

vortex, or "eye" of the storm, was not less than 4 miles. The storm was accompanied by very heavy rainfall, the amount at St. Vincent being about 14 inches in the 24 hours ending at 9 A.M. on the 12th. The barometer at the Botanic Gardens, Kingstown, on the 11th fell from 29.539 ins. at 10 A.M. to 28.509 ins. at 11.40 A.M., a fall of 1.03 in. in 1 hour 40 mins. In Barbados 11,400 houses were swept away or blown down, and 115 lives were lost; and in St. Vincent 6000 houses were blown down or damaged beyond repair, and 200 lives lost.

Mr. W. H. Dines, B.A., F.R.Met.Soc., read a paper on the connection between the winter temperature and the height of the barometer in North-western Europe. From an examination of the records of the barometer and temperature at several observatories extending over many years, the author is of opinion that the winter temperature at a place in Western Europe has no connection with the height of the barometer at that place, and that in winter it is just as likely to be cold when the barometer is below the average, as when it is above the average.

Edwin Dunkin, F.R.S.

THE record of the life of the veteran astronomer whose memory was honoured by a special resolution at the last meeting of the Royal Astronomical Society may be summed up by saying that it was that of a man who found his life's happiness in faithfully doing his duty. Mr. Dunkin was not a great astronomer whose name will be quoted with those of Herschel, Airy, or Adams; his work in his own branch, though less brilliant, was not less arduous nor less useful, but equally deserving of renown with that of those celebrated men.

We have record of Mr. Dunkin's life from its earliest moment, for his birth is mentioned in the Minute-book of the Board of Longitude. His father, William Dunkin, who lived at Truro, Cornwall, was a computer on the staff of the 'Nautical Almanac,' and had occasion about this time to write to the Secretary of the Board, and in the letter* mentioned the birth of a son on 1821, August 19.

This son, Edwin, the third of the family, was educated at private schools in Truro until 1832, when, on the establishment of the 'Nautical Almanac' Office in Somerset House, the family removed to Camden Town, London, and the lad was sent to schools in that neighbourhood—first to Grove House, and then to Wellington House, Hampstead Road, where Charles Dickens had been a pupil a year or two before. In 1837 he was sent to a school at Guines, near Calais, where he remained until the death of his father in the summer of 1838.

* Observatory, vol. xxi. p. 123 footnote.

Having now to choose his career in life (his two elder brothers had pre-deceased their father), and being inclined to science, Edwin Dunkin naturally turned to his father's old friend, Davies Gilbert, F.R.S., for advice, and to Lieut. Stratford, the Superintendent of the 'Nautical Almanac,' for help. Through their influence he and his younger brother Richard were chosen by Airy as two of a band of young men he was then gathering together, quite distinct from the staff of the Royal Observatory, to effect the reductions of the planetary and lunar observations of Bradley, Bliss, Maskelyne, and Pond. The severity of this work has often been mentioned by Mr. Dunkin: the lads worked from eight in the morning until eight at night, with only one hour's interval, and were kept under the strictest supervision, so that it was a welcome relief when in 1840 he, with J. R. Hind, was attached as computer to the newly formed Magnetic and Meteorological Department at Greenwich under Mr. James Glaisher. The hours in this department were then irksome, for as this was before the era of photographic registration, eye-observations of the magnetic needles had to be made every two hours throughout the day and night. In October 1845 Dunkin was transferred to the Astronomical Department, and took his turn as a regular observer with the meridian instruments. It is worthy of mention as evidence of Mr. Dunkin's character, and the pride he took in his work, that he has more than once said to the writer of this that one of the pleasanter moments of his life was when he first saw his name printed in the Greenwich volume, and his happiest period was when, as a young man, he followed the regular and healthy life of an observer, taking his turn for duty on alternate days, in friendly emulation with his colleagues as to who could do the best day's work. He must have early obtained some reputation, for when H.M.S. 'Beagle' was setting forth on her scientific expedition, and her crew of observers was being chosen, Dunkin was given the opportunity of being the astronomer of the party; but as he had then met the lady who was to be his life-partner, and was looking forward to marriage, he was loth to leave. Airy, too, must have had a high opinion of his zealous assistant, for when the altazimuth was set up in 1847, he put Mr. Dunkin in complete charge of the instrument and of the intricate reductions: he and one computer, Hugh Breen, for several years alone used this instrument; they took turns of half a lunation in length and observed the Moon every night. The severity of this arrangement can be easily realized. When Airy organized the Harton Colliery experiment in 1854 Dunkin was one of the observers. He was one of the earliest astronomers who made use of the telegraph for the determination of terrestrial longitude, for he and M. Faye of Paris were the representatives of the two National Observatories in the first measurement of the arc, Greenwich—Paris, by means of the telegraph. An examination of the details of this work will show Mr. Dunkin's quality as an observer. He was the chief

observer in the telegraphic determination of the longitude of Valentia in 1862.

Mr. Dunkin joined the Royal Astronomical Society in March 1845, and in January 1852 made his first contribution to the 'Monthly Notices,' on the subject of the solar eclipse of 1851 July, which he had observed from Christiania, whither he had accompanied the Astronomer Royal's expedition. The interest of a solar eclipse at that time lay chiefly in the study of prominences and of the phenomenon known as Baily's Beads. It is curious to note now that Mr. Dunkin gave it as his opinion, though with reservation, that the prominences *had some connexion with the Moon*. Five years later he contributed his second paper, "On an Occultation of Jupiter," and from that time forward papers by him were fairly frequent, generally on subjects immediately connected with his work, on observations of occasional phenomena or on probable error and personality of observation. His most important work, which was no doubt instrumental in gaining for him Fellowship of the Royal Society, was a discussion of the Solar Motion in Space from the proper motions of 1167 stars*, the result of which was closely similar to that found by Herschel eighty years earlier. He became a member of the Council of the Royal Astronomical Society in 1868, and in February 1870 he was elected Secretary. He filled this office in a most capable manner until February 1877. Under his management the February number, which, as a report of the science during the previous year, forms such a useful contribution to astronomical literature, grew to its present size. Necessity occurred during his tenure of office to publish obituary notices of several distinguished astronomers, and several of these from his pen have been published in one interesting volume. Whilst he was Secretary, the Society changed its quarters from Somerset House to its present home in Piccadilly, and the management of this removal and the furnishing and arrangement of the new quarters in Burlington House were effected almost entirely by Mr. Dunkin. In 1884 he was elected President of the Society, and occupied the chair for the usual period of two years. In June 1876 he was elected a Fellow of the Royal Society, and served on the Council for two years, 1879-81.

In 1870 Mr. Dunkin was relieved from the work of observing at Greenwich, and was made Superintendent of Computers, which office carried with it the control of all the reductions relating to observations with the Transit-Circle. The retirement of Sir George Airy in August 1881, and the appointment of Mr. W. H. M. Christie to the office of Astronomer Royal, left the post of Chief Assistant vacant, and Mr. Dunkin was chosen to fill this for a defined period of three years, dating from 1881, Aug. 25, so that he ended his official career on 1884, Aug. 25, at the age of 63, after a service of 46 years. Since then he has taken little active

* *Memoirs R. A. S.* vol. xxxii.

part in astronomy; he attended the meetings of the Society occasionally, but not frequently, as the journey from town late at night was prejudicial to his health. He was almost always present at the Visitation of the Royal Observatory and similar functions, when it was pleasant to see the delight with which he renewed acquaintance with the instruments so well known to him, and discoursed to his former colleagues on his earlier experiences. He tolerated the introduction of the Sun-spot department, and also of the spectroscope, as these did not compete in any way with the Transit-Circle; but he, with conservative mind, could never be brought to appreciate the application of photography to the determination of star-places, which he seemed to consider cast some derogation on old and well-tried methods. He died at "Kenwyn," Kidbrooke Park Road, Blackheath, on 1898, Nov. 26, after an illness of about three months' duration, and was buried on Dec. 1 in Charlton Cemetery.

Besides the contributions to scientific literature mentioned above, Mr. Dunkin re-arranged a new edition of Dr. Lardner's textbook on Astronomy; he was sole author of a well-known work 'The Midnight Sky,' and contributed to the 'Leisure Hour' and other publications. He was a member of the Royal Institution of Cornwall, and sometimes wrote in its publications.

He married, on 1848, April 4, Maria, eldest daughter of the late Samuel Joseph Hadlow, formerly a member of the Stock Exchange. His widow survives him, also an only child, Edwin Hadlow Wise Dunkin, an antiquarian of reputation, author of 'The Monumental Brasses of Cornwall,' 'The Church Bells of Cornwall,' besides papers in the 'Sussex Archæological Collections.'

H. P. H.

Notes on the Wolf-Rayet Stars.

THIRTY-TWO of these curious objects were examined, spectroscopically and spectrographically, by Professor Campbell with the great Lick refractor in 1892-3*; and in sorting these out by the alternative position† of their characteristic azure band, I have lately noticed a correlation of some significance. It is this: when the band in question has its maximum at λ 469, the line most prominent in the lower part of the spectrum is at λ 541; while the shifting of the blue glow upward to λ 465 throws the stress of radiation downward upon the yellow line at λ 581. There is an "extreme and mean" correspondence. The inner rays are strong when the outer rays are weak, and *vice versa*. So far as extant data enable one to judge, this rule is infallible; merely a slight

* 'Astronomy and Astrophysics,' vol. xiii. p. 448.

† Observed by Vogel in 1873, definitively recognized as marking a specific difference by Sir William and Lady Huggins in 1890, and admitted as a principle of classification by Pickering in 1891.