A. Lorentz, Lord Rayleigh, and Sir Joseph Larmor—went to his house one evening, and met there in his study Sir J. J. Thomson and Dr. Glazebrook, who were staying with him; thus constituting a remarkably representative gathering, and giving him a pleasure which he remembered to the end of his life.

There is much more that might be said; but let his position in the world of science be what it may, we in the University of his mature life knew him well, and know him best as an admirable colleague, a staunch friend, and a good man.

At the Memorial service, the following true words concerning him were spoken by the Rev. Henry Gow, who knew him well:—

We remember that he did work to make him famous throughout the world of science which gave him a high place amongst the discoverers of truth; but we remember much more than that. We remember how he loved life, how interested he was in little things, how he delighted in children, in flowers, and in birds; what confidence and affection he inspired, how free he was from claims of self and from uneasy egotism; how much happiness he felt and gave. We remember his wise judgments, strong character, cheerful courage, his delightful humour, and a certain peace-

ful beauty and childlike joyousness of spirit behind all his multifarious gifts. He rejoiced to be the friend as well as the teacher of the young. He kept his heart free from all bitterness and disillusion which come so often to us in our later years. He knew and felt always how beautiful and great a thing it was to be alive.

OLIVER J. LODGE.

#### NOTES.

DR. G. T. BEILBY, Prof. A. Keith, F.R.S., and Mr. J. Swinburne, F.R.S., have been elected members of the Athenæum Club under the rule which empowers the annual election by the committee of a certain number of persons "of distinguished eminence in science, literature, the arts, or for public services."

By the death of Mrs. Huxley on March 5, in her eighty-ninth year, another link with the scientific society of the latter half of the nineteenth century has been snapped. All who had the happiness of knowing Huxley intimately are aware of the reliance which he at all times reposed on the advice and judgment of his lifelong helpmate. Not only in all domestic concerns, but in questions of literary criticism and even of scientific procedure, he never took a step without consulting her, and her wide knowledge and keen literary instincts made her aid invaluable to him. As is well known, the young surgeon of the *Rattlesnake* found a kindly welcome in the house of Mr. W. Fanning, a merchant in Sydney; and the half-sister of the merchant's wife, Miss Henrietta Heathorn, who had come out to Australia four years earlier, won his affections, though eight years had to elapse before the marriage could take place. Strange to say, Mrs. Huxley's health was a constant source of anxiety to her husband; he believed that an Australian medical man had so injudiciously treated a complaint from which she suffered as to have fatally undermined her constitution, but, nevertheless, she has survived Huxley himself by nearly twenty years. Mrs. Huxley wrote some very striking and thoughtful poems, nonsense verses, for the amusement of her children and grandchildren, and laughable stories, illustrated by one of her gifted daughters, with the same object; she will, however, be best remembered by the little work containing judiciously selected passages from her husband's writings, the admirable "Aphorisms and Reflections from the Writings of T. H. Huxley."

THE HON. FRANCIS ALBERT ROLLO RUSSELL, whose death on March 30 we announced with regret last week, was the third son of the first Earl Russell. He was born on July 11, 1849, and was educated at Harrow and at Christ Church, Oxford. As a youth he became interested in meteorological phenomena, and when about fifteen or sixteen years of age he began keeping records of the weather, especially of clouds and optical phenomena. He became a fellow of the Royal Meteorological Society in 1868, and served on the council from 1879 to 1892, and again in 1914, and was a vice-president in 1893-94. He was a fellow of the Royal Sanitary Institute, and served on the council in 1881-82, and again in 1889-92. Mr. Russell was the author of several works and papers on

meteorological subjects, and also on matters connected with public health. He took a great interest in the question of London fogs, and was an advocate for the abatement of coal smoke. In conjunction with the late Mr. Douglas Archibald, he made a report to the Royal Society on the unusual optical phenomena of the atmosphere, 1883-6, including twilight effects, coronal appearances, sky haze, coloured suns and moons, etc., which were due to the volcanic eruption of Krakatoa. For his memoir, "The Atmosphere in Relation to Human Life and Health" (148 pp.), which was submitted to the Hodgkins Fund prize competition of the Smithsonian Institution, he was awarded honourable mention with a silver medal. Among his other works may be mentioned "The Spread of Influenza: its Supposed Relation to Atmospheric Conditions" (1891), "On Hail" (1893), and "The Early Correspondence of Lord John Russell," which was published last year.

THE seventieth birthday, on March 25, of Prof. Adolf Engler, the director of the Royal Botanic Garden and Museum at Dahlem, near Berlin, was celebrated in the presence of many eminent German and foreign botanists, by several functions. On the day itself, Prof. Lindau spoke on behalf of the scientific staff of the garden and museum. Prof. Pax, rector of the University of Breslau, with Profs. Diels and Gilg, as its editors, presented to Prof. Engler a copy of the *Fest-Band* of Engler's "Botanische Jahrbücher." The volume forms a supplement to the fiftieth volume of this well-known publication, and consists of more than forty illustrated contributions, largely from his pupils. The volume will be a lasting memorial of appreciation of Prof. Engler's botanical position, not only in Germany, but also in both hemispheres. As a further mark of this appreciation, Prof. Haberlandt presented Prof. Engler, on behalf of hundreds of subscribers, with his life-size marble bust, the work of the sculptor, A. Manthe, while Prof. Wittmack (to whom we owe these particulars, and the celebration much of its success) read the congratulatory address of the Deutsche Botanische Gesellschaft. Following similar addresses from the Vereinigung für angewandte Botanik, and from the Freie Vereinigung, an album of views of all the meeting places of the systematists was presented. Prof. Warming spoke on behalf of the foreign botanists. The presidents of the German Horticulture and of the Dendrological Societies added their felicitations, and it was announced that Prof. Engler had been made an honorary member of several learned societies in Germany, Russia, and other countries. On March 26 there was a banquet at which the official world was represented; and on March 27 the monthly meeting of the Deutsche Botanische Gesellschaft was converted into an "Engler" meeting, and Prof. von Wettstein gave, by special invitation, a lecture on the phylogenetic evolution of the Angiosperm flower.

In connection with the establishment of a meteorological observatory at Agra for upper-air observations, the *Pioneer Mail* states that the Government of India has decided that the observatory shall be called the "Aerological Observatory, Agra," and that Mr. J. H. Field, Imperial meteorologist, while in charge of this