and important rôle in the maintenance of efficiency, such as lighting, heating, ventilation, the mode of life led by the worker outside his definite hours of labour, his housing, etc. Many of these factors have been partially examined. Thus Leonard Hill has carried out a great deal of valuable work on the influence of the cooling power of the air. Vernon has collected much interesting evidence, which shows that there is a very definite relation between the efficiency, as measured by output, and the temperature of the working place. The output in the hottest weather was about 30 per cent. below that when the weather was coldest. He also observed an apparent connexion between the relative humidity of the air and the efficiency of the worker. The efficiency, as might have been expected, was apparently greatest when the relative humidity was low. Elton has reported on the influence of lighting in silk weaving. He found

that the output was lowest when artificial light was used. He stated that even when electric light of sufficient intensity was used, the output was about 10 per cent. lower than the daylight value. The actual equipment of the factories, the provision of seats of suitable size, height, etc., the design of the machines, and so on, all play their part, as is shown by the many records, particularly from the United States.

In other words, the real over-all industrial efficiency of the worker cannot be causally related to any single factor. It is not the mere capacity of the individual to perform so many kilogram-metres of work in a given time with the smallest expenditure of energy. The quest of efficiency calls for the closest and most intimate co-operation between the scientific investigator, the employer, and the employee, and it can only be satisfactorily attacked when mutual distrust of motives, capacities, and methods is stilled.

The Total Solar Eclipse of September 21.

By Dr. A. C. D. CROMMELIN.

THE failure of the Christmas Island eclipse expedition is a great astronomical disappointment. Messrs. Jones and Melotte have devoted ten months or more to it, and hoped to secure useful photometric results for connecting the northern and southern stellar magnitude scales in addition to the eclipse work. The climate, however, proved unexpectedly unfavourable, and practically nothing could be done.

On the other hand, the conditions appear to have been ideal right across Australia, and enthusiastic reports have come from Wollal (West Coast), Cordillo Downs (centre), and Goondiwindi and Stanthorpe (Queensland). The Einstein problem was studied at Wollal by the Lick Observatory party under Prof. Campbell, and that from Toronto under Prof. Chant. Mr. Evershed also finally selected this station in preference to the Maldives, and is believed to have undertaken the same investigation, in addition, doubtless, to spectroscopic work. Prof. Dodwell, the Government Astronomer at Adelaide, had the use at Cordillo Downs of a tower telescope lent by the Lick Observatory for the Einstein problem; the New South Wales astronomers were in Queensland and did some spectroscopic work; they intended also to make Einstein investigations, but the telegrams do not allude to these.

It is well to point out that the test of the Einstein theory does not depend wholly on the results of this eclipse. The plates secured in the 1919 eclipse at Principe and Sobral settled definitely that at least the

half-shift was present, while the two cameras with the best definition gave values very close to the Einstein value. Further, the star-field in that eclipse was the best along the whole extent of the ecliptic, the stars in the present eclipse being much fainter. There are, however, two circumstances that should add weight to this eclipse: (1) that some of the observers were pointing directly on the stars, avoiding the use of a coelostat or other mirror; (2) that the plan was being tried of photographing another star-field *during totality*, thus obtaining an independent scale-value for the plates, which gives a much larger coefficient to the Einstein displacement in the equations of condition.

Probably weeks or months must elapse before the Einstein results are to hand.

The corona is said to have had four long streamers, one extending to three solar diameters, which is more than the average, though by no means a record.

Prof. Chant reports that the shadow bands were photographed. Prof. Kerr Grant, of Adelaide University, made measures at Cordillo by the photo-electric cell of the relative brightness of the sun and the corona. The results, with this very sensitive instrument, should be more trustworthy than previous determinations.

The next two total eclipses (1923, September, and 1925, January) are visible in the United States; 1926, January, in Sumatra, etc., and 1927 in England and Norway.

Obituary.

PROF. ALEXANDER SMITH.

ALEXANDER SMITH, emeritus professor of chemistry in Columbia University, New York, died in Edinburgh on September 8, aged fifty-seven. Smith was born in Edinburgh, and entered the University there in 1882, where he studied mathematics under Chrystal, natural philosophy under Tait, and chemistry under Crum Brown, graduating as B.Sc. in 1886. During

the following three years he attended the University of Munich, working in Baeyer's laboratory, chiefly under the direction of Claisen, and obtained the degree of Ph.D. in 1889.

After a year spent as assistant in the chemistry department of the University of Edinburgh, Smith was offered the chair of chemistry and mineralogy in Wabash College, Indiana, a post which he held for four years. In 1894 he became assistant professor of