

(1912-20), but also at Calama in Chile (1918-20), is given as 1.946. Dr. Abbot admits, however, a criticism by Kron, to the effect that this value may be 2 per cent. too low owing to a systematic influence tending to magnify the measured atmospheric transmissibility for ultra-violet rays. The error does not affect the evidence for variability in the solar radiation.

The above value is slightly greater than the mean (1.933) for the epoch 1902-12, and it is suggested that the increase is associated with the greater average solar activity during the later period. Whether this be so or not (and the more detailed comparison of values of the solar constant with sunspot numbers scarcely strengthens the evidence for such a connexion), the really remarkable result is the minuteness of the change; the solar agent which affects the diurnal variation of terrestrial magnetism must vary by 20 per cent. or more, instead of $\frac{1}{2}$ per cent. or 1 per cent., as here. There is, of course, a very slight compensation for any general increase of solar emissivity at times of many sunspots, owing to the diminution of emitting surface caused by the presence of the low-temperature spots; if there are also absorbing vapours above the spots, the compensation may not be merely slight; an appreciable drop (about 5 per cent.) in the solar constant coincided with the passage of a very large group of sunspots across the sun's disc in March 1920.

The short-period "solar-constant" variation, of amount from 2 to 10 per cent., has been further confirmed by simultaneous observations at Mount Wilson and at Calama, Chile; these stations are about 5000 miles apart, on opposite sides of the equator, and at different altitudes. Their observations show a moderate degree of correlation (0.491). Attempts have been made by Dr. Abbot and his colleagues to find connexions between the variations of the solar constant and the variations of contrast of brightness on the sun's disc which have been revealed by observations of the distribution of radiation over the sun's surface. Such measures have been carried on now for more than eight years by the Smithsonian observatory. The association between the two phenomena, if real, is very complex, high contrast sometimes accompanying high, and sometimes low, values of the solar constant. A correspondingly complex theory is propounded to account for this, but a much longer series of observations is required to test the theory. Dr. Abbot urges the desirability of other observatories taking up solar-constant work,

especially in view of the possibility that variations of radiation have predictable meteorological consequences, as Clayton's studies might suggest.

Various other cognate researches have been made by Dr. Abbot and his colleagues, Messrs. Fowle, Aldrich, Moore, and Abbot, during the period, since 1912, dealt with in the volume of *Annals* before us. Variations in the solar radiation have been tentatively sought by observing the changing brightness of the planets. The sun's total radiation has also been measured, at various terrestrial altitudes, from sea-level to high mountain stations, and beyond, up to 25,000 metres, by sounding balloons. A new empirical method of determining the solar constant by observations occupying only fifteen minutes in all has been introduced at Calama; this removes one of the chief sources of error in the longer method, namely, real variations in atmospheric transparency during the observations. In the new method the amount and character of the atmospheric absorption at the time of a pyrheliometer observation is inferred from a measure of the brightness of the sky in a zone 15° from the sun, and from the intensity of a particular water absorption band observed by means of the bolograph. Many observations of the brightness and transmissive power of the atmosphere have been made in the course of this and the other parts of the solar-constant work. Laboratory studies have been made on the absorption of long-wave radiation by water vapour, carbon dioxide, ozone, and by many common solid substances. The reflecting power of clouds has been measured by balloon observations at Mount Wilson in 1918; the ratio of reflection found was 78 per cent., independent of the solar altitude. From this the albedo of the earth is estimated at 43 per cent.

On account of over-frequent cloud and haze at Mount Wilson the solar-constant work carried on there since 1915 has been transferred to Mount Harqua Hala in Arizona, and the Calama station in the plain has been removed to Mount Montezuma, a few miles away. For a short time in 1917-18 observations were made at Hump Mountain in North Carolina, but the situation proved too cloudy. It is interesting to note, however, that one excellent observation was made at a lower air temperature than any experienced elsewhere during a complete solar-constant observation; both the hands and feet of the observer with the pyrheliometer were frozen in the course of the measurements!

Obituary.

W. H. WESLEY.

WILLIAM HENRY WESLEY, who died on October 17, at the age of eighty-one years, was appointed assistant secretary of the Royal Astronomical Society in 1875, and continued in that office till his death, a period of forty-seven years. He had excellent qualifications for the post, being most orderly and methodical in all secretarial and editorial work, and having great skill as a draughtsman and engraver, as was exemplified in his engravings of Dr. Boeddicker's drawings of the Milky

Way, and the illustrations of the corona in Mr. Ranyard's memoir on solar eclipses. It used to be said that Wesley knew the corona better than any man living, although he had never seen it; however, after an unsuccessful effort in Norway in 1896, the equatorial *coudé* at Algiers was put at his service by M. Trépiéd in 1900, when he made a detailed drawing in the short duration of totality (64 seconds) and expressed his opinion that the eye was no more efficient than the photographic plate for this work. He made combination drawings from the negatives obtained by the Greenwich staff in the eclipses of 1898,

1900, 1901, 1905, and these will probably be reproduced.

Fellows of the Royal Astronomical Society will long remember Wesley's readiness to help them in their researches, and to put his intimate knowledge of the society's library at their service. He was an original member of the British Astronomical Association, and served as vice-president for many years; on one occasion he delivered the presidential address in place of the late Mr. Green. A. C. D. CROMMELIN.

PROF. C. MICHIE SMITH.

CHARLES MICHIE SMITH, who died on September 27, was born on July 13, 1854, at Keig, Aberdeen. He studied at Aberdeen and Edinburgh, graduating as B.Sc. in 1876. He was appointed professor of physics at the Christian College, Madras, in the same year, and in 1891 became Government Astronomer at Madras. In 1899 he brought out the New Madras General Catalogue of 5303 stars: the low latitude of Madras gives its star catalogues special importance, since they serve to link the northern and southern catalogues.

Michie Smith observed the annular eclipse of 1894, and the total one of 1898 at Saldol, obtaining some beautiful large-scale coronal photographs. He also observed the Leonid meteors in 1899, including 37 of the first magnitude (Mon. Not. R.A.S., vol. 60), and published an extensive record of meteors seen at Madras from 1861 to 1890. He also observed the Zodiacal light, and wrote the article on this subject in the "Encyclopædia Britannica" (9th edit.).

Regular meteorological observations were made at Madras, and in 1893, Michie Smith published those of the years 1856 to 1861. He also contributed papers to the Royal Society of Edinburgh on the eruption of Bandaisan, the determination of surface-tension by measurement of ripples, and on atmospheric electricity and the absorption spectra of vegetable colouring matters. It was under his initiative that the mountain observatory at Kodaikanal was inaugurated in 1899, which has played such an important part in the extension of our knowledge of solar physics. He presided over the two observatories from 1899 till his retirement in 1911, when he was succeeded by Mr. Evershed.

WE regret to announce the death of the eminent scholar and editor, Dr. James Hastings, at the age of seventy-one years. The various Dictionaries of the Bible published under his control have enjoyed much popularity, combining with the orthodox position the results of modern criticism. But his greatest work was the "Encyclopædia of Religion and Ethics," the publication of which began in 1908 and ended with the twelfth volume in 1921. Like all works of the kind, it is uneven, but to the student of comparative religion, ethics and philosophy, anthropology and folklore, it is of the highest value. Hastings was a model editor, quiet and unassuming, sparing no pains to verify a fact or a reference; he maintained the most agreeable relations with his many contributors, some of whom must have tried his patience sorely. His fault, if it be a fault, was excessive kindness and hesitation in using his blue pencil when he was dealing with men who were recognised authorities on the subjects which they undertook. The war, which interfered with his arrangements with foreign scholars, added much to his anxieties, and the work must have come to a temporary end if he had not been generously supported by his publishers. He had planned a general index of the Encyclopædia, which will add much to its value for the working scholar. It is to be hoped that the scheme for the index was drawn up before his sudden, untimely, and much regretted death.

IN the *Chemiker Zeitung* of September 28 the death is announced on September 15 of Prof. F. Nobbe, of the Forestry Academy of Tharandt, the founder of the research station of plant physiology and the first station for seed control.

WE notice with much regret the announcement of the death on October 26, at sixty-six years of age, of Dr. C. G. Knott, reader in applied mathematics, University of Edinburgh, and on October 28, in his eighty-fifth year, of Prof. A. Crum Brown, emeritus professor of chemistry in the same university.

Current Topics and Events.

MUCH anxiety is felt in this country as to the position and prospects of the Royal College of Science, Dublin, under the Irish Provisional Government. By a sudden decree, the college was closed on October 1—a day before the new session would have opened. It was announced that a bomb had been found in the building, and this provided a plausible excuse for the action taken. No students had, however, been admitted to the college since June 30, and the circulation of the rumour as to the discovery of the bomb was known to be merely a means of suggesting that the college was a centre of disaffection and that in the interests of public safety it should be closed. For a week or two afterwards the teaching was carried on in buildings lent by the National Uni-

versity, but a second decree was made on October 16 ordering the students, about four hundred in number, to enter the National University classes, an arrangement against which both professors and students strongly protested. A compromise may be effected, but meanwhile the Royal College of Science is in the complete occupation of the military, and no one in authority will say that the building will be restored to its original purposes when military necessity ceases. It would be nothing short of a calamity if an institution in which so much valuable scientific work has been carried on for many years should have its activities abruptly ended to serve purely political purposes. The college is unique in Ireland; its equipment cost more than 250,000*l.* and no other