

gave 1.18, which is in better agreement with Takeuchi's value.

The considerable interest aroused by Prof. Tomaschek's work stimulated the following additional remarks. The adjustment in the surface crust at the end of October seems, from all accounts, to be fairly sudden. On October 27, 1872, d'Abbadie reported a sudden large change in the vertical measured with a mercury trough level. On October 22, 1951, Dr. Corkan observed a sudden tilt at Bidston, as at Winsford, and there was also a sudden tilt in the Po Valley in north Italy. The interpretation of the tilting at the Continental stations is unlikely to be affected by shallow faults. (The Boussinesq solution for the tilting of an elastic plate shows that a fault would have to extend to a depth of about one-third the diameter of the Continent in order to have appreciable effect.) Winsford is embedded in a sedimentary trough some 6,000 ft. deep, between the Pennines and the Caledonian axis. All possibilities of correlating other phenomena with the annual variation of tilt are being investigated; for example, magnetic effects. No similar observations in the southern hemisphere appear to have been made, but it is possible that the effects might well be smaller on account of the more even meteorological conditions prevailing there.

Takeuchi, H., *Trans. Amer. Geophys. Union*, 31, 651 (1950).

OBITUARIES

Dr. W. J. Elford, F.R.S.

WORKERS in many fields of science will regret the untimely death on February 14 of William Joseph Elford. He came of a family long associated with Malmesbury in Wiltshire, where he was born in 1900. He graduated in 1923 from the University of Bristol, and afterwards held a Colston Research Fellowship, working under Prof. J. W. McBain.

In 1925 he joined the staff of the National Institute for Medical Research and remained for the rest of his working life. When he arrived, a big programme of work on virus diseases had been instituted there, and a wide field was open for the study of the physico-chemical properties of viruses. Building on the earlier work of Bechhold, Elford found out how to prepare a series of graded colloidion ('Gradocol') membranes, having pores of very uniform size. With these he worked out methods of ultrafiltration analysis for particles within the size-range from protein molecules to bacteria. With numerous collaborators he determined the sizes of many viruses including bacteriophages. Knowledge so obtained is at the basis of much we know about viruses to-day. Subsequent work, making use of other techniques, has to a remarkable extent confirmed the estimations of virus sizes which Elford made from his studies on ultrafiltration. He himself contributed further by his inverted capillary tube method in centrifugation analysis and by his studies of the density of virus particles.

Elford made a number of contributions to knowledge about bacteriophages, and, during the Second World War, to aerial disinfection. Among other things he showed that ozone was of no practical value for sterilizing air under conditions tolerable to human beings.

Recently, with other colleagues, he made a most useful contribution to the technique of electron-microscopy by showing that certain viruses which are adsorbed to red blood cells are equally well adsorbed to the stomata of red cell 'ghosts'. These form very suitable images for study by the electron-microscope, and the attachment of influenza and other viruses to them can be directly observed. In 1949 he unexpectedly found that recently isolated strains of influenza virus existed largely in the form of long filaments, and it seemed possible that the previously recognized spherical forms might develop within these or as a result of their fragmentation—a novel concept of virus-multiplication.

Elford, who remained a bachelor, was devoted to his laboratory work, in which he was scrupulously painstaking. He was an ideal, always willing, collaborator, working excellently with many biological colleagues. He quickly assimilated the biologists' point of view and, in turn, taught them the advantages of exact quantitative methods. He was elected a Fellow of the Royal Society in 1950. For nine years his health had not been good; but he continued working until the onset of his brief final illness. His place will be very hard to fill.

C. H. ANDREWES

Dr. H. W. Dickinson

THE death of Dr. Henry Winram Dickinson, which occurred at Purley, Surrey, on February 21, will be regretted by students of technological history in many lands, for not only did he do outstanding work at the Science Museum, South Kensington, but also he was the most active member of the Newcomen Society for furthering the study of the history of engineering and technology from its formation in 1920. The parent Society has now a membership of more than four hundred, while "American Newcomen", as the autonomous North American branch is often referred to, has a membership of more than 12,000. The birth of this branch was due to Dickinson's visits to the United States, during one of which he was given the honorary degree of D.Eng. by Lehigh University.

Born at Ulverston, Lancashire, on August 28, 1870, Dickinson attended Manchester Grammar School and Owens College, and was trained as an engineer in Glasgow. In 1895 he joined the staff of the Science Museum, and during the next thirty-five years served under four directors—General E. R. Festing, W. I. Last, Sir Francis Ogilvie and Sir Henry Lyons. He became the senior keeper, having charge of the Engineering Division, and was secretary to the Advisory Council. His position in the Museum brought him into contact with engineers from all parts of the world, and he counted among his friends Dr. Oscar von Miller, the creator of the Deutsches Museum at Munich, at the opening of which he was the British representative. He retired from the Museum in 1930, but his interest in its fortunes never flagged.

The formation of the Newcomen Society in 1920 had given Dickinson further scope for his business abilities, his love of research and his flair for writing; and in the companionship of its members he found his greatest joy. He wrote many articles, addresses, memoirs and books, among which were those on Fulton, Wilkinson, Watt, Boulton and Trevithick. From the first he edited the Society's admirable *Transactions* and was always to the fore in its