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Obituaries.

Edward Walter Maunder.

The time has come when the Association has to mourn the loss of its founder, and it may not be unbecoming to begin this notice, written in appreciation of the work and character of Edward Walter Maunder, with a brief account of the circumstances that led to the coming into being of the British Astronomical Association that owed so much to him both for its existence and for the prosperity it has achieved in its subsequent career.

A Society, called the Liverpool Astronomical Society, that had been founded in 1881 by the union of a few local astronomers, had had remarkable success, and about the year 1887 comprised six or seven hundred members, mainly amateur astronomers, some being of local habitation, but the greater number having their homes in other parts of the kingdom. From that time, however, a decline appears to have set in, and some disaffection arose on the part of those members not resident in Liverpool, who felt that their interests were not sufficiently considered. Maunder was known to, and in touch with, many amateur astronomers, perhaps because he had been editor of the *Observatory Magazine* for some years, and in this way the friction in the Liverpool Society came to his knowledge, whereupon he saw the existence of a want that he resolved to supply by establishing an organisation of the same kind with some of its faults remedied. The first public suggestion for the formation of such a body came from Mr. W. H. S. Monck, of Dublin, who had been an active member of the Liverpool Society, and in a letter to the *English Mechanic* of 1890, July 18, pointed out the failings of that body with a view to preventing their repetition. This was followed by letters from others in the same journal, seconding the proposal, and in the number for August 8 there appeared one over the signature E. W. Maunder, which began: "With reference to Mr. Monck's letter in your issue of July 18, you will, perhaps, allow me to say that a Society upon the lines that Mr. Monck has suggested is now in process of formation, and that I shall be pleased to receive the names of those who would like to join." Thus was the British Astronomical Association launched. There was much consideration as to its name, objection being raised to the use of the word "Society," lest there should be confusion with the older organisation, and it may be added as a matter of record that the first mention of the word "British" as part of its title seems to have been made by Mr. William Godden, who, in the number of the *English Mechanic* that Mr. Maunder's first letter appeared, wrote that the new organisation should not be called "Amateur," as it had been in making these preliminary suggestions, but that the word "General" or "British" would be better. Maunder's effort was not confined to receiving names, but by interview and letter he collected

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well-known workers in the science as adherents, and on October 24 a general meeting of the Association was held in the hall of the Society of Arts, when a membership of nearly 300 was reported. It is unnecessary to pursue this subject further. The records of the Association in the *Journals* show the interest Maunder had in this body of his own creation and the large amount of knowledge, skill, and labour he expended to further its welfare. He was editor of its publications from the beginning to October, 1900, with the exception of the fifth and sixth sessions, when he transferred the editorship to the lady he afterwards married, as he was chosen to occupy the Presidential Chair in those years.

But to go back to earlier years, Edward Walter Maunder was born in London on April 12, 1851, the youngest of three sons of the Rev. George Maunder, a Wesleyan minister. He went to the school attached to the University College in Gower Street, and afterwards to the classes at King's College, London. As an indication of scientific bent it may be mentioned that as a lad in a period of enforced leisure after a very severe illness he set himself the task of making a map of the town of Croydon, where his family was then living, by pacing the length of the streets and measuring angles by eye. After boyhood he found occupation for a time in a bank in the City of London, but at the end of the year 1872 an examination was conducted by the Civil Service Commissioners, the first of its kind, for the purpose of filling a vacancy in the staff of the Royal Observatory. Three of the competitors, Downing, Finlay, and Maunder, were all afterwards well known in the astronomical world. Downing, who was first, was appointed to fill the vacancy at Greenwich; and posts were found for the two *proximè accesserunt*. Finlay was First Assistant at the Royal Observatory, Cape of Good Hope, at the beginning of 1873, and through a second examination Maunder was appointed Photographic and Spectroscopic Assistant at Greenwich on November 6 of the same year. This was a new post, the creation of which had been foreshadowed by the Astronomer Royal, Airy, in his report to the Board of Visitors of 1872, when he said that a continued series of observations of the solar spots might fittingly be included in the curriculum of the Royal Observatory, but expressed some doubt whether the same could be said of solar spectroscopy. Both these things, however, were favoured by Mr. Christie, then Airy's chief assistant, and by 1874, April, a photoheliograph that had been used at the Kew Observatory (it was afterwards replaced by a Dallmeyer, on its return from the Transit of Venus Expedition) was installed at Greenwich, and on May 2, 1874, a spectroscope was received from Mr. Browning and attached to the refractor with $12\frac{3}{4}$ object-glass by Merz, then known as the Great Equatorial. These were the days of wet plate photography, and taking the daily pictures of the Sun was a somewhat lengthy proceeding, requiring considerable skill. At first the spots were not measured, but merely numbered and their dates recorded; but from the beginning of 1875 the areas were measured, and later

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their positions on the disc, in the well-known form. On occasion, as the photographic work permitted, Maunder used the spectroscope to examine the Sun's limb for the purpose of detecting and measuring the solar prominences by the method evolved by Lockyer and Janssen some years earlier, and about the year 1875 he, with Mr. Christie who observed with the instrument occasionally, began a series of observations of displacement of lines in stellar spectra for determination of velocity in the line of sight. Sometimes the spectroscope was applied to the planets or to comets, there being several notes on the latter class of observation by Maunder in the *Monthly Notices*, whilst at others this adjunct was removed to use the refractor for simple visual observation, a study of the surface of Mars at the opposition of Mars of 1877 being a notable example of his work of this class.

The preceding paragraph indicates the subjects of Maunder's work during the first decade of his service at the Royal Observatory. On Christie's appointment to the office of Astronomer Royal in 1881, one of his first tasks was to re-organise the sunspot work, by making improvements in various directions. The photoheliograph was modified so that the diameter of the Sun on the photographs was now 8 inches, instead of 4 as it had been hitherto; the scheme for completing the daily series by adding photographs taken at Dehra Dun and elsewhere was inaugurated; a new measuring machine was obtained from Messrs. Troughton and Simms, the *personnel* of the department was increased, and thus was put in train the formation of the unique record of the solar spots that must always be associated with the name of Maunder. Much might be said about the tabulations and deductions made from these, probably with the help of his able wife, but it must be sufficient to mention a determination of the Solar Rotation period published in the names of Mr. and Mrs. Maunder in the *Monthly Notices* for 1905 June, that embodies some ingenious and novel statistical methods, and a tabulation of the dates of the larger magnetic disturbances recorded at the Royal Observatory, Greenwich, in the years 1882-1903, leading to correlation with the Solar Rotation that appeared in November, 1904, and caused some sensation since it appeared to show so vividly the dependence of the terrestrial phenomena on the solar. His diagrams were always very informative. They were not only pleasant to the eye, but brought the fact home to the mind with much force; the "butterfly" diagram that exhibits all there is to know about the distribution of the spots in latitude being a case in point. From the indexes to our own volumes as well as from those of publications of the Royal Astronomical Society, may be learned the diversity of subjects that engaged Maunder's attention. Archaic astronomy, such as the origin of the constellations, was one on which he wrote much; the Zodiacal light was another; the limit of vision as it applied to the appearance of "canals" on Mars was investigated by him and the headmaster of the Royal Hospital School in an ingenious experiment; but space will not permit of details of all his researches and writings, which covered a wide range.

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The *Observatory Magazine* was founded by Mr. Christie in the early part of the year 1877, and carried on by him single-handed until his appointment as Astronomer Royal in 1881 August, when he asked Maunder to join him as co-editor, and the number for November bore both names on its cover. From that time until the end of the year 1887 Maunder took the leading part in producing this publication, though for three of the years two of his colleagues were nominally associated with him in the editorship. For a period he supplied *Nature* with a weekly column, and at another the astronomical section of the periodical *Knowledge* was in his charge, and many articles on varied astronomical subjects will be found in its pages. The astronomical section of a theological work, " The International Standard Bible Encyclopædia," was written by him, and this probably does not complete the list of productions of this kind from his facile pen. His book on the Royal Observatory, Greenwich, which appeared in 1900, is a brightly written and choicely illustrated history of the institution ; and " Astronomy Without a Telescope," published in 1902, has found many readers. As its title implies, it teaches what may be done in astronomy by means of the naked eye and binoculars ; it describes the constellations, meteors, the Zodiacal light and the Milky Way. Its concluding lines anent the Galaxy, " It is nature at her vastest that we approach : we look up to her in her most exalted form. We see unrolled before us the volume which the finger of God has written ; we stand in the dwelling-place of the Most High," indicates the devoutness which was a marked feature of Maunder's character.

His extensive Biblical knowledge, combined with his astronomical, led to the writing of the " Astronomy of the Bible (1908), an Elementary Commentary on the Astronomical References of Holy Scripture," which is an erudite book embodying information and opinions of an unusual kind, that received high commendation of a very catholic nature, for a Jewish Rabbi, his Holiness the Pope, and the Archbishops of Canterbury and York, all expressed their appreciation.

Since Maunder's work was associated with photography of the Sun and spectroscopy, it is not surprising that he was chosen to take part in the observation of Solar Eclipses. To observe the total eclipse of the Sun of 1886 August 29, an expedition of several well-known astronomers and physicists, of whom Maunder was one, was sent by the British Government to Grenada, West Indies, and, observing from Carriacou, he obtained seven photographs of the corona and two of the coronal spectrum. To observe the eclipse of 1901 May 18, he went as the observer from the Royal Observatory by sanction of the Admiralty, to Mauritius, where he obtained a successful series of photographs. For the eclipse of 1905 August he went to Canada at the request of the Canadian Government, but on this occasion adverse weather conditions prevented observation of the phenomena. Distinct from these official expeditions were those under the auspices of the British Astronomical Association, for the inception and carrying out of which Maunder was largely responsible. The voyage

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to Vädsö, in Lapland, to observe the eclipse of 6 August, 1896, achieved a great success socially, but the main purpose of the expedition was, unfortunately, frustrated by a heavily clouded sky at the critical moment. Accounts of the expeditions to India in 1898, when both the parties organized met with complete success, and to Portugal, Spain, and Algeria to see the eclipse of 1900 May 28, which was in the main equally well observed, have been given in two charming books edited by Maunder, issued as publications of the Association. On the first of these occasions, that is, in 1898, Mrs. Maunder, who accompanied him, photographed a ray of the corona extending to a distance of six lunar radii from the limb.

Such is the record of a very full life; of work well planned and well carried out. The friends he leaves behind to mourn his loss will keep in remembrance a generous-minded gentleman, a man who never wilfully said an unkind word, but often said kind ones, though one whose placidity of bearing did not prevent him from vigorously maintaining views that he felt to be just. A characteristic of our friend was his " silver " tongue, very effective in the lecture-room and remarkably in keeping with his amiability of manner.

Some personal details have already been given and to these it may be added that Maunder was twice married. His first wife died in 1888, leaving a family of three sons and two daughters, all of whom survive him. In 1895 he married Miss A. S. D. Russell, who had previously been a member of the staff of the Royal Observatory and has contributed to astronomy jointly with her husband and in her own name. Maunder retired from his post at the end of the year 1913, having completed 40 years' service, but was recalled during the war to carry on the sunspot record. For some years after his retirement he was Secretary of the Victoria Institute, an organisation whose purpose it is to reconcile, if necessary, the tenets of Scripture with the truths of science. He joined the Royal Astronomical Society on 1875 February 12. He was a member of its Council for many years, and joint Honorary Secretary from 1892 to 1897.

He died on March 21 last, after a period of great debility, within a month of the completion of his 77th year. It may be added that a memorial service was held at the Catholic Apostolic Church in Camberwell, London, S.E., which Maunder, holding, as its members do, the views considered orthodox by the Established Church of England, attended, and in whose private affairs he took a leading part. H. P. H.

Antonio Abetti.

By the death at Florence of Professor Antonio Abetti on February 20 last, Italy has lost a notable figure in the field of astronomy. Born in 1846 at S. Pietro di Gorizia, then a part of " Italia Irredenta," Prof. Abetti, after completing his studies at the University of Padua, commenced his astronomical career as assistant at the observatory of that city under the directorship

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of Lorenzoni, and remained actively associated with the institution for over twenty years. In 1874 he joined the Italian expedition to India for observing the transit of Venus, and on this occasion had the good fortune to see the planet projected against the solar chromosphere on the C-line through the open slit of his spectroscope. This observation, which is figured in the *Mem. Soc. Spett. Ital.*, and which Prof. Abetti described to the writer during one of his visits to Arcetri, was considered most remarkable at the time and, by some, was scarcely credited. Abetti's technical ability—always one of his chief characteristics—was still further developed by a year's practical work at the Observatory of Berlin, and at the comparatively early age of 47 he was nominated Director of the Arcetri Observatory at Florence. This institution, re-opened in 1872 by Donati, the discoverer of the great comet of 1858, and for some years under the directorship of Tempel, had, unfortunately, passed through a period of neglect owing largely to the transfer of Italy's capital to Rome, so that when Abetti took over the directorship in 1893 he found full scope for his technical skill in its re-organisation. Thus, he re-mounted the large Amici objective, added a Bamberg meridian circle, and generally modernised the instrumental equipment of the observatory to such an extent that, thanks to his energies and those of his son and successor, Dr. Giorgio Abetti, the classic hill of Arcetri is crowned to-day with one of the most up-to-date astrophysical observatories in Europe. Details of the latest instruments, including the newly-erected tower telescope, will be found elsewhere in the JOURNAL,* but reference must be made here to the late director's enormous output of observational work, which was primarily devoted to astronomy of position in general and to the study of the minor planets in particular. The complete list of his publications includes some 79 separate items, while his astronomical activities, in spite of his retirement under the age limit in 1921, lasted to within a short time of his death. It was his idea, *e.g.*, to found at Arcetri, and in the immediate vicinity of the Observatory, the new laboratories for physics and practical optics which several of our Members had an opportunity of visiting in 1922 on the occasion of the meeting in Italy of the International Astronomical Union, while so late as February 8 last a circular bearing his signature appeared dealing with business matters concerning the Italian Astronomical Society.

Prof. Antonio Abetti had been for many years a member of the famous Accademia dei Lincei, and in 1921 was elected an Associate of the Royal Astronomical Society, but in spite of his many professional duties, which included those connected with the chair of astronomy at the University of Florence, he always took the keenest interest in the social side of our science. It is in this respect more particularly that the present writer would like to record his deep sense of gratitude for the never-failing interest and encouragement in amateur work, as well as for the

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cherished and helpful friendship generously extended to him throughout his long residence in Florence.

W. A. P.

James Fulton McCallum.

By the death of Mr. James F. McCallum on 14th March last, at the age of 63, the Association and the West of Scotland Branch lost a member of a most valuable type. There is not much to tell of Mr. McCallum's career. He was the eldest son of a respected citizen of Paisley, and remained all his life connected with his native town. He occupied various clerical positions in the offices of one of the great Paisley thread firms; but his true life was lived outside of business hours. He was one of the leading members of Paisley Philosophical Institution, which he frequently represented at scientific gatherings. He was president of the local Naturalists' Society, member of the Library and Museum Committees, and keenly interested in Marine Biology. Many other local activities might easily be added; but his connection with astronomy deserves a few more words.

His interest in astronomy was a late development, but it rapidly became his premier interest. He became a regular attender at the West of Scotland Branch, and soon a member of its council. In the branch he was generally thought of as a coming president. In 1923 he joined the parent Association. In 1925 he took over the convenership of the Astronomical Section of Paisley Philosophical Institution, and immediately joined enthusiastically with the writer in schemes for the reconstruction of this body. To that end the West of Scotland Branch of the Association joined in conducting a series of public lectures, at which attendances of hundreds were gathered; the success of these lectures was due to the energy of Mr. McCallum in making the local arrangements perfect in every detail. When, later, an astronomy class was formed, Mr. McCallum acted as class secretary, and did everything necessary with the foresight of the born organiser. Out of the class came a flourishing little astronomical society, of which Mr. McCallum is the acknowledged founder, and of which he was naturally convener.

The state of Mr. McCallum's health gave him anxiety for some time before his death; for that reason he had to decline a pressing invitation to give a paper before the West of Scotland Branch, but he did give an account of his observations of the eclipse, made at Southport. The illness which caused his death was quite unexpected, however, and very short; the funeral was attended by two representatives of the West of Scotland Branch, and the members passed, upstanding, a vote of regret and sympathy with the relatives. Similar tributes were also paid by the Paisley Astronomical Class and Society.

The present writer can never hope to meet with a more enthusiastic or understanding fellow-worker in the diffusion of our science. Mr. McCallum did well a work whose importance can scarcely be overestimated; and he is assured of a memorial in the continuance of the work which he established.—T. L. McD.

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George A. Taylor.

The death is recorded of George Augustine Taylor on January 20, 1928, at 20, Loftus Street, Sydney, N.S.W. He was the editor of *Building, Construction, The Commonwealth Home, The Australasian Engineer,* and *The Radio Journal.* Mr. Taylor joined the Association as a Member of the New South Wales (Sydney) Branch on April 27, 1922.

Reviews.

"Die Bahnbestimmung der Himmelskörper." Von Julius Bauschinger. Second edition. Pp. xv + 671. Leipzig: Wilhelm Engelmann, 1928. Cloth bound. 59 Marks.

English astronomers, on the whole, have devoted very little attention to the determination of orbits. Dr. Crommelin is our most notable exception, although a number of orbits have also been computed by Merfield, Merton and Wood. Perhaps the scarcity of suitable literature in our language has been partly responsible for this seeming lack of interest. Watson's *Theoretical Astronomy,* first published in 1868, and still the only text-book, is out of date and out of print. A recent paper by Merton* has inspired one or two efforts. Readers of the German language, on the other hand, have been particularly fortunate in having Oppolzer's *Lehrbuch zur Bahnbestimmung der Kometen und Planeten* (1870 and 1880), Klinkerfues's *Theoretische Astronomie* (1871) and, since 1906, the first edition of the work under review. As a text-book, and as a guide and companion to the practical orbit computer, this latter is unrivalled. It had become out of print, and a second edition is decidedly welcome.

The development of the subject proceeds in an orderly and logical sequence, and is complete, no reference being needed to other books for various auxiliary steps or processes The first section is devoted to spherical and dynamical astronomy, the subjects of co-ordinate systems, time, precession, nutation aberration and parallax being treated, with a view to their subsequent application. Then follows the properties of a body moving round the Sun, succeeded by a short section in which the complication of a moving terrestrial viewpoint is introduced. The reader is now prepared for the real subject of the book, which is dealt with in an admirably clear and well illustrated style. Chapters on special perturbations and the definitive orbit follow, and the book concludes with an account of the determination of the orbits of meteors, satellites and double stars.

Our chief cause for regret is that so little has been done in this revised edition to incorporate the researches of the past twenty years. The method used by Cowell and Crommelin in their prize-winning essay on Halley's Comet is not even mentioned. Leuschner's so-called "short method" is dismissed with a mere reference. Although this method does not seem to be used by anyone who has not come under the spell of Leuschner himself, and its claims are not admitted on this side of the Atlantic, nevertheless the work of the Berkeley school would seem to call for more than four lines. The more general use of calculating machines to-day offers scope for improvement and shortening of the older logarithmic methods, as Merton and others have shown; nevertheless the computer will look in vain for any hint in this direction.

It must not be inferred from the criticism of the last paragraph that the work is hopelessly out of date. It still remains the foremost treatise on the subject, but the reader who has mastered its contents and wishes

* G. Merton, "A Modification of Gauss's Method for the Determination of Orbits," *M.N.R.A.S.,* **85,** 693 (1925 June).

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