(5) A book on "The Foundations of Short-Wave Therapy" by Holzer and Weissenberg[10] has recently appeared. These authors are vague in their references to 'specific actions', but refer to colour reactions, notably decolorisation of the dye pinacyanol in a short-wave field[11]. As this appeared to be a simple and striking example of the effect of short waves, we attempted to repeat it in our laboratory, but without success, and we are informed in a personal communication from Dr. Holzer that he has since been unable to reproduce the effect.

(6) Another similar example which we unsuccessfully attempted to verify is Esau's observation, quoted by Pflomm[12], that turpentine oil could be hardened by exposure to a short-wave field ; no details were available, and although we have asked Prof. Esau for fuller information we have as yet received no reply. Still more mysterious are the effects on operators of short wave appliances reported by both Holzer and Schliephake. The precise nature of these effects appears somewhat indefinite, but their principal manifestations are psychological and can be prevented by suitably screening the apparatus. The present writers, working on 3 metres with totally unscreened apparatus using a power much greater than that quoted by Schliephake, have failed to notice any effects following daily exposure, and they have been informed by research engineers working with very high power on ultra-short wave-lengths that such effects are unknown in their experience.

(7) One of the most promising lines of attack would appear to be the investigation of anomalies in dielectric constants at these frequencies, with a view to possible correlation with dipole moment phenomena. Hausser[13] has published work in which such effects were observed for sphingomyelin at a frequency corresponding to a wave-length of 5 metres. This example, if confirmed, would constitute the nearest approach to the clear demonstration of a specific effect yet made ; it is therefore of particular interest, though it appears from personal communication with the author that the position is not yet cleared up to her entire satisfaction. In any case its relationship, if any, to the spectacular effects claimed by the more enthusiastic protagonists of specific short-wave actions is still obscure.

We believe that, with the exception of the last example, the above selection of experiments and observations is typical of those upon which the hypothesis of a specific action has been built. If such an effect exists, it should be possible for the discoverers to describe at least one clear-cut experiment which could be repeated by other workers. In the absence of such evidence we consider that the great mass of inconclusive observations which has been presented is a very insecure foundation for the rapidly growing belief in specific short-wave therapy. Whilst the possible existence of specific actions of ultra-short waves cannot be denied, in our opinion such effects have not as yet been adequately demonstrated. We therefore find ourselves in agreement with the conclusions of a recent report to the Council on Physical Therapy of the American Medical Association, by Mortimer and Osborne[14] :

"There is no conclusive evidence from the literature nor were we able to substantiate the claim of specific biologic action of high frequency currents (short-wave diathermy). In our opinion the burden of proof still lies on those who claim any biologic action of these currents other than heat."

[1] J. C. McLennan and A. C. Burton, *Can. J. Res.*, **5**, 550 (1931) ; ibid., **3**, 224 (1930).
[2] T. Reiter, *Deut. Med. Woch.*, **59**, 1497 (1933).
[3] F. Dickens, S. F. Evans and H. Weil-Malherbe, in publication.
[4] E. Schliephake and A. Compère, *Klin. Woch.*, **12**, 1729 (1933).
[5] E. Schliephake, "Kurzwellentherapie", Fischer, Jena, 1935.
[6] ibid., p. 52.
[7] W. Haase and E. Schliephake, *Strahlentherapie*, **40**, 133 (1931).
[8] W. T. Szymanowsky and R. A. Hicks, *J. Infect. Dis.*, **50**, 1 (1932).
[9] ibid., **50**, 466 (1932).
[10] W. Holzer and E. Weissenberg, "Foundations of Short-Wave Therapy", Hutchinson, London (1935).
[11] W. Holzer, *Akad. Anzeig.*, Dec. 7, 1933.
[12] E. Pflomm, *Munch. Med. Woch.*, **77**, 1854 (1930).
[13] I. Hausser, *Sitz. Heid. Akad. Wiss.*, 6 Abh., 1–41 (1935).
[14] B. Mortimer and S. L. Osborne, *J. Amer. Med. Assoc.*, **104**, 1413 1935).

Obituary

Prof. W. E. Dalby, F.R.S.

PROF. WILLIAM ERNEST DALBY, emeritus professor of engineering in the University of London, who died at his home at Ealing on June 25 at the age of seventy-two years, received his practical training in engineering in the Stratford locomotive works of the Great Eastern Railway, and afterwards at the L. and N.W.R. works at Crewe. His duties at Crewe afforded him exceptional facilities for gaining experience in all branches of engineering work, and in construction and maintenance of both permanent way and locomotive. In 1894 he was at the University of Cambridge as assistant to the late Sir Alfred Ewing, who was then developing a Department of Engineering in that University. He left Cambridge to become professor of mechanical engineering and applied mathematics at the Finsbury Technical College, and in 1904 he succeeded the late Prof. W. C. Unwin as University professor of engineering at the Central Technical College, South Kensington. When that College was incorporated in the Imperial College of Science and Technology as the City and

Guilds (Engineering) College in 1907, he was made a member of its governing body and remained so until his retirement from the professorship in 1931. He was Dean of the City and Guilds College from 1906 until his retirement, and at the jubilee celebrations of the College in 1934 he was elected honorary fellow of the City and Guilds of London Institute.

Prof. Dalby served as dean of the Faculty of Engineering in the University of London for four years and as senator for eight years. He was elected a fellow of the Royal Society in 1913, was for some years vice-president of the Institution of Mechanical Engineers, and at the time of his death was a vice-president of the Institution of Civil Engineers. The Institution of Naval Architects also elected him honorary vice-president. He was president of Section G (Engineering) of the British Association in 1910, and was a member of some of that Association's research committees, notably the Gaseous Explosions Committee. During the Great War, Prof. Dalby served on several Government committees, and carried out much confidential research work for all three of the fighting Services. Of the many committees on which he served during the War and afterwards, mention may be made of the Board of Invention and Research, the Engineering Section of the War Committee of the Royal Society, for which he acted as secretary, and the Bridge Stress Committee.

It was only natural that Prof. Dalby's close connexion with railway problems during his service at the locomotive works should direct his attention to the many mechanical problems that arise in steam engine practice, and in the earlier part of his professional career his interest was largely centred on such problems. Towards the end of the nineteenth century, the demand for increased speed of engines brought into prominence the closer study of the methods of balancing rotating and reciprocating masses of engines. Prof. Dalby devoted considerable attention to this problem, and at the spring meeting of the Institution of Naval Architects in 1898 he described a new method which he had devised of solving balancing problems. The advantage of his method was that, by using a 'reference plane', the problem was reduced to one of graphical vector addition. This method he developed in his book "Balancing of Engines", which was first published in 1902. It has received such wide acceptance and has been so generally adopted that its authorship is in danger of being forgotten. In the latest edition of this work (1929) the author rightly states in the preface that his method "has found its way into textbooks with *and without* acknowledgment". Designers of high-speed engines are indebted to Prof. Dalby for so clear and simple a method of solving their balancing problems, and these problems are also not without interest for civil engineers, as the Report of the Bridge Stress Committee conclusively shows. In 1906 he published his second book on engine mechanism, namely, "Valves and Valve Gear Mechanism".

In connexion with the British Association's Gaseous Explosions Committee, Prof. Dalby was associated with the late Prof. H. L. Callendar in attempts to measure directly the temperatures inside the cylinders of gas engines. The method they employed required accurate indicating of the engine, and as the optical indicators then available were not sufficiently accurate for their purpose, Prof. Dalby improved on the design and produced the 'Dalby Watson optical indicator', which gave remarkably fine and accurate indicator diagrams.

Prof. Dalby was not slow to realize that such an indicator would prove invaluable in the rapid testing of materials, and shortly afterwards he designed his 'optical load extension recorder'. In this instrument he measured the load on the test specimen by the elastic extension of a hollow steel weigh-bar, the small elastic extensions being magnified optically to any desired scale. A photographic record of a load extension test could thus be obtained. Inertia effects in such an instrument being practically eliminated, test pieces could be rapidly loaded without sacrifice in accuracy of measurement. To effect such rapid loading he designed a special hydraulic testing machine, and thus he obtained a load extension diagram of a test-piece broken in one second of time. The instrument is described in several papers contributed to the learned societies and also in his book published in 1923, "Strength and Structure of Steel and Other Metals", wherein will be found records of researches carried out by its use.

The largest of Prof. Dalby's publications was "Steam Power". It was published in 1915 and brought into one volume comprehensive studies of steam plants, the properties of steam and the various dynamic and other problems associated with such plant. His last book, published in 1931, was entitled "Power and the Internal Combustion Engine". In addition to the five books mentioned above, he was the author of numerous papers contributed to learned societies and institutions.

In his teaching and lecturing, Prof. Dalby was clear in exposition and could make attractive any subject he presented to his audience. He was wholeheartedly interested in his profession, and his enthusiasm was an inspiration to those who were associated with him. His work at the College and for the many committees on which he served left him little time for recreation, and that recreation he often sought in change of work, for he was always happy at his drawing board designing or improving apparatus for conducting his researches. The many students who have come under his influence, and the wider circle of those who have read his publications or listened to his lectures, will regret the passing of one who has done much for the advancement of engineering science.

WE regret to announce the following deaths:

Dr. H. J. Hansen, of Copenhagen, a foreign member of the Linnean Society of London, on June 26.

Prof. Julius A. Nieuwland, professor of chemistry in Notre Dame University, U.S.A., known for his work on synthetic rubber and lewisite, on June 11, aged fifty-eight years.