

solution satisfactory to himself, those who knew him little might believe him indifferent. He would gather himself together, and in a few words would show how far his thoughts had taken him into the fundamentals of the subject. During the last year of his life he devoted much attention to relativity, and on his last voyage from Havre to New York he spent most of his days discussing it with Prof. Michelson. The work Prof. Lippmann leaves behind him is of capital importance; but it represents only a part of the thoughts of a man of science with views acute and deep whom the search for perfection and a reserved temperament kept far from noise and strife.

CAPT. W. E. ROLSTON.

THE sudden death, on August 9, at forty-five years of age, of Capt. W. E. Rolston will be greatly regretted by many old students of the Royal College of Science, South Kensington, where he received his scientific training. Capt. Rolston was the founder and managing editor of the *Cologne Post*—the admirable daily paper published by the British Army on the Rhine—but he was well known in astronomical circles by his work with Sir Norman Lockyer, and at Cambridge. He entered the Royal College of Science as a Teacher in Training, and for about a year assisted in the demonstrations in the course of astronomical physics there, gaining also some experience in solar physics work. In 1899 Rolston took up a teaching post, but returned again to the Solar Physics Observatory at South Kensington in 1901, and remained on the staff of the observatory until he joined the Buffs in 1915. He was with Sir Norman Lockyer for twelve years before the transfer of the observatory to Cambridge in 1913, where he continued to be a member of the staff.

After some preliminary work in the general routine of the observatory, Rolston became mainly responsible for several specialised branches of the investigations in progress. One of the most important of these was an attempt to apply the principles of Stokes's Law of Radiation to the determination of the relative temperatures of stellar atmospheres. A fundamental feature of Sir Norman Lockyer's Kensington classification of stellar spectra required the recognition of different temperature levels, and to investigate this a special prismatic camera, with quartz-calcite optical train, was obtained and mounted on one of the equatorial telescopes. Pairs of stars were photographed on the same plate under conditions as nearly identical as possible, with controlled exposures designed to give equal photographic intensity for the region  $H_{\beta}$ - $H_{\gamma}$ . By then measuring the relative intensity of the red and violet regions respectively, it was possible to arrange the various spectra in order of temperature level. These observations extended over about three years, and the results were communicated in a paper to the Royal Society in 1904 on the "Temperature Classification of Stars." In addition to taking a share in

the observational routine work, both day and night, on solar and stellar spectra, Rolston repeated much of the reduction work on old observations of widened lines in sunspot spectra, and brought the summaries up to date.

From 1907 to 1912 Rolston was chiefly occupied with the reduction of orientations, and with stone circles and temples in various parts of the world, these being regarded as having originally been designed by their constructors to serve for the determination of time and season in the regulation of the economic and religious life of the early communities. The results of these researches were extremely suggestive, and were communicated by Sir Norman Lockyer to the Royal Society.

During the last two years before the transference of the observatory to Cambridge Rolston was engaged in preparing a comprehensive account of the observations of novæ from the discussion of all available material, and this was published as a separate volume entitled "Phenomena of New Stars." After transference to Cambridge he took charge of the Huggins spectroscopic equatorial, and also assisted in the reductional work on stellar spectra.

Throughout his connection with the Solar Physics Observatory Rolston took great interest in the dissemination of scientific knowledge, and was most successful as a writer and as a popular lecturer. For a number of years before the war he wrote the notes for *Our Astronomical Column*, and also contributed numerous articles and reviews. The experience thus obtained was turned to excellent account when in March, 1919, he founded the *Cologne Post*, the unique daily newspaper which has had such valuable influence in revealing British thought to Germany. His success showed the value of a scientific training to business management and literary balance, and the frequent articles and notes on scientific and educational subjects published in the columns of his journal commanded both attention and respect. Rolston was, indeed, a man of sterling worth and sound knowledge, and all who knew him will deplore that he has been taken from them in the prime of life.

SAMUEL ALFRED VARLEY.

By the death on August 4 of Mr. S. A. Varley, at eighty-nine years of age, we have lost almost the last of those pioneers who were associated with the application of electricity. A younger brother of the late Cromwell Varley, F.R.S., and an early student and disciple of Michael Faraday, Mr. Varley was a notable inventor even comparatively early in life, when in the service of the Electric Telegraph Company. His name and fame will always be especially associated with dynamo-electric machinery, the first example of which he produced in 1866. This was a self-exciting machine with soft iron magnets. Ten years later Mr. Varley patented the original compound-wound dynamo. This afterwards became the subject of litigation, when Mr. Varley's claims

to priority were in the end completely established. The machine may be seen amongst the historical apparatus at the South Kensington Museum. His other inventions included a lightning protector for telegraph lines and cables, a polarised needle telegraph instrument, and the time-ball as now used at Greenwich Observatory and elsewhere.

Mr. Varley, following Lord Kelvin, contributed a highly useful paper, in 1858, to the Institution of Civil Engineers on the electrical qualifications requisite in long submarine telegraph cables, as well as another on the same subject to the Society of Arts. In setting forth here the true electrical qualifications for the working of a submarine cable, he showed in a very convincing way that conductor resistance was as much a factor in retardation as induction. He was the son of a famous artist, Cornelius Varley, and was one of a famous family of electricians. C. B.

It is with much regret that we have to record the death of M. JULES CARPENTIER on June 29. M. Carpentier was born in 1851, and received his education at the Ecole Polytechnique. In 1876 he entered the service of the Paris-Lyons-Marseilles railway as assistant constructional engineer, and would probably have developed his genius for machine construction in the service of the railway had not the death of Ruhmkorff directed his attention to the design of electrical apparatus. He took over Ruhmkorff's workshops, reorganised them, and commenced to manu-

facture standard electrical apparatus suitable for the measurement of the heavy currents necessary for the application of electricity to industry. Amperemeters, voltmeters, electro-dynamometers, and other apparatus associated with the names of d'Arsonval, Marcel Deprez, and Baudot were in a large measure developed and made practical instruments by the genius of Carpentier. His activities did not end with electrical instrument-making, for his name is also associated with three-colour photography, while during the war his workshops turned out a number of periscopes for use on submarines. M. Carpentier was elected a free member of the Paris Academy of Sciences in 1907, where he represented the mechanical arts and the manufacture of instruments of precision.

THE death occurred on August 13, at the age of sixty-five years, of SIR ALFRED W. W. DALE, late vice-chancellor of the University of Liverpool. Sir Alfred was educated at King Edward's School, Birmingham, and Trinity Hall, Cambridge. For twenty years he was lecturer, bursar, and tutor of his old college, during which time he established for himself a reputation as an able administrator of university affairs, as well as a classical scholar. In 1899 he was appointed principal of University College, Liverpool, and when Victoria University was dissolved in 1903, and its separate colleges assumed university rank, he became the first vice-chancellor of Liverpool University, retaining this post until 1919, when he was succeeded by Dr. J. G. Adami.

### Notes.

THE local secretaries of the British Association for the Edinburgh meeting desire to contradict the statement which appears to be current in some quarters that the hotels and boarding-houses of Edinburgh are fully booked for the period of the meeting. There is plenty of accommodation vacant in certain hotels, in boarding-houses, and in apartments; and in one of the hostels—a modern hall of residence—fifty places are still available for the accommodation of members. The Secretary for Hotels and Lodgings, the University, Edinburgh, will be glad to answer inquiries. Members who write to hotels and boarding-houses direct should enclose a stamped addressed envelope for reply.

THE outbreak of smallpox in Nottingham is at present kept within bounds by the incessant work of the medical and civic authorities. The trouble is that Nottingham has been for some years a hunting-ground of "anti" people. Still, we may be fairly sure that Nottingham will not suffer the fate of Gloucester, where 279 unvaccinated children died of smallpox in 1895-96. But there is always this difficulty, that vaccination in early childhood, though it may fail to give complete protection against smallpox some years later, may so modify the attack that the case is mistaken for chicken-pox. This mistake must be reckoned as well-nigh inevitable, now that

smallpox is so rare that many doctors have never seen a case of it. The annual report (1920) of the Scottish Board of Health contains a good summary of the Glasgow epidemic last year. It is the old story: that the general neglect of vaccination in childhood is bringing about a reversion to the original habits of the disease. Smallpox naturally prefers children under ten years of age: and now it gets them. Of course we all know that vaccination is not a perfect method; we all hope for a perfect method; we all would like to get rid of the calf, to be able to use a non-living vaccine, exactly standardised; a hypodermic dose, and no scratching of the skin. Some day, surely, this perfect method will be worked out. Meanwhile we all know what would happen if it were possible to take a school of 200 small children, to vaccinate 100, to leave 100 unvaccinated, and then to expose the whole school to smallpox. Even the anti-vaccinationists know what would happen. The present writer put this view of the disease to one of them, and he answered that God would interfere in favour of the unvaccinated children: a fool's answer. Two cases of smallpox have just occurred in Huddersfield (*Times*, August 11). Let us hope that vaccination of contacts, quarantine, and other sanitary measures will prevent the spread of infection. Probably we shall