

Edward Walter Maunder FRAS (1851–1928): his life and times

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‘... but these are deeds that should not pass away and names that must not wither.’

Childe Harold's Pilgrimage. Lord Byron (1788–1824)

The year 2001 saw the sesquicentenary of the birth of Edward Walter Maunder,¹ and 2004 the centenary of the publication of his Butterfly Diagram and the experiment on the canals of Mars. Despite his holding a pivotal place in the history of British amateur astronomy, so far no major treatment of his life has appeared.² Although he was a prolific writer, virtually no reference appears in any modern work today; even his work in solar astronomy and geophysics is generally unacknowledged. Sheehan's portrayal of Maunder as ‘...a good example of the way in which fame and oblivion are inequally distributed among scientists... though he accomplished a great deal of... work of the very first rank... he is relatively unknown today’³ is very pertinent. However, this appears to be changing as research is currently in progress respecting his work in solar astronomy and his investigations of the history of the origins of constellations. It is however as the founder of the British Astronomical Association that he is remembered.

Antecedents

The name Maunder is apparently of West Country origin, particularly in the area of Somerset and Devon. The name itself is Middle English and, as is to be expected, has a number of variants.⁴ In a short account of Cruwys Morchard published in 1931, it is stated that ‘The first mention of the name Maunder occurs in 1368. This family were tenants of Moore from 1514 until 1637, when they became owners and continued to live there until 1875.’ This same work also contains a list of the overseers (presumably of the poor law institutions) and Church wardens from 1628–1874, which includes several Maunders.⁵ The will and inventory of a George Maunder (1648), which survived until the Second World War, identified him as yeoman.⁶ A number of Maunders attended the University of Cambridge, but whether any of these were ancestors of Walter has yet to be proven.⁷ The emphasis placed on Cruwys Morchard is intentional, as will be seen later.

It is possible to trace Walter's ancestry back to at least his great-great grandfather, George Maunder (baptised 1730) of Tiverton who had married either a Mary Brook of Exeter or (maybe a second marriage) Mary Skinner in Cruwys Morton in 1755.⁸ He was father to Thomas

Maunder (1755–1831) who married Susannah Ocock (1751–1823) of Silverton in 1779. They had six children (three boys, three girls) including Walter's grandfather Thomas (1784–1851). This Thomas enlisted in the 28th Regiment of Foot (later the Gloucester Regiment) in 1803, and was called to the Colours in 1804 while the Regiment was stationed in Formoy, Co. Cork, Ireland.⁹ During one period of leave in 1812 he married Ann Moody (1795–1823) of Caistor, Lincolnshire.¹⁰ Involved in several campaigns, he served under Sir John Moore at Corunna (1809), was part of the army of Wellington which entered France (1813), was present at Waterloo (1815), and received various campaign medals, including the Waterloo medal.¹¹ During this campaign twins were born at Bayonne, of which only George Peter (1813–1878) survived, who was the father of Edward Walter Maunder, the subject of this paper. After retiring from the army, Thomas moved to Bedminster, where he became a tanner.¹²

In a letter to her stepson Ernest concerning the funeral arrangements of Tom (i.e. Thomas Frid, died June 1935) Annie Maunder refers to a possible early astronomical connection (and hence the emphasis placed on Cruwys Morchard), for she writes:

‘Do you remember my telling you of a description of the Aurora Borealis of Nov. 10, 1719, sent to the Royal Society by the Rev. William Maunder the ‘Chaplain’ of Cruwys Marchard [*sic*] in Devonshire and how like it was in expression and general character to what your father would have written. I told Gordon about it this morning when I saw him, and he says that Cruwys Marchard is where the family came from. – So that Rev. William Maunder is probably a relative and very possibly an ancestor. – a nice case of heredity in character and literary expression.’¹³

The Rev. William Maunder referred to cannot have been rector of Cruwys Morchard parish church as according to the records it was a William Shepherd during this period.¹⁴ He could have been rector of another parish, possibly Tiverton. The letter in the *Philosophical Transactions* does not appear to make any reference or inference to his being a minister of religion.

However no one of this name appears in the lists of alumni of Oxford or Cambridge Universities for this period who can with any certainty be identified as William, and as it was not possible to attend either University at this time unless you were a communicant of the Church of England; if he had been an ordained minister he must certainly have been a nonconformist one.¹⁵



Figure 1. The Maunder family in the 1870s (date unknown). *Back row:* George W. (brother); Rev. George (father); Anne Eliza (sister); Mary Ann (mother). *Front row:* Edward Walter; Ellen Beatrice (sister); Mary Ann (sister); Thomas Frid (brother). *Courtesy Mr Philip Maunder.*

Parents and siblings

Edward Walter Maunder was the youngest son and fifth of seven children of the Revd George Maunder, Wesleyan Minister, and Mary Ann Frid (1817–1878). Following his father's retirement from the army and settlement in Bedminster, George was originally apprenticed to a printer in Bristol. However he showed a marked preference for the Church, became an ordained Wesleyan Methodist minister and from youth a teetotaler, very active in the battle against drink. He had a distinguished career in the ministry, being appointed chairman of the Oxford District in 1876, and promoting the building of the Wesley Memorial Church there; he was also a founder and the first editor of the *Methodist Temperance Magazine* (1868). While serving in the Southwark (Surrey) circuit he struck up a friendship with Thomas Frid, whose eldest daughter, Mary Ann, he married on 1840 July 2 at the parish church of St Giles, Camberwell.¹⁶ As a Methodist minister he travelled a great deal around the country, as can be seen in the birth places of his children (Table 1). Following his marriage he went to Leamington, where his eldest son, Thomas Frid, was born, and then successively to Manchester, Sheffield, London, Leeds and then back to London in 1861 as Superintendent of the Lam-

beth Circuit, before finally moving to Oxford, where he died suddenly in 1878.¹⁷

Of Walter's siblings, Thomas Frid is the one most associated with him. Thomas was born on 1841 June 17, educated at University College School (1850–1852) and became an accountant in the City of London, with an office at 26 Martin's Lane, Cannon Street, London, E.C., retiring in 1907.¹⁹ So far as is known, he had no particular interest in astronomy *per se* (there are no papers concerning astronomy with his name appearing in either the *BAA Journal* or other astronomical publications), but this did not prevent him from helping his brother, with whom his name is closely linked in relation to the formation of the BAA in 1890.²⁰ At the first Council meeting of the BAA, on Wednesday 1890 October 8, he was appointed its first Assistant Secretary.²¹ The few letters of his that exist in the archives of both the BAA and the Royal Astronomical Society (RAS), largely deal with administrative matters, including one letter that may well be illustrative of his sense of humour, for he writes:

'I am afraid you spoil your 'fellows.' I am sending out reminders to defaulters and I find that the bulk of them are 'FRAS's' and parsons. When they are both rolled into one there seems no chance of getting the subn. I suppose the clergy are more used to collecting subns. than paying them.'²²

At the Council meeting of 1928 January 25 he submitted his resignation, effective from the end of the session. The letter of resignation does not appear to have survived, and therefore the reason why is unknown, however as he was in his 87th year it may be reasonable to assume that age was at least one contributory factor. A further reference to him appears in the Council minutes for 1935 January 2 where it is noted that Thomas Frid had submitted his resignation from the BAA, with no reference as to why, but presumably age was again a factor. He died in the following June, following a short stroke, just eleven days short of his 93rd birthday.²³ He was a Fellow of the Society of Accountants and Auditors (1885–1908), but no obituary or other biographical assessment appears to have been written about him other than the one in our *Journal*.²⁴ He served a total of 38 years as Assistant Secretary (exceeded so far only by Lydia Alberta Brown's 39 years).

Of Walter's other siblings, George William was appointed Comptroller of Stamps and Taxes for Ireland in 1904,²⁵ and was an original member of the BAA (resigned 1920). George is only mentioned in a few letters, and so far only one letter from him to Walter has been found.²⁶ His two younger sisters, Mary Ann and Ellen Beatrice were teachers in Yorkshire for a short period,²⁷ although

Table 1. Children of George and Mary Ann Maunder

Thomas Frid	1841–1935	Leamington
Anne Eliza	1843–1912	Manchester
George William	1845–1928	Manchester
Henry Arthur	1848–1850	Sheffield (?)
Edward Walter	1851–1928	Middlesex
Mary Ann	1854–1933	Middlesex
Ellen Beatrice	1856–1946	Leeds

at some time before this they were living with Walter, for in a letter to Holden he writes ‘But I am not free to leave... two sisters, who live with me, are also entirely dependent upon me.’²⁸ As the census return for 1891 does not identify a resident nurse or other servant to care for his children, it is possible that either or both of his sisters acted as such for Walter. His elder sister, Anne Eliza, married Augustus Wheeler.²⁹ His remaining brother, Henry Arthur, died while still an infant; the family still have in their possession a lock of his hair.

Birth and early years

Edward Walter Maunder was born on 1851 April 12, at 5 Chesterfield (now Chesterton) Street, St Pancras in the county of Middlesex.³⁰ There are no surviving records of his childhood, although it is stated that on a number of occasions he suffered several episodes of illness, for on one occasion:

‘...of enforced leisure ...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.’³¹

He was a student at University College School between 1864–1867, for which he retained an affection throughout his life, writing that ‘I always feel I owe a very heavy debt indeed to the Old School.’³² No records relating to his academic abilities are known to have survived. From 1867–1872 his occupation is uncertain, for although he is frequently said to have been employed for a ‘short time’ in a bank, that this equalled five years is unlikely. It was also during this period his literary ability became evident for the first time, as (with other members of the family) he produced a journal called the *Sciolist* with contributions from both family and friends. The contents included stories, and articles on the political and religious leaders of the day. This however ran to only one volume which, according to the introduction, was intentional. Very few copies appear to exist; none have been found outside the family, and there is no record of it in the catalogue of the British Library.³³

In January 1872 Maunder entered Kings College as an occasional student, registering for Chemistry, Mathematics and Natural Philosophy, with a fee of £11 11s. (£11.55); re-enrolling in April of the same year for a further term, taking the same subjects. In the following October he entered the department of General Literature and Science as a full time student, being placed in the Modern Division, the fee being £17 7s. 6d. (£17.37½p). He returned to King’s again the following year as an occasional student, enrolling in the course for Physical Laboratory, paying a fee of £4 4s. (£4.20); this appears to be the conclusion of his formal higher education.³⁴ (Why Maunder undertook these courses is unknown; it may be that he did so in order to enter into a scientific career.)

Although we do not know when he became interested in astronomy, it may have been while at school, as he gives an account of an observation of the Sun he made when 14 years of age, (so far the earliest known by him):

‘In February, 1866, as I was returning home from school one evening, I saw the sun, low down in the west, shining red through the mist. The sun was dim and red enough for me to look at him without blinking, and I saw plainly on him a round black spot, just as if a nail had been driven into him up to the head. It was the first time that I had ever seen anything on the surface of the sun.’³⁵

The last sentence would imply that Maunder observed the Sun on other occasions, although whether in an astronomical sense or not is unknown. He rarely makes references to his childhood, and the only other one found so far appeared in a paper in which he refers to a dispute he had over the claim made by the father of a school-fellow that ‘Religion has come into Conflict [with] Science of the present.’³⁶

The Royal Observatory, Greenwich – I

In 1872 the then Astronomer Royal for England, Sir George Biddell Airy (Figure 2), decided to inaugurate astrophysical observations at the Royal Observatory. This was a new departure for the Observatory as it was originally founded (1675) for ‘Rectifying the Tables of the Motions of the Heavens and the Places of the Fixed Stars in order to find out the so much-desired Longitude at Sea for perfecting the Art of Navigation.’³⁷ With the encouragement of William Christie, Airy agreed to the creation of a department devoted to the study of sunspots, in order to monitor their effect on weather conditions.³⁸ Further correspondence by Airy (1873) with several persons (including Warren de la Rue³⁹ and the Admiralty) was concerned both with the need to find a photographic and spectroscopic assistant, and to ‘guide’ the Civil Service Commission examiners. Appointment to and promotion within the Civil Service up to this time was largely one of patronage, where an individual’s promotion depended not on what but whom he knew. In 1870 this was changed with the enactment of an Order in Council which required that all subsequent appointments and promotions should be made solely on merit and therefore, as a department of the Hydrographic Division of the Admiralty, the Royal Observatory would be included within this requirement.⁴⁰ This change would probably not have been welcomed by Airy, who insisted that ‘no one... should be appointed to the Observatory staff without the Astronomer Royal’s full permission.’⁴¹ This may well also have coloured his opinion of any appointee.

For the post at Greenwich the Astronomer Royal would obviously have been involved in any decisions over the content and form which the examination would take. Presumably when this was announced Maunder expressed a desire to sit, for a letter from his father still exists in the archives of the Observatory asking for details concerning the salary and terms of service.⁴²

The examination for the post of first assistant was held from 1872 December 10–16, and Maunder achieved third place, with the Greenwich post being offered to Arthur Mat-

threw Weld Downing and the Cape of Good Hope one to William Henry Finlay.⁴³ The timetable for the examination shows it was spread over three days and divided into two parts – obligatory and optional papers – with both containing sections on mathematics and languages. The astronomical questions show similarities with those of recent GCSE papers.

In the following year Maunder entered the examination (starting on September 30, and continuing over several days) for the junior assistant post of Photographic and Spectroscopic Observer at the Royal Observatory, in competition with one other person (no. 2 in the statistical table, a Mr Pole according to Christie). Although his low marks in astronomy are interesting given his future prominence, what is possibly more so are those he obtained in photography,⁴⁴ for according to one of his grandsons (now deceased) it is said that he spent the night before the examination with a friend learning almost from the start all that he could about it.⁴⁵ He was placed first in the examination, and ‘...being qualified for admission on probation to the situation of Junior Assistant for Photographic and Spectroscopic Observation in the Royal Observatory, Greenwich...’ was appointed on a probationary period of six months.⁴⁶ On 1874 April 1, Airy informed the Admiralty that Maunder was to be confirmed in the post ‘Having successfully completed his six months probation from November 4th. Cannot be confirmed until May 4th.’⁴⁷

His confirmation in the post was not however secure, even before starting, for in a short note to the Civil Service Commission, Airy wrote that ‘I think (but not with certainty) that I should have selected No. 2, for it is easier in time of need to teach a man detail scientific work than fundamental science.’⁴⁸ In the following March, Airy wrote to the Admiralty that Maunder ‘...joined the Observatory on 1873 November 6, and has since that time been in regular attendance to his duties ...and that his conduct has been satisfactory.’⁴⁹ It appears that Airy’s remarks were either misinterpreted or misunderstood, for in a subsequent letter Airy wrote that:

‘My object in that communication had regard to this approaching time of payment of ...salaries, and was not intended as Final Certificate of Mr. Maunder’s fitness ...Mr Maunder continues to perform his duties with regularity. But with the progress of time, I have been ...struck with his exceeding listlessness, the apparent feebleness of character, and the utter inability to meet any occurrence in the smallest degree unusual. Very lately, on occasion of breaking a large bottle of acid ...he was unable to diminish the flow by merely tilting the bottle, unable to call in assistance from persons at hand, unable to aid them when they came, and able only to stand and gaze...’⁵⁰

In the reply to this letter it was requested that ‘The Commissioners would be glad to be informed whether they are right in understanding that Mr. Maunder will not be confirmed in his appointment, and whether it is wished that they should proceed to hold an open competitive examination for the vacancy...’⁵¹ The following week Airy wrote to the Admiralty, referring to this letter and also to a letter to the Admiralty dated just two days previously (this letter appears to be lost), saying that:

‘In regard to the present instances Mr. Maunder is regular and willing in the discharge of routine duties, and perhaps produces

results as good as other beginners would do. But I do not believe that he can ever discharge those duties which must be expected from officers of senior rank... At the same time, it is possible that his character may open out more. I think that Mr. Maunder may be approved for appointment to the rank of Junior Assistant... that such appointment will not be recognised as giving him any claim... to promotion... unless it shall be shown to the entire satisfaction of the Admiralty and the Commissioners of the Civil Service (perhaps also of the Astronomer Royal) that he is perfectly competent to the discharge of those duties which attach... to the office of superior assistant.’⁵²

Maunder’s appointment was finally confirmed, subject to the conditions suggested in the letter of June 25.⁵³ (It may have been fortunate for Maunder that it was not until two years later that J. Walrond was to write to Airy asking about a possible vacancy for an assistant, as a friend of a friend was interested. In his reply Airy wrote that ‘Of the three men whom the Commission had sent me, ...Maunder although industrious, is the veriest dummy that I ever saw ...the wrong man was chosen...’⁵⁴) At the time of Maunder’s appointment to the Royal Observatory it was probably doubtful that anyone on the staff had extensive experience in the use of the spectroscope. At this time most workers in the new field of astrophysics were amateurs (e.g. Huggins). So in order to become familiar with the spectroscope, upon taking up his appointment, ‘one of the first things ...he had done on entering Greenwich Observatory was to go down to Rugby to see Mr. Seabroke, who had given him some lessons on the use of a particular form of spectroscope which Mr. Seabroke had devised.’⁵⁵

Although Airy has a reputation for being ‘harsh’, which the previous quotes may justify, recent research shows that this was not necessarily the case. Chapman shows that he (Airy) could be very ‘fair-minded’ in his dealings with his staff, and would take a great deal of trouble, time and effort to help those whom he felt were deserving.⁵⁶ There is an oral tradition that many of the aspersions cast at Airy’s name came from Maunder, but so far this cannot be verified. An examination of the RGO archives shows that Airy could equally be ‘harsh’ on other staff. It is quite possible that Airy’s comments and views are a reflection of his resentment of not being able to choose his assistants, rather than his opinion of the abilities of those assistants.⁵⁷

So far only one instance has been found where with respect to Maunder, Airy writes ‘I am much satisfied with his conduct.’ This occurred on 1876 March 23 when Maunder



Figure 2. Sir George Biddell Airy (1801–1891), 6th Astronomer Royal. Cartoon by Spy. Courtesy the Royal Astronomical Society.

had returned to the Observatory in the evening in order to complete some work. Upon completing this he was about to depart when he discovered that part of the Great Equatorial Dome was on fire, and, in Airy's words, with '...great promptness and judgement...' he was able to extinguish the fire.⁵⁸ There is possibly another compliment, although in this case it cannot be certain that it refers directly to Maunder's work. In this Airy writes that 'Regarding the collection of 1877 photographic drawings of Mars which you prepared lately: I wish to have this fine series united, in the same order of positions of Mars (as depending on rotation) which you had used...' The photographic drawings referred to are probably the series taken by Maunder during the 1877 opposition of Mars.⁵⁹ However, some of Airy's comments about Maunder do seem to be more of a personal nature than others.

Maunder's private opinion of Airy is not known, but he does recount various stories about him, including the one of Airy spending an afternoon engaged in labelling wooden cases as 'empty' and stacking them. Although never denying Airy's abilities, of which he would write with admiration, Maunder recognised that 'great as Airy was, he had the defects of his qualities, and some of these were serious' and that Airy was 'despotic in the extreme... which was the cause of a little serious suffering to some of his staff.'⁶⁰ (Maunder was possibly remembering his own early days at Greenwich when he wrote this.)

The RGO archives contain a number of notes and memos from Airy which are possibly representative of what Maunder refers to.⁶¹ However the balance can be redressed, for Maunder makes several references which shows a more humane side of Airy; in a letter to Christie concerning a query over leave of absence and sick leave, he writes

'It cannot be well for the Observatory to compel an Assistant who should more fitly be in bed to make observations which he has not the health or strength to make properly; ...But it is the regulation at present, and though undeniably a harsh one, as such it is accepted. It was however administered very leniently by Sir G. Airy who introduced it, ...'⁶²

(It is noticeable that following Airy's retirement in 1881, and with the appointment of W. H. M. Christie as his successor, Maunder begins to show a more positive side of his character. Within the next ten years he had developed a reputation which saw him becoming the editor of a major astronomical publication, becoming increasingly recognised as a leading authority on the Sun and Mars, whose work was recognised and respected by foreign astronomers, and also become confident enough to be able to found a national astronomical society.)

With Maunder's appointment as Photographic and Spectroscopic Assistant (equivalent to that of Assistant of the Second Class), his duties were essentially to observe sunspots during the day, and to measure the displacement of lines in the spectra of the brightest stars during the night (in order to determine their velocities in the line of sight by using the Doppler principle). It seems that Maunder was not to be engaged immediately in his duties, and was in the meantime put to other work, for a memo from Airy to Christie said 'Utilize Mr. Maunder as you can, keep him employed on something.'⁶³ Later Christie in answer to a query from

Airy says that:

'Mr. Maunder is now employed in getting the Photography into something like a system, entering all the photographs which we have in a book with all necessary particulars. Besides this I set him to assist in the ordinary routine work where ever there is a great pressure for we are short handed. He has taken a large number of observations... and I propose giving him duty with the Transit Circle next week when the Moon will be off.'⁶⁴

Maunder was unable to engage immediately with his work due to problems with some of the instruments. It was not until the installation of the photoheliograph, then recently removed from the Kew Observatory to Greenwich (1873) and brought into use in April 1874, and a spectrohelioscope (originally owned by a Mr Browning), which had been adapted for making observations and to map the solar prominences that had also been acquired (1874), that he was able to commence his observations.

The measurement of radial motion (or line-of-sight) was his other responsibility, but his work in this area was to be largely inconclusive, and it was not until much later where the use of photography was to become almost *de rigor* that any useful work was accomplished, and then by astronomers who had the use of larger instruments. (This will be dealt with in the second part of this paper.)

First marriage and family

On 1875 September 11 Walter married Edith Hannah Bustin (Figure 3), by whom he had six children (Table 2 and Figure 4). Hannah was born on 1852 October 29 in Kennington, Surrey, the daughter of Anthony Bustin (deceased at the time of her marriage) and Matilda Sarah Bustin, and died on 1888 October 26 of tuberculosis (also known as phthisis or the 'white plague'). Little else appears to be known of her at present.⁶⁵ The photograph of Maunder as a young man (Figure 5) may well be of this period.

At least one of Walter's children (Irene) was to continue the family's literary tradition, with the publication of a book of fairy stories in 1905.⁶⁶

It has been suggested that Maunder did not always have good relationships with his children. M. B. Ogilvie wrote that 'Family impression indicates that Walter was more interested in his work than in his family' and goes on to suggest that he started ignoring his children after the death of his wife.⁶⁷ Other anecdotal evidence however, also from the family, suggests the opposite, for a number of stories are still told of the close nature of his feelings for his family. One

Table 2. Family of Edward Walter and Edith Hannah Maunder

George Harvard	1877–1945	(BAA member 1905 – 1908)
Edith Augustus	1878–1966	(BAA member 1898 – 1909)
Irene Matilda	1880–1977	(BAA member 1899 – 1907)
Walter Antony	1884–1885	
Edward Arthur	1886–1966	
Henry Ernest	1888–1977	



Figure 3. Hannah Bustin, E. Walter Maunder's first wife. *Courtesy Mr Philip Maunder.*

example is an occasion while visiting his daughter Edith in Brighton he was greeted by his two granddaughters who 'jumped up and down', an action which he copied.⁶⁸ His correspondence also makes references to his children, in particular during times of illness.⁶⁹ In 1907 his eldest daughter, Edith, became seriously ill with acute appendicitis, requiring surgery within twelve hours of diagnosis. According to Walter the surgeon, when referring to the operation, said 'if it had been delayed another twelve hours it would probably have been too late to save her life.'⁷⁰ It also goes without saying that 'family troubles' would have occurred, one such event happening in the same year Edith had appendicitis (what this 'trouble' was is not identified).⁷¹

It should also be borne in mind that his career would not allow much time to be spent with his children, needing to be at the observatory during both the day and at night. Finally, during this period attitudes to children were very different from those of today, and therefore he was probably no different from any other single parent in his relationships with his children.

Although some of his children were to become members of the BAA (Table 2), none of them appears to have had any serious lasting interest in astronomy. Both daughters, Irene and Edith, accompanied him on various eclipse expeditions, especially to Algiers in 1900.⁷² Despite this, that they

would have a better than adequate knowledge of astronomy is only to be expected. This would prove to be of use when, as was frequently the case, Walter would double-book himself for lectures, and it was usual for one of his children (usually Henry Ernest, his youngest son) to speak on his behalf. (One such occasion was when Henry Ernest gave his father's talk on 'The World About' to the Woolwich Library Literary Society on 1913 October 2; but not being an astronomer and therefore in order to avoid questions and answers, he would spin it out.⁷³) One lecture which Walter did give is referred to in a letter to Barnard. This was the occasion when he was persuaded by Annie to give a lecture to her old college, Girton. The subject was on Mars and its 'Canals'. In the following letter, also to Barnard, he writes '...it certainly was a new experience to be the only member of the voting sex amongst a hundred ladies.'⁷⁴

Maunder appears to have been a fairly prolific and popular speaker, for as well as speaking at RAS, BAA and BAA branch meetings, he also spoke to local societies etc., some of which were referrals from the Astronomer Royal.⁷⁵ His children may also have helped him in other ways. An examination of his correspondence shows a variety of handwriting styles, which suggest that his children, and possibly his second wife Annie, may have written at least some letters to his dictation. Later, in a letter to P. B. Molesworth, Annie refers to Walter using a typewriter, and writes that 'Even my husband will sometimes now write one of his own letters.'⁷⁶

'...pilot Maunder standing on the deck.' (The BAA)⁷⁷

Maunder, possibly because of his nonconformist origins, was in favour of women having the same rights as men, at least with respect to membership of scientific societies, although so far no trace has been found concerning his opinion on the question of universal suffrage. With his election

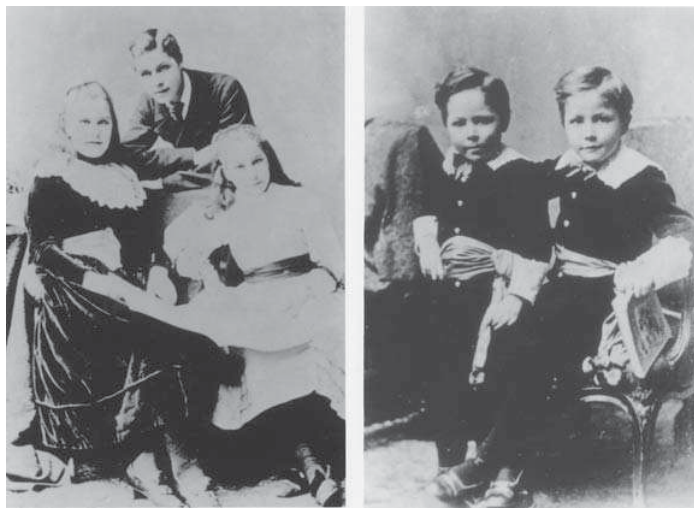


Figure 4. Children of E. Walter and Hannah Maunder. *Left:* Edith, John Harvard and Irene; *right:* Henry Ernest and Edward Arthur. *Courtesy Mr Philip Maunder.*

as a fellow of the Royal Astronomical Society in 1875⁷⁸ he became active in the advocacy of female members, although he was unsuccessful in achieving this.⁷⁹ It may have been because of this that he looked at various other alternatives, and possibly took inspiration elsewhere, for in a letter to Flammarion (1887), he wrote

‘I rejoice to see that an Astronomical Society for France has at length been started. ...that it has seemed to me remarkable that a French Society specially designed for its promotion had not been originated years ago. ...Allow me to express my hope and assured conviction that the new Society will have a career bright with usefulness and progress.’⁸⁰

Some years later a letter to Holden contains another possible reason for founding a society, writing that:

‘It was largely my dissatisfaction of the best results which I could accomplish in the work I am officially bound to do, which made me try to do some little service to Science in another direction by starting the B.A.A.’⁸¹

Possibly because of this, and also with a great deal of pressure from others, he decided to form an astronomical society which not only allowed women members, but was also to be of a less technical nature than the Royal Astronomical Society.⁸² In taking this decision he had the very persistent encouragement of Elizabeth Brown,⁸³ to whom he ‘turned a deaf ear to all the entreaties...’, but with the gentle persistence which characterised her, she would not take ‘No’ for an answer, and she wrote to other people to bring pressure upon him...’ At a meeting of the BAA during which its early years were discussed, Maunder was ‘especially ...anxious that Miss Brown’s memory should have due credit accorded to it’.⁸⁴ Maunder succumbed to her persuasions, and after approaching his colleagues at the Royal Observatory obtained their support; and with the aid of his brother Thomas Frid who ‘...carried the heavier end of the stick during all that arduous work of preliminary preparation’ started the process.⁸⁵ They soon obtained the support of others including William Huggins, and also the tacit (if not active) support of Christie. It was at about this time that a letter by Monck appeared in the *English Mechanic* stating:

‘Perhaps you will allow me to advocate through your columns the foundation of an Amateur Astronomer’s Association in London. ...The Liverpool Astronomical Society, for a time, promised to supply the need; ...Its local character, however, damaged it, ...that this society had at one time between 600 and 700 members with excellent prospects of increase ...is sufficient to show the wide-spread interest in the subject which exists all over the country; and there are hundreds of men and women who ...willingly subscribe half a guinea a year to a national society ...The society would also be a means of introducing amateurs residing in different places to each other. The society might also be the means of disseminating some of the latest and best astronomical photographs...’⁸⁶



Figure 5. Edward Walter Maunder as a young man, ca. early 1870s. Courtesy Mr Philip Maunder.

Subsequent issues (nos. 1323–1335) contained letters supporting this proposal, in particular one from Miss Elizabeth Brown⁸⁷ as well as letters in defence of the Liverpool Astronomical Society.

In the issue for August 8 a letter was published signed by Maunder which stated ‘...that a society upon the lines which Mr Monck has suggested is now in process of formation, and that I shall be most pleased to receive the names of those who would like to join it.’⁸⁸ With the work of constituting the society falling largely on both Walter and Thomas, a committee was soon organised and meetings were held in the rooms at Burlington House of W. H. Wesley (then assistant secretary of the Royal Astronomical Society).⁸⁹ In a later issue of *English Mechanic*, Monck wrote that it was Maunder

‘...to whose energy the formation of the new astronomical society is mainly owing.’⁹⁰

The success of the society was virtually assured within the first few months, as over 230 applications for membership had been received by 1890 October, and had more than doubled, to almost 500 members, by the end of December.⁹¹ The first formal meeting of the proposed new Society was held on 1890 October 24 at the Hall of the Society of Arts, John Street, Adelphi with William Henry Maw (1838–1924) in the chair. By all accounts the meeting went relatively smoothly, due largely to the efficient manner of organisation by Walter and Thomas. It would appear that lessons were learnt from the demise of the LAS, in that the subscription fee was set at a more realistic rate, for after meeting all the expenses incurred, the BAA had nearly £200 in hand. Also, as the new society was planned with the idea of a national, even international, remit, it would be able to cope better than the LAS, which was essentially a local society (albeit with members in Brazil and the Australian colonies).

Arguably Maunder’s most important role (after founding the BAA) was that of Editor. For a society with a large national membership, the likelihood of having a meeting in which all its members could be present was highly unlikely, if not impossible, and therefore its publications would be the most important means of communication, keeping the membership informed of its activities. Although over the ensuing years the *Journal* has seen changes in content, format and style, its underlying principle has remained a mixture of meeting reports, news items, long and short articles and papers and news of the Association. Unlike the popular magazines of today it does not have an over-reliance on advertising, therefore detracting from its primary purpose. Maunder was a good choice for this role, as he had had previous experience of editing an astronomical publication. (In 1881 he became joint editor of the *Observatory Magazine*, with its founder Christie,⁹² and becoming sole editor from 1882–1885

when he was joined by A. M. W. Downing and Thomas Lewis, finally relinquishing the post in 1887.) As editor of the *BAA Journal* he may have had greater independence, as unlike the *Observatory Magazine* he did not have the continued presence of Christie in the background.

But even before the society was formally inaugurated there were indications of disagreement and dissatisfaction. In *English Mechanic* a correspondent using the pseudonym of ‘Yorkshireman’ wrote that he considered the means of electing the first council and decisions about the regulations and bye-laws was not acceptable. In reply to this, Maunder gives an extensive account of the reasons why various actions were taken, in particular emphasising the need for a provisional committee to be set up which was responsible for laying down the procedures and bye-laws, which then would require the sanction of the membership at its first meeting.⁹³ It is also interesting to see that even at this date there were more than enough cranks around, for in a letter to *English Mechanic* a few months later, Maunder had to publicly and emphatically deny an implication that he was the author of a circular recommending a work called *The Triumph of Philosophy*, which he calls ‘a stupid paradoxical work... worthless publication.’ What appears to have caused him particular concern was the attempt to make the members of the Association believe him to be the author.⁹⁴ In the RGO archives are two letters from Edwin Ball Knobel to Christie expressing disbelief that Maunder could have endorsed such views, and in response to Christie’s reply to his first letter, Knobel wrote ‘I had no idea of *seriously* thinking Maunder had uttered such horrible views, but the paragraph being side by side with the opinion of the Secretary of the Liverpool Astronomical Society was remarkable...’⁹⁵ Knobel was one of those who was initially suspicious of the new society, and, according to Hollis, was ‘...anxious and jealous for its [i.e. RAS] welfare [but] it was not long before he realised that his view was a mistaken one, and the Association had no more hearty supporter.’⁹⁶

In the early years of the Association Maunder also appears to have experienced a degree of jealousy from various individuals over his role in its founding. In a letter to Barnard (1896) he wrote

‘Thank you for your kind expressions of sympathy with me in the little difficulties with which I have had to contend. ...one or two persons have from the beginning entertained some jealousy of me for my starting the British Astronomical Association and have from time to time taken opportunity to express the same in certain small ways. ...My succeeding poor Ranyard with *Knowledge* was a still worse offence ...’⁹⁷

He also seems to have become more active in other ways for, as referred to above, it was at this time that he was appointed to the post of Astronomical Editor of *Knowledge* (1896–1905) in succession to Arthur Cowper Ranyard.⁹⁸ He appears to have been offered the editorship of the magazine itself, but refused and that this was also a bone of contention amongst some of his contemporaries is also hinted at in a letter to Barnard dated the previous month.⁹⁹

The ‘little difficulties’ referred to are not identified, but despite all this, Maunder was committed to the Association and, with Annie, was a leading influence in its future. An

Table 3. Edward Walter Maunder – BAA service

Founder; member of Provisional Committee & Secretary (<i>pro tem</i>)	1890
President	1894–1896
Vice-President	1904–1908; 1925–1927
Acting Secretary	1908, 1910, 1914–1917
Ordinary member of Council	1909–1910
Editor of the <i>Journal</i> and <i>Memoirs</i>	1890–1894; 1896–1900
Director:	
Mars Section	1892–1893
Star Colour Section	1900–1901
Comet Section	1901–1907
Solar Section	1910–1925
BAA representative, National Committee for Astronomy ¹⁰⁰	1919–1924
Member of various sub-committees	
Gaps in service:	1908 Sept–1909 August 1927 Sept–1928 March
Total number of years of service	34 years 8 months
Total period of membership	36 years 5 months

examination of the Council lists for 1890 until his death in 1928 shows that with the exception of about eighteen months he was involved in or was a member of the Council throughout this period (Table 3), including on various sub-committees. Although he does not appear to have been a member of the IAU (probably due to his age, and having by then formally retired from professional astronomy), he was appointed as the first BAA representative (with Harold Thomson) on the National Committee of Astronomy, which was formed by the then IAU adhering body for the United Kingdom, the Royal Society (1919). (This may well have given him some quiet satisfaction, as previous applications to join the Royal Society had been rejected.)

It may seem strange or odd that his name does not appear in the lists of members of Sections that were occasionally published in the *Journal*, in particular for the Solar and Mars Sections, but this may have been due to conflict of interest in that both these constituted part of his professional duties, and therefore any observations etc. were related to his work. This did not however prevent him from being able to contribute observations to the Sections as and when appropriate. Just prior to his retirement he did become more active in the work of the Sections, especially the Solar, becoming its Director in 1910.

As the minutes of the BAA Council meetings for 1898–1910 are missing (presumed destroyed), Maunder’s actual role during this period is unknown. The directorship of the Star Colour Section lasted for less than a year, terminating with his going to observe the solar eclipse of May 1901. Whether the directorship of this Section was intended to be temporary cannot now be determined, as neither the *Journal* nor the first volume of the History of the BAA makes any reference to it. A possible reason for his directorship of the Comet Section may be due to A. C. D. Crommelin (the then Director) being appointed a Secretary of the Association (1900–1904) and then President (1904–1906), for at this time it was not usual for one person to hold more than one post (although exceptions can be found).¹⁰¹ Unfortunately it has not been possible to find out more, and no references have been found in either the *Journal*, the *Memoirs*, or the Section archives about it. As

one of the leading Mars observers of the time, it may have been expected for Maunder to be appointed the first Director of the newly created Section, but the first to be considered was Arthur Stanley Williams.

The Royal Observatory, Greenwich – II

The year 1881 saw the retirement of Airy as Astronomer Royal. He was succeeded by W. H. M. Christie (Figure 6),¹⁰² who was to continue the changes first inaugurated by Airy, not all of which were well received. Christie had been the prime mover in the establishment of a physical department at Greenwich which was to be concerned with observations of sunspots (and later would include the study of the Earth's magnetism). Associated with this was the idea that this department would be headed by a chief assistant; and it was as chief assistant that Christie had been largely responsible for the introduction of the spectroscope and the Kew photoheliograph. Upon his promotion to Astronomer Royal, Christie (Figure 6) appointed Edwin Dunkin as Chief Assistant. But this was not to be an indication of events to come, rather just a 'temporary expedient', for Christie's long term aim was to introduce university (Cambridge) trained mathematicians to fill the places. Unfortunately for Christie it would seem that this 'expedient' allowed the staff to assume that a precedent had been instigated.¹⁰³ As up to this time senior appointments would have been made on an internal basis, it would obviously not have been acceptable to the existing staff, particularly as they would probably be passed over for promotion.¹⁰⁴

In 1884 Maunder was appointed to what was to be a specially created fourth first-class assistantship at Greenwich. In a letter to Christie (1883) he asked that:

'...you would kindly undertake to recommend me for promotion ...to be a *fourth* first class assistant, without waiting for a vacancy among the three present first class assistants. ...I am about to enter upon my eleventh year of service, and therefore unless promoted I shall have obtained my maximum salary – that the department of which I have charge has developed to a much greater degree than any others in the Observatory ...that my duties are in one most important respect the most severe and trying in the Observatory ...I have been placed in a position of superintendence over other Assistants, and ...such a position furnishes some ground for asking for an increase in rank and salary commensurable to the increase in responsibilities...' ¹⁰⁵

Despite the request for this to be addressed sooner rather than later it was over a year before any action occurred. Christie wrote concerning this to the Admiralty, in reply to which he received:

'With reference to your letter of the 25th October, 1884, No. 38, I am commanded by my Lords Commissioners of the Admiralty to acquaint you that they have been pleased to approve of the Assistant for Spectroscopy and Photographic duties at the Royal Observatory being raised from the position of a 2nd Class to that of a 1st Class Assistant, as recommended by you. This change is to take place from the 15th instant inclusive, the

Kinder: Edward Walter Maunder



Figure 6. Sir William Henry Mahoney Christie (1845–1922), 7th Astronomer Royal. *Courtesy the Royal Astronomical Society.*

date of the Treasury sanction of the same.' ¹⁰⁶

That there were still issues of dissent is apparent, for example over concerns how changes in accounting for sick leave and leave of absence were introduced. In the letter to Christie in which he queries the calculation of his leaves of absence and sickness, Maunder refers to

'The immemorial rule and custom of the Observatory. The Assistants have been allowed so many days leave in the year ...In these

rules it has necessarily been implied that if by sickness, accident or the special favour of the Astronomer Royal, an Assistant has had more than his due share of absence in any year, no charge has been made for that excess in a following year. All these rules will be thrown aside if I am to be charged this year with the excess, (a purely imaginary and nominal one) of leave taken last year.' ¹⁰⁷

Well into the 1890s it is clear that he continued to be unhappy with his situation at the Observatory. His claims for promotion were apparently denied or overlooked, so that although his title would change over the years, his substantive 'rank' remained that of Assistant throughout his career. But other, unmentioned, factors may also have been present for although it may appear that events calmed down, there were still indications of unresolved issues.

By now Maunder had gained an international reputation, for in 1891 he was offered the use of the Lick reflector, an offer which he appears to have hoped to accept, but

'...the adverse decision of our Chief to prevent my coming out. ...That I am prevented from accepting it, is my misfortune, ...Yet if such a vacancy should occur again ...I should be very glad if you would let me know particulars. Greenwich Observatory has fallen on evil days, and I am not the only Assistant who would be glad to have a fuller opportunity than it affords of doing good work for Science.' ¹⁰⁸

H. H. Turner, presumably replying for Christie, had previously written:

'Even Mr. Maunder, whose spectroscope work we hope soon to interrupt for the mounting of our new 28" refractor is charged also with the daily taking, measuring, and reducing of solar photographs – a work which cannot be interrupted. Under these circumstances we are not in a position even to consider the question...' ¹⁰⁹

Within a few weeks following this Walter was to receive a lengthy letter from Holden with the offer of a possible post at the Lick. With the departure of Keeler (to Allegheny Observatory) at this time, the vacant post had been offered to W. W. Campbell, but it was also

'...possible that another astronomer may be added to our force within a year and if it can be arranged so that you could come here...., it would please me in the highest degree and so far as my power goes... I will nominate you... considering the unique as-

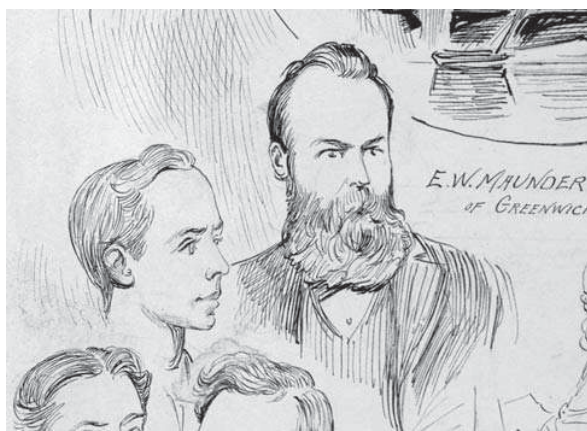


Figure 7. Edward and possibly Annie at a BAA meeting, 1893 April. Detail from BAA add. MS 1, BAA archives.

tronomical opportunities and your eminent fitness to take advantage of it, I should think you safe in accepting it...'¹¹⁰

Not having received a reply Holden wrote again in June a further short note, adding 'I am now in a position to offer you the appointment of Astronomer here at \$1500 per year!' In reply Maunder reluctantly had to refuse this due to family commitments. His reply also identifies his workload; he apologises for not replying earlier due to illness (influenza) and the ensuing arrears of work, as well as marking various Government examination papers, the BAA and that a helper, just from school, who needed instruction, took up much of his time.¹¹¹ (At this time the Lick Observatory was also having problems; it would be interesting to know whether Maunder had heard about them, and also of Holden's character, and whether these were factors.¹¹²)

The vacancy of a chief assistantship post at Greenwich occurred in 1894 when H. H Turner was appointed to the Savilian Chair of Astronomy at Oxford; but Walter did not apply, for writing to Holden, he says

'Thanks for your good wishes *re* the Chief Assistantship. ...though I have been assured that had I applied I should have been appointed ...I thought it better not to stir up strife.'¹¹³

Again this letter suggests that he was subject to some jealousy, possibly from other colleagues, as although he had declined the Lick post, he continued to look for promotion, for in a letter to David Gill he wrote:

'There is now no possibility for me of further advancement at Greenwich; and even the possibility of my usefulness is curtailed. I therefore wish if possible to leave this Observatory and the thought has suggested itself to me; –Would it be possible for me to succeed Dr Copeland at Edinburgh? ...Would it be asking too much of you to do what you could when you are here in England... As you know I have had little opportunity for astronomical usefulness here... I am not devoid of energy and capacity, and that I might be trusted with greater responsibilities.'¹¹⁴

In fact Walter had to wait for almost ten years before the post became vacant. (In the archives of the RGO there exists a short document which gives an outline of Maunder's achievements and which may have been part of a reference.¹¹⁵) References to other positions for which he applied can also be found in both his and Annie's correspondence. Annie, writing in a letter to

Molesworth, said that Walter was considering applying for the vacancy due to be created by the imminent retirement of Sir Joseph Norman Lockyer (professor at the Solar Physics Laboratory, South Kensington) in May 1901, but 'Sir Norman has a youth, his son 'Jimmy' by name – whom he wants to succeed him... Walter is going to see the Dean, Professor Judd...'¹¹⁶ In her next letter, Annie mentions Walter's visit to the Dean, but gives an essentially pessimistic view that although there might be a chance it would only be a small one.

His career did however receive advancements in other ways, although even these were not always apparently considered. In 1892 he was nominated for the position of secretary of the Royal Astronomical Society, about which he wrote that it:

'...came as a great surprise. In a point of fact there was a contest between two other Fellows for the second place, and as neither could be carried, I was – quite unexpectedly – suggested and carried.'¹¹⁷

In 1897 he was elected a vice-president of the Royal Astronomical Society, and on 1905 March 24 he became a member of the Royal Astronomical Society's Dining Club, writing that:

'...I was warmly greeted there on my first appearance as a member by 'Jimmy.' My last intercourse with him had been through the medium of our correspondence in *Knowledge* in which we went for each other's scalps, and I think I got his. However he seems to bear no ill-will, which is as it should be.'¹¹⁸

Second marriage

In 1890 one of the reforms which Christie had inaugurated at Greenwich was the employment of women onto the staff of the Observatory.¹¹⁹ This was not a new idea, for a similar scheme had previously been undertaken (1875) at the Harvard College Observatory; although unlike the Harvard experiment, it did not last for very long.¹²⁰ While it was in existence it was to see the employment of two women who were to play leading roles in the BAA – Annie Scott Dill Russell (1868–1947) and Alice Everett.¹²¹ Annie Russell joined the observatory staff in 1891, and was placed in the Solar Phys-



Figure 8. Maunder and Annie, possibly wedding anniversary portraits, date unknown. Courtesy Mr Philip Maunder.

ics department under the supervision of Maunder. Presumably romance blossomed, as on 1895 December 28 they married.¹²² It is possible that an early drawing of Annie (next to that of Walter) exists in the BAA archives. This drawing is in ink (artist unknown), and includes several well-known figures of the time. A reference to David Gill giving an account of his lecture on the determination of the solar parallax at a BAA meeting would date this drawing to April 1893, and to the left of Maunder's is the profile of a youngish female, which shows a resemblance to one in the *Daily Graphic* (1901) and in an article about Annie by Brück¹²³ (Figure 7).

By all accounts this marriage was a very happy one, and no evidence has been found to suggest that Maunder's children resented their new stepmother. In fact surviving correspondence would suggest the opposite, for in a letter to his children in 1905, Walter refers to Annie as their 'mother' and in another letter she refers to herself as mother.¹²⁴ Although some seventeen years his junior in age (and nine years older than his eldest son), Annie was seen by Walter as very much his equal, their relationship being a symbiotic one with a number of articles and a book appearing in their joint names; and she was involved in many others although her input was not formally acknowledged. (It is not possible now to determine what was Annie's and what was Walter's contribution.) When she was widowed in 1928, Annie did not follow the then customary practice of changing her 'style' of address to Mrs Annie Scott Dill Maunder, but retained her marital style as Mrs Edward Walter Maunder, and it is under this name that she appears in various publications.¹²⁵

'An eclipse expedition was a risky venture...'¹²⁶ Travel

During his life in both his professional and private capacity, Walter travelled quite extensively. Some of these journeys were to observe eclipses, while others were holidays or convalescence following illness. He was a member of six total solar eclipse expeditions (Table 4), making him one of 'Britain's most regular eclipse observers.'¹²⁷ Although eclipse expeditions were not unusual occurrences they were still largely private ones, for it was not until the 1860s that some attempts were made to organise them on more formal lines. Until the eclipse of 1868, the primary objective of eclipse observing was to time the contacts; however the development of the spectroscope had also made it possible to observe prominences. From the eclipse of 1868 this was a normal feature of eclipse observation, and later observations of other solar phenomena, including the corona and flash spectrum, became standard features.¹²⁸

In England both the Royal Society and the Royal Astronomical Society would create their own *ad hoc* committees to arrange for the observation of an eclipse. Eventually these two committees combined to form the Joint Permanent Eclipse Committee (JPEC) in 1894. The JPEC acted as the co-ordinating body (e.g. between government departments such as the Treasury, the Royal Navy and appropriate colonial or foreign gov-

Table 4. Total solar eclipse expeditions of E. W. Maunder

Grenada	British West Indies	1886 August 29
Vadsö	Norway	1896 August 9
Talni	India	1898 January 22
Algiers	Algeria	1900 May 28
Port Arthur	Mauritius	1901 May 18
Labrador	Canada	1905 August 30

ernments) and to assist with financial support. As one of the secretaries of the Royal Astronomical Society, Maunder would have been involved in the creation of this body.¹²⁹

One of the most notable features about solar eclipses is that they frequently seem to occur in inhospitable or virtually inaccessible areas and getting there could be very hazardous, including having to surmount icebergs, shifting sand/mud banks and heavy fog.¹³⁰ (Man-made 'hazards' would include over-officious customs officers who, despite receiving official instruction from their government, would refuse instruments to pass through customs without being examined. This however was unusual, as the reception of the various parties was usually very good, with transport and carriage costs frequently being waived; even when international opinion was particularly anti-British, e.g. during the Boer War.) Communication was not only slow, but the lack of it could be very frustrating. The outcome of civil disturbance occurring at the beginning of an expedition may not be known for several weeks or months. In 1886, before leaving for Grenada to observe the eclipse, an outbreak of street fighting in Belfast occurred, and due to the length of the voyage, it would not be until two weeks later that the eclipse expedition discovered that 'the Belfast riots had run their course as a nine days' wonder, and had become stale and forgotten.'¹³¹ Similarly while completing packing for the Algiers eclipse (1900) on May 18 they heard rumours of the relief of Mafeking, but not until about a week later, after arriving at Marseilles, was it confirmed.

The JPEC did not cater for amateurs, and therefore an alternative method of travelling to view eclipses had to be found. Fortunately the BAA was able to provide a platform on which to achieve this. In 1896, with Maunder as one of the organisers, the first organised expedition, to Norway, was undertaken, which was claimed to be '...a new departure in astronomical expedition. It was the first time that a company of anything approaching this magnitude had been organised upon the admirable Pickwickian principle, and composed entirely of volunteers, for the purpose of observing a total eclipse.'¹³² In writing this Maunder (or possibly his co-editor, John Mackenzie Bacon) identified this as the first organised expedition of *amateurs*, rather than of professionals. The BAA would later organise a number of other expeditions and gatherings to observe eclipses, the latest being 1999 August 11 in Truro, Cornwall.¹³³

The Norway expedition, although not a success scientifically due to cloud, gave occasion for a number of anecdotes, including one about an observer who was going to take a series of photographs of the corona during totality. He was accompanied by a Lapp porter but 'Unfortunately, the sud-

den approach of darkness just before totality so terrified the Lapp that he ran away, taking the camera with him and all efforts to trace him or the camera were of no avail.¹³⁴ While

‘The effect of the darkness upon men and animals was the same, ...Even a little band of obstreperous Germans from the *Erling Jarl*, who had made themselves offensive by their disorderly conduct before the eclipse began, were awed into silence, and the most profound stillness prevailed until the return of light.’¹³⁵

A number of post-eclipse events were also organised, with some arranged to coincide with other events *e.g.* following the 1896 eclipse Walter and Annie were guests of Agnes Mary Clerke, who gave a party in honour of E. E. Barnard following his award of the Gold Medal by the Royal Astronomical Society.¹³⁶

Despite the disappointment of being unable to actually witness the Norway event, it was decided that an expedition should also be mounted to observe the 1898 eclipse in India. The BAA expedition to India consisted of three parties, to Talni, Pulgaon and the Ganges. Of these, the Maunders (with J. P. G. Smith, C. Thwaites and later Capt P. B. Molesworth, R.E.) were based at Talni. The party departed from Tilbury aboard *RMS Ballarat* on 1897 Dec 8, and excepting for ‘one of the most serious storms of the year in the dreaded Bay [of Biscay]’¹³⁷ the voyage was sufficiently calm to allow astronomical observations to be made (*e.g.* a large sunspot group, Mercury and the Zodiacal Light), before safely arriving in Bombay on 1898 Jan 3. At Talni, while preparing for the eclipse, opportunity was also taken to make further observations, including of the Zodiacal Light. It was also this voyage which apparently suggested to Walter the need for a book on naked eye astronomy. Annie was able to take photographs of the Milky Way (which formed part of a project for which she had received a Girton Scholarship). A typical ‘day’ would be:

Daybreak	‘chota hazri’, then worked in observatories ¹³⁸
10.00	Bath, prepare for breakfast
11.00 or 11.30	breakfast, then lazy time of day – reading, writing, sleeping.
before 16.30	tea
16.30–sundown	work in the observatories
20.00	dinner, then more observing.

(It might seem that the period from 10.00–16.30 was wasted; but it should be remembered that this would be the hottest time of the day, and therefore it would be impossible to undertake much work.) Maunder makes only brief mention of the local flora and fauna, and appears to almost regret that they only saw ‘...one poor little [venomous] two-foot-long snake, and a brace or so of jackals, whose presence was only indicated by their howls’¹³⁹ and not the tigers, panthers and hamadryads (cobras) about which they had been told by their friends. As well as describing the eclipse, he also writes about the effect it had on the local native population (the native police sergeant spent the time of the eclipse at his devotions); and that in the evening following the eclipse how the natives placed garlands of flowers around the necks of the observers. Another anecdote refers to a traveller they met at Lucknow, who apparently was in his hotel on the morning of January 22, and complaining to the manager about his room being ‘as dark as a coal cellar’ to be told (by the manager) ‘Why man, it’s the eclipse.’¹⁴⁰

Travel also provided an opportunity to engage in sight-seeing, which for the Norway and Labrador eclipse expeditions proved to be the only outcome, while in India he and Annie visited various places associated with the Indian Mutiny. But as to be expected, it is an astronomical site about which he writes most. In both the *Indian Eclipse Memoir* and *Astronomy without a Telescope* he writes of the work and observatories of Jai Singh – Delhi, Jaipur (which he spells Jeypore) and Benares, and the much greater emphasis placed on religious functions, comparing them with the Great Pyramid of Cheops and Stonehenge, and also describes a collection of Indian coins which depicted the signs of the zodiac.¹⁴¹ The Indian Eclipse expedition however was to end in sadness for the Maunders. Although not a member of the BAA, Walter’s nephew, Charles Frederick Layton Maunder, observed the eclipse while on board the Orient steamship *Orotava*, and wrote to his father (George William) giving an account of his findings which was published. This was apparently to be ‘The first account of the eclipse that was published in England, as distinguished from accounts telegraphed.’¹⁴² Unfortunately he died a few days later, and was buried in Constantinople (now Istanbul).

Eclipse expeditions also created other opportunities, including meeting Royalty and members of the nobility, albeit foreign. When in Algiers, they were asked by Princess Amelie of Schleswig–Holstein (aunt to Kaiser Wilhelm II, Emperor of Germany), who was staying at the same hotel, to ‘explain the circumstances of the eclipse, and they came up to the roof to examine our instruments and arrangements.’¹⁴³

As well as having to suffer the disruptions caused by the Boer War which was still in progress, the 1901 eclipse to Mauritius was also beset with other difficulties even before setting out. In a letter to Molesworth, Annie wrote that ‘...my husband has asked the JPEC to send him out there [Sumatra] for the eclipse.’¹⁴⁴ Several months later Walter was to write that ‘We have now been at three eclipses without receiving the slightest government or official assistance in aid of our expenses and cannot indulge further in the luxury. The Astronomer Royal has some thoughts of sending me to Mauritius for 1901.’¹⁴⁵ In a further letter to Molesworth Annie writes that ‘The Astronomer Royal proposes to send my husband to Mauritius on the ground he is experienced in eclipses and the totality is shorter there, and Mr. Dyson... is to go to Sumatra because he is new to the work.’ The decision to send Maunder to Mauritius was apparently based on the recommendation of Turner.¹⁴⁶ The site of the observations was to be the Royal Alfred Observatory, and they were due to leave England on March 23, and return in the following July.¹⁴⁷ Maunder’s responsibilities appeared to include co-ordinating the various needs and demands of both expeditions, in particular with respect to photographic plates and equipment.¹⁴⁸ When it came to sailing for Mauritius, they had to change ships on at least two occasions, and the possibility of dock strikes at Marseilles meant that they may have had to be diverted to Genoa (this however appears to have been averted).¹⁴⁹

Just to add to this chapter of incidents, following Walter's being laid down with malaria, the departure home was delayed, partly due to restrictions on shipping caused by the Boer War,¹⁵⁰ and also due to an outbreak of plague in Mauritius; so that when they finally were able to start home (over six weeks late) they had to go via Ceylon on board the British India *SS Mombasa* (mentioned in Kipling's 'The Bridge Builders').¹⁵¹ One of the small 'gleams of sunshine' was the opportunity to make a number of other astronomical observations: for example in Mauritius he observed and photographed what has been described as the first comet of the new century – comet 1901a, discovered by Halls & Tattershall.¹⁵²

The last expedition with which Walter was connected was to Canada. The original invitation was at the request of Sir Wilfred Laurier (1841–1919, Prime Minister of Canada) and made through Mr Joseph Pope (Under Secretary of State for Canada) in a letter to Maunder saying that 'Mr. Maunder was personally invited by the Canadian Premier to join the official Canadian expedition as guest of the Canadian Government.'¹⁵³ Writing to Molesworth, Annie says that 'Last week Sir Wilfred Laurier telegraphed to ask Walter and me to join the Canadian official party...' In order to undertake this Walter had to apply to Christie for permission to take leave of absence, and in doing so also enquired about any particular work which could be done for the Royal Observatory, and whether any expenses (those not met by the Canadian Government) could be subsidised either by the Observatory or JPEC.¹⁵⁴ Initially Annie does not appear to have been included in the invitation, for a telegram from Pope (dated May 9) extended the invitation to her. (Later the invitation was to include Annie's brother, Samuel.) They left Liverpool on 1905 July 20, aboard the *SS Victorian*, arriving in Quebec on July 28.¹⁵⁵ Upon arriving at Quebec they had to wait until August 4 to travel to the head of Lake Melville, the 'North-West River' post of the Hudson Bay Company, where they arrived on August 11. (The supervision of their huts and equipment was under the care of John Stanley Plaskett, later Dominion Observer.) The ensuing days saw them rehearsing for the eclipse, but unfortunately the day of the eclipse (August 30) was completely clouded over. Following the conclusion of the eclipse the instruments were dismantled, and after a short delay due to storms, they left on September 1, reaching Quebec on the 7th, embarking on the *SS Hungarian*, and arrived in Liverpool on September 30.¹⁵⁶ Although there were no scientific results, Maunder was still able to find plenty to write about.¹⁵⁷

Health problems

While the lack of communication could at best be frustrating, it was the potential health hazards, particularly plague, which were to pose serious problems. Both the Indian eclipse

expedition (originally planned for Masur, in the Satara District) and the Mauritius expedition in particular were affected. For Walter however it was not plague but malaria which caused him problems.

On the Wednesday following the Mauritius eclipse, Maunder came down with malaria, which following a dose of quinine appeared to have been settled. However by the following Friday he had a major relapse, and was too ill to be able to undertake much of the post-eclipse work (developing plates, packing instruments).¹⁵⁸ It was not until in a letter dated the following week that he was able to send a fuller account of the eclipse and subsequent work, an account which included further details about his health problems, and also details concerning the difficulties of being able to leave the island. It was not until July 12 that they were able to depart, finally hoping to arrive home on August 16. There appears to have been some uncertainty at the ROG concerning the date of his return, for in one of the very few letters known to exist to and from Irene (Maunder's daughter), Dyson wrote 'Can you let me know when Mr. Maunder is expected back? A note has just come about his instruments which have arrived, if ...in a few days I can leave him to attend to it, but if not I will see about them coming through the customs', in reply to which Irene wrote 'My father will not be home before the 24th, though probably he will not be much later ...He is returning by the British India *SS Mombasa*.'¹⁵⁹

That the malaria was the cause of recurrent bouts of fever for the rest of his life can be seen in a number of letters from both himself and from Annie.¹⁶⁰ It seems that this was to last for several months, as Annie writing to Molesworth says that '...my husband has had fever off and on ever since the one of May last.'¹⁶¹ In the November following their return Walter was to write to Barnard that 'I have not quite got rid of fever yet.'¹⁶² Some of the recurrences were to be of such severity that he needed extensive convalescence, as in one letter to Barnard he wrote 'I had a sudden and rather severe attack of it about three weeks ago and have come to stay with my sisters for a few days...' ¹⁶³ Fortunately while in Mauritius they had the presence of Annie's sister Hester who was a doctor, travelling with them, and therefore able to advise on appropriate measures to take regarding medical care.¹⁶⁴

Throughout his life Walter continued to suffer from ill-health; as well as malaria, various gastric troubles, and seasonal complaints (colds and flu), he was to suffer at least two serious illnesses in the next few years. In a letter to Hale¹⁶⁵ he refers to a 'slight attack of appendicitis... my doctor urges... an operation soon... inasmuch as I had a severe attack some years ago...' Later, in 1909, in a letter to Wesley¹⁶⁶ he says 'I am not perfectly well, – am in a great deal of pain at times, – but it is not a serious matter.' However, assuming that this is the same illness, it appears to have got worse, for Annie, writing to Barnard refers to Walter having to have surgery (for what is not identified). Not long after this he was also to be afflicted with partial blindness resulting from a detached retina,¹⁶⁷ which for an astronomer is obviously a serious matter, and which required seven months sick leave. Some anxiety was expressed over whether it was malignant

Kinder: Edward Walter Maunder

in origin, but this was later felt to be unlikely as it had not changed over a period of time.¹⁶⁸

The Royal Observatory, Greenwich – III

From the mid-1890s Maunder's role began to change. In a letter to Barnard he wrote 'My observing days are over. The sun spot work will take my entire time now for some years to come.'¹⁶⁹ Although he feels his observing days were over, it is from about this time that his major written output starts, in particular his work on sunspots, their effect on the Earth's magnetic field, Mars and life, and Biblical studies.

As well as being editor of both the *BAA Journal* and *Knowledge*, various activities with the Royal Astronomical Society also took up time, including being consulted over the design of the Jackson–Gwilt Medal and the proposed Flamsteed Memorial.¹⁷⁰ He also deputed for the Rev. Edmund Ledger, Gresham Professor of Astronomy, giving lectures in 1903 on the history of the Royal Observatory.¹⁷¹ In 1905 Maunder was elected honorary Fellow of the Royal Astronomical Society of Canada, and two years later a Foreign Member of the Società degli Spettroscopisti Italiani.

It was about this time that his name was submitted as a candidate suitable for election to the Royal Society, and over the following decade a number of recommendations would be submitted to its Council for Maunder's name to be put forward, the signatories including some of the most influential names in British astronomy.¹⁷² But despite the fact that the lists included the names of a number of distinguished astronomers, including the current Astronomer Royal (Christie and later Dyson), Her/His Majesty's Astronomer at the Cape (David Gill), a peer of the realm (Rosse) and other leading astronomers of the day he was unsuccessful. In a letter to the physicist Larmor (then Secretary of the Royal Society, 1901–1912) Huggins writes that '...Maunder is too 'weak' a candidate for F.R.S. and that he has been turned down by 5 or 6 previous R.S. Councils, it is absurd to elect him merely because he keeps trying.'¹⁷³

One of the few references to a private observatory occurs during this period (1900) in a number of letters and in an article by Annie.¹⁷⁴ According to Stroobant *et al.* it had a Simms 4-inch equatorial refractor for cometary work.¹⁷⁵ The early records of the BAA instrument collection record a number of donations made by the Maunders. However no photographs or other illustrations are known to exist of the observatory, and no account appears to have been made of it in the *Monthly Notices*, *BAA Journal* or *The Observatory Magazine*.

Maunder's second book, *Astronomy without a Telescope*¹⁷⁶ appeared at this time, and was essentially a republication in book form of the series of articles that had appeared in *Knowledge* in 1900 under this title, including those on the constellations. Each chapter dealt with a particular subject. By all accounts it was very favourably re-

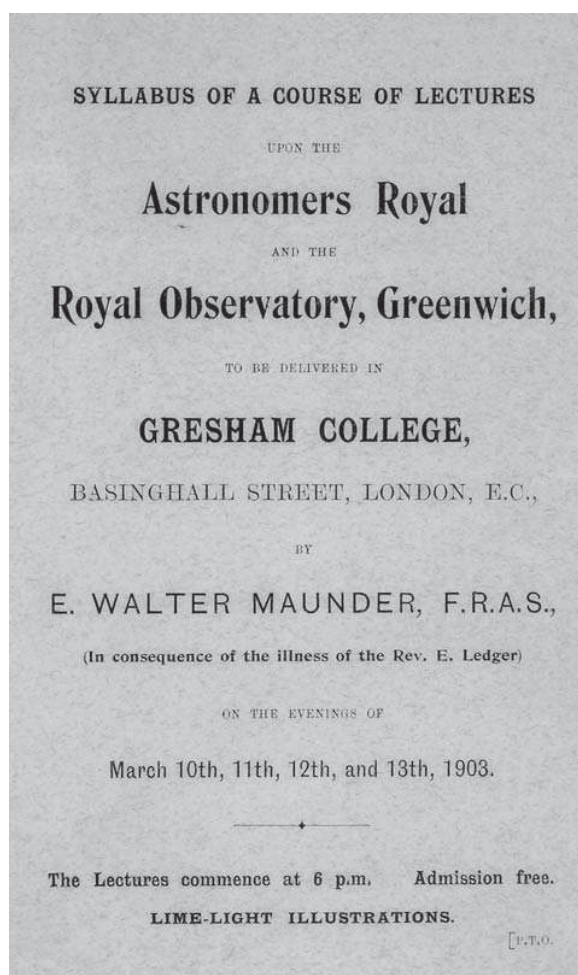


Figure 9. Syllabus for a course of lectures given by Maunder at Gresham College, City of London, in 1903. CUL/RGO 7/223; reproduced with permission of the Syndics of Cambridge University Library.

ceived, being described as '...an excellent work' by Hector Macpherson.¹⁷⁷ Writing in his obituary of Maunder, Hollis refers to its appearance on the open shelves of the British Museum Library which had to be 'replaced due to hard wear, something not said about the others.'¹⁷⁸ (Its popularity was such that 'Owing to the increased demand for Mr. E. W. Maunder's popular work *Astronomy without a Telescope* only lately issued, the publishers have prepared a second impression, which is now ready.'¹⁷⁹)

Maunder continued to be involved in various non-astronomical matters connected with the Royal Observatory. Presumably because he was the longest serving senior assistant, he appears to have been the spokesman for the others in connection with a formal approach for a review of salary. As well as several letters to Christie about meetings to discuss these requests, he also undertook correspondence with others (e.g. the Government Laboratory in the Strand, and also his brother, George) requesting information about their pay structure.¹⁸⁰ So far no evidence has been found regarding the outcome.

During this period occurs an example of a number of questions which still need to be answered about Maunder. In 1908 the Maunders were in South Africa, and visited the Cape Ob-

servatory. It was probably then that he had a discussion with Sir David Gill (His Majesty's Astronomer at the Cape), about the Cape Observatory, during which conversation(s) took place about (possibly) improvements. It seems that he and Gill entered into some subterfuge as he writes that

'I wrote... on the lines which you suggested. Of course I gave this as my own advice, and neither mentioned your name... I am glad to say that I heard by last mail that my advice had been taken very well; indeed gratefully. So I hope the trouble will be entirely got over.'¹⁸¹

What this advice was is not specified, and there is no indication in any of the official records so far examined in the RGO archives as to what it could have been. Given the comment made in the letter it is very probable that the involvement of Gill would have been controversial at least; it is possible that Gill wished to make changes which he could not suggest himself, but by using a third party (Maunder) he was able to circumvent any difficulties.

Retirement

Maunder makes very few references in his correspondence to events in the wider world. His account of the Dockers' strike (1911) includes the thought that the hot summer was responsible for the labour troubles; and that the spectre of being '...within sight of an actual famine in London; our food supplies had run down lower than any one can recollect.'¹⁸²

The same year saw a further attempt to introduce 'Daylight Saving' by William Willett. In a letter to the *Daily Graphic* Maunder wrote

'Mr. William Willett is again urging the claims of his wrongly-named proposal; he calls it the 'Daylight Saving' Bill, it is really a 'Bill for Putting the Clock Wrong'... The time system of the country is to be disorganised twice a year, not in order that we may enjoy more daylight, but in the hope that more people will get up early if they are cheated into doing so than will ever do so of their own accord... His statement that the Bill will give forty millions of people 'an additional hour of daylight—seven hours a week for twenty-three weeks for the enjoyment of their leisure,' is absurd... The only possible way of gaining this additional hour is to get out of bed an hour earlier, and this we can do – if we choose – without an Act of Parliament. If we do not get up out of bed, no possible Act of Parliament will 'save our daylight', for us.'¹⁸³

The year 1911 was to mark a more significant milestone in Maunder's life, as upon reaching his 60th birthday, he was eligible for retirement under the normal Civil Service rules. However, under the same regulations it was possible for a Civil Servant to be retained for further years, '...in the case of Officers holding important positions, whose service it may be desirable to prolong... [in] the interests of the public service.' Furthermore, a letter to Dyson asked if '...it is considered necessary in the interests of science to retain Mr. Maunder's services beyond that date' and to which in reply Dyson wrote 'I think it is in the interests of the Observatory that Mr. Maunder's services should be retained until he has completed 40 years of service, that is till November 6, 1913...

Kinder: Edward Walter Maunder



Figure 10. Greek Orthodox cathedral in Camberwell, formerly the Apostolic Church, at which Maunder was a deacon. Photo by A. J. Kinder.

His special knowledge of the work of his department could not be well dispensed with at present.'¹⁸⁴ The reply confirmed Maunder's retention in his post, and a similar request made in 1912 March, was also confirmed. Therefore it was not until 1913 November that he was finally able to retire.

'The heavens declare the glory of God...'¹⁸⁵

Following his retirement from the Royal Observatory, Maunder accepted the position of secretary of the Victoria Institute, a position he held until his return to the Royal Observatory later in the War.¹⁸⁶ As was to be expected from someone born into a Wesleyan Methodist household Walter had very strong and definite religious beliefs. At some point in his life (the actual date is so far unknown) he became an adherent of the Church of the Catholic Apostolic Faith (the 'Irvingite Church'),¹⁸⁷ rising to the post of deacon. As a deacon his responsibilities included baptism, visiting the sick, giving advice, religious education, reading the Gospel, administering the Chalice at the Eucharist, various minor offices (including the Litany), presiding at prayer meetings, offering prayers for women after childbirth, preaching, and assisting the higher clergy.¹⁸⁸ It was also possible to adhere to other Christian sects (including Anglican, Lutheran and even Roman Catholic), for it '...did not claim to be *the* Church, nor even to be *a* Church... they were a work of the Holy Spirit *within* the Universal Church...';¹⁸⁹ for the appeal of the church was '...an opportunity to develop and practise forms of worship free from control of the state and of the Protestant minded Anglican hierarchy' and that 'the two main attractions were the restoration of the Christian hope in the return of the Lord and the beauty and dignity of the liturgical worship.'¹⁹⁰ Maunder became deacon at its church in Camberwell, and it was there that his memorial service was held.¹⁹¹ The church still exists, but is now a Cathedral of the Orthodox Greek Faith (Figure 10). No record of a memorial service is known to exist.

It is however in his writings, in particular those for the 'popular press', that Maunder's religious beliefs are very

much evident. In an article on Mars he wrote 'He [God] has given to man an intellect to cope with the problems of creation...',¹⁹² a theme he later develops further, writing that:

'He wishes us to know Him,... to understand some little thing of His workings... He excites our wonder, our admiration, and our curiosity, by the strange and beautiful spectacles which He presents before us in earth and sky and sea... He hath made His wonderful works to be remembered.'¹⁹³

As well as being deeply religious, Maunder was widely read, as evidenced by the many references made in his works and correspondence, quoting for example Dickens and Kipling as well as the *Bible*.

The Royal Observatory, Greenwich – IV and war service

Following the outbreak of war in 1914 various members of the Observatory staff were either called to the Colours or transferred to other departments where the work was considered to be more appropriate to the War effort. Along with Annie, Walter had been working in a voluntary capacity at the Observatory since December 1915. From March 1916 he was employed in a formal capacity at the Observatory, for in a letter to the Admiralty, Dyson wrote 'Mr Maunder has been employed here for the whole of his time since March 24...' In making the request that Maunder be re-called into his old position of First Class Assistant, Solar Department, Dyson also wrote that his services 'would be of great use just now in making up arrears and keeping the current work going.' The salary to be paid was £150, the difference between his full pay on retirement and his pension, and concluded that 'Mr Maunder is thoroughly efficient and his long experience and knowledge of the work here would be of great service'. Although Maunder had been employed since March 24, Dyson suggested April 1 as being a convenient date to start from with respect of salary, and this was subsequently confirmed. Amongst his duties was the measurement of the solar photographs, a backlog of such having occurred due to the lack of overseas photographs (a result of enemy U-boats) complementing the Greenwich series, especially for those days in which Greenwich was clouded over. The last measurement made by Maunder was at the end of February 1917.¹⁹⁴

Maunder remained at the Royal Observatory until 1919 September 30 when he was released, having 'rendered extremely valuable service to the Royal Observatory.'¹⁹⁵ In the following February, he applied for consideration to be given for an increase in his pension and commutation allowance, to take into account the cost of living. This letter was sent by Dyson to the Admiralty who added its support; it took almost eight months before a reply (in the negative) was received.¹⁹⁶

Although his work was to be invaluable, a more practical contribution to the War effort was his *The Stars as Guide to Night Marching* (1916), which resulted in a letter from Capt F. A. Osborn of the Royal Army Medical Corps, who was

serving on the Western Front at the time, containing the following comments:

'I am writing to you from the front to congratulate you most heartily on your excellent book *Guide to Marching by the Stars*. It has helped me wonderfully and every day I dip into it and am learning more and more of the stars... I am writing to... ask you to advertise your book *more* than you do – advertise it everywhere – *Punch* – *Daily Mail* – *John Bull* and *The Morning Post*... It will help soldiers enormously. It is excellent and any fool can understand it which is more than can be said of some astronomical books – Proctor's *Star Atlas* is a thorn in my side... send Lord Northcliffe a copy and ask him to mention it in his paper for the good of the army – with warm congratulations and thanks for your careful helpful clear book...'¹⁹⁷

It has not been possible to determine whether Maunder replied to this or followed the suggestion.

Final years

Following the completion of his second period at Greenwich, Maunder was again able to enter upon retirement. He continued his astronomical research in a private capacity, in particular his work on sunspots. This resulted in a paper which again expounded his discoveries connected with the sunspot minima in the 17th and early 18th century.¹⁹⁸ His final years also appear to have seen a marked slowing down in his work, as very few articles appear under his name.

Maunder died on the 1928 March 21 from cardiac failure complicated with uraemia and arteris sclerosis [*sic*] at his home, 8 Maze Hill, London, SE10.¹⁹⁹ His will was proved on April 28, with his brother in law, John Dill Russell, FRCS, surgeon, and his son, George Harvard Maunder, actuary, as executors and trustees, leaving the residue of his estate to Annie.²⁰⁰ He is buried in the family plot in Shooter's Hill Cemetery.²⁰¹

It is very unlikely that anyone alive today would have met or known Maunder personally. Consequently what his contemporaries would have thought of him is known only from surviving anecdotes and the writings of others, especially obituaries. Of all those who knew him, it was Hollis who appears to have written the most, according to whom he was

'...a generous-minded gentleman, ...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 ...[had] amiability of manner ...Maunder will be remembered ...for so long as this Association lasts ...whilst I, and others who knew him, will remember him for ...a true Christian gentleman.'²⁰² Elsewhere Hollis also wrote that 'Maunder was a man with no enemies, but many friends. A suavity of manner and a softness in speech were markedly in keeping with a kindness of heart and amiability of character that lay deeper than its outward manifestations.'²⁰³

Dyson (Astronomer Royal) speaking at the meeting in which Maunder's death was announced said that '...I had always admired his knowledge and wonderful memory of astronomical events.' Knobel (at the same meeting) spoke of Maunder's role in founding the BAA and quoted the words to be found

on the tomb of Sir Christopher Wren *Si monumentum requiris, circumspice* [If you seek his monument, look around].²⁰⁴ The unknown obituarist of *The Times* and also the *English Mechanic* refers to him as a ‘distinguished astronomer.’

Despite these eulogies Maunder is barely remembered today, a situation best summed up by Crowe, who wrote that

‘History has dealt harshly with Maunder. Unnoticed in England’s [sic] *Dictionary of National Biography*, his solar researches described as ‘undistinguished’ in the *Dictionary of Scientific Biography*, where his Martian studies are scarcely mentioned, he is now nearly forgotten. An evaluation of his accomplishments as Greenwich solar spectroscopist, founder of the B.A.A. and editor... of both its *Journal* and of *Observatory*, and author of an array of respected astronomical books and papers cannot now be attempted.’²⁰⁵

There is still much to be said and written about Maunder’s life and work. Recognition has been very slow in coming. In 1970 a crater on the far side of the Moon was named for both Annie and Walter, while in 1973 a crater on Mars was named for Walter.²⁰⁶ Even as the originator of the ‘Butterfly Diagram’ little mention is made; and it was not until 1979 that the phrase *Maunder Minimum* to describe the period from 1645–1715 when no solar activity was recorded was coined by John Eddy.²⁰⁷ In a recent work however Maunder has been described as ‘Clearly a man before his time in an England not in the least ready for him....’²⁰⁸

Conclusion

This paper has attempted to examine the life and times of Edward Walter Maunder (his work is the subject of a second paper still in preparation). Maunder was a remarkable man, who despite circumstances was able to achieve a great deal. That his name is still largely ignored today as a pioneer in solar physics is both a tragedy and detrimental to not only the whole of solar physics, but to astronomy in general. He lived at a time when astrophysics was still in its early years, and following his appointment to the Royal Observatory, he became the first *professional* astrophysicist in the United Kingdom, as opposed to amateurs (Huggins, Lockyer). Today his service to the cause of British astronomy, both professional and amateur, would have merited him some form of civil honour, but unfortunately for himself, he lived at a time when this was not very common.

Biographical sources

As can be expected Maunder’s obituaries are one of the major sources for information about his life and work, and although limited in their coverage, those appearing in the *Journal*, *Monthly Notices of the Royal Astronomical Society* and *The Observatory Magazine* are by far the best. One of the best biographies (at least to 1905) is that which

appeared in Macpherson’s *Astronomers of Today* (1905).²⁰⁹ As already mentioned above, there was no entry for Maunder in the *Dictionary of National Biography* until the new edition published in 2004. This provides a comprehensive account of both his life and work (Annie has a separate entry), although like other entries in the sixty volumes, it does not provide a bibliography (previous editions did). The entry in *Who was Who* is brief and provides just an outline of his career. The entry in the *Dictionary of Scientific Biography* is sparse, and very much underrates his achievements, referring to his solar work as just a ‘tabulation of various sunspot features, such as number, area, changes in position, and motion’ from which he was to be able to draw various conclusions, e.g. the relationship between period and latitude of sunspots, position of the solar axis of rotation, correlation between the solar rotation and terrestrial magnetic disturbances *etc.* Furthermore, Maunder, using a spectroscope attached to the Great Equatorial, observed solar prominences, stellar radial motions, and the spectra of planets, comets, novae and nebulae. There is no mention of his work on Mars and its canals, the astronomy of the Bible or his work on the origin of the constellations.²¹⁰

Various other sources (e.g. *The Times*, *Nature*, *Annual Register*, etc.) largely contain concise accounts of his life and work. With the exception of the revised *DNB*, there is no recent account of his life, although two books, *The Maunder Minimum and the Variable Sun–Earth Connection* by W. W–H Soon & S. H. Yaskell (2003) and *The Extraterrestrial Life Debate, 1750–1900* by M. J. Crowe (1999) go into some detail about his work in these fields. None of the histories of the Royal Observatory Greenwich provide any significant accounts of Maunder, despite the fact that there is a great deal of archive material available.

Appeal

Although I have had access to much of Maunder’s correspondence, there is still a great deal which I have not been able to find, some of which presumably exists in university and observatory archives. I have no records of any correspondence by or to any of the Maunders from any of the major European observatories and astronomers (in particular France, Germany, Italy, Russia, Spain, Scandinavia), with the exception of Antoniadi and Flammarion. Likewise Ireland, Canada, Australia, New Zealand, South Africa and India also show a lack of letters, despite references to such letters appearing in the known correspondence. A tantalising comment made to me recently was the existence of a ‘suitcase’ of letters which the owner intended to offer to the BAA about the time of the Association’s centenary in 1990. However contact was lost, due to the death of the owner, soon after the initial contact was made.

Should anyone know of any letters etc., by or to any of the Maunders, I would greatly appreciate it if they could let me know.

Acknowledgments

If it was not for the help and assistance of many individuals and organisations this paper would not have been possible. In particular Adam Perkins (Archivist, RGO Archives), Godfrey Waller (Superintendent) and Louise Clarke (Deputy Superintendent) of the Manuscripts Collection, Cambridge University Library, showed unfailing courtesy and willingness in obtaining for me the appropriate records of the RGO archives, even when at some inconvenience; equally the assistance of Peter Hingley and Mary Chibnall (Royal Astronomical Society) and Dr Allan Chapman (Wadham College, Oxford) whose immense courtesy and encouragement in pointing out various sources proved of value. Many archives provided me with information and copies of correspondence, some of which will be more appropriately acknowledged in the paper on his scientific work. Of these I wish to acknowledge in particular the Syndics of Cambridge University Library / PPARC for allowing me to quote from the RGO Archives (referenced below as CUL/RGO); and the archivists and institutions of the Lick Observatory (Mary Lea Shane Archives); California Institute of Technology; Royal Society; Jean and Alexander Heard Library, Vanderbilt University (Edward Emerson Barnard Archives); and the Editors of *The Observatory Magazine* for allowing me to reproduce various letters held by them; the Council of the Royal Astronomical Society for allowing me to reproduce the photographs of Airy and Christie, as well as those individuals mentioned in the references.

Finally I thank Mr Philip Maunder (grandson of Walter) and family for their courtesy and help in my research, and allowing me to see various artefacts still held by the family and originally owned by Edward Walter Maunder. In fact the assistance I received from Philip and family cannot be adequately acknowledged. The comments and suggestions of the referees who looked at this paper were also of great assistance.

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Notes and references

- 1 Although his full name was Edward Walter Maunder, which he used in all his writings, and frequently appeared as E. Walter Maunder for his signature, he was almost always referred to as Walter.
- 2 Obituaries appeared in *J. Brit. Astron. Assoc.*, **38** pp 165–168, 229–233 (1928); *Monthly Notices of the RAS* **89**, 313–318 (1929); *The Observatory Magazine* **51**, 141–142, 152–153, 157–159 (1928); *The Times* 1928 March 22; *The English and Amateur Mechanics* **3**, 487, 507 (1928); *The Annual Register* 1928; *Nature* **121**, 545–546 (1928); *Bulletin de la Société Astronomique de France* (1928), 240–242; *Kentish Mercury* 1928 March 22. Biographical articles appeared in the *Dictionary of Scientific Biography* **9**, 183–185 (1975); *Astronomers of Today*, Hector Macpherson Jnr, 192–200 (1905); *Who was Who II 1916–1928*; *Poggendorff's Biographisch-Literarisches Handwörterbuch* (1904, 1931) and *Who's Who in Science* 1913, ed. by H. H. Stephenson; *The Dictionary of Nineteenth-century British Scientists* (2004) and various volumes of *The Science Year Book* for 1905–1909 edited by Major B. F. S. Baden-Powell. All future references to the *Journal* of the BAA and *RAS Monthly Notices*

- will be given as *JBAA* and *MNRAS* respectively.
- 3 W. Sheehan, *Planets and Perceptions*, p. 195 (Tucson, 1988).
- 4 Mander, Manders, Maunder, Maunders from “ME mander ‘basket-maker’”, from a derivative of OF *maund* ‘basket’”. P. H. Reaney, *A Dictionary of English Surnames*, Oxford (1997, rev.). Another meaning of ‘Maunder’ is given in *The Concise Oxford Dictionary* (1990) as to ‘1 talk in a dreamy or rambling manner. 2 move or act listlessly or idly.’ Sheehan in *Planets and Perceptions* (1988) makes a punning reference to this by writing that ‘He was simply a conservative grumbler, a maunderer, against an idea that bid fair to sweep all before it.’ (p. 198).
- 5 Cruwys Morchard (variant spellings), a small scattered village and parish six miles west of Tiverton, nine miles north of Crediton, 15 miles south-east from South Molton and 16 miles north-north-west of Exeter. It was the family seat of the Cruwys family (*Kelly's Devonshire*). Margaret C. S. Cruwys, *A Cruwys Morchard Notebook 1066–1874*, Exeter, (1939) p. 12. I would like to thank Mrs S. M. Laithwaite, archivist at the Devon Record Office, Castle Street, Exeter for this information.
- 6 See ‘A Devon Yeoman in 1648’ by W. G. Hoskins in *Devon and Cornwall Notes and Queries* **22** (1943). This is an account of the will and inventory (destroyed by enemy action), and included a transcript of the inventory. I would like to thank Mrs K. Va'mos, Assistant Local Studies Librarian, Devon Lifelong Learning, Exeter Central Library, Exeter, Devon, for providing me with this information and a copy of the entry, as well as a copy of the will of William Maunder, of Morchard Cruyse, Husbandman, dated 3 May 1595 and proved 8 July 1595.
- 7 J. Foster, *Alumni Oxoniensis: members of the University of Oxford 1500–1714, their parentage, birthplace and year of birth, with a record of their degrees, being the matriculation register of the university arranged, revised, and annotated* (4 vols., Oxford/London 1891–'92; reprinted 1968). Several Maunders are referred to, largely from the West Country, including ‘Richard Mander, son of William, of Morchard Cruwys, Devon, pleb. Balliol College, matric. 1 March 1677/8, aged 17; William Maunder, son of William of Cruwys Morchard, Devon, gent. Balliol Coll., matric. 15 May 1746, age 17’. There are no records of a Maunder for this period in J. & J. A. Venn *Alumni Cantabrigenses: a biographical list of ... the University of Cambridge...* pt. 1 *From the Earliest Times to 1751* (1922–'27; 4 vols., Cambridge). M. Feingold in ‘Mathematical Sciences and New Philosophies’ in *The History of the University of Oxford IV: Seventeenth Century Oxford* refers to a Dr. Maunder (p.421).
- 8 Personal communication from Mr Philip Maunder, letter 2001 April 11; the Maunder one-name website (www.acay.com.au/~amaunder/mauneng) gives George as being baptised in 1730 in Cruwys Morchard Church, and married Mary Skinner (no date), issue Mary (baptised 1751), Ann (baptised 1754) and Thomas (born 13 February, 1755).
- 9 I would like to thank Mrs S. Pike for supplying me with copies of D. Ayles ‘100 Years ago George Maunder did not pull his punches’ in *Alliance News* (1981 July/August) pp. 10–11 and G. M. Carson ‘George Maunder – A Wesley Disciple’ (source unidentified) pp. 11–17. The memorials in the *Wesleyan/Methodist Magazine* for 1881 May were written by Thomas Frid Maunder.
- 10 A copy of the certificate, dated 5 May 1921 and written by the then vicar of Caistor in Lincolnshire, of the marriage of Thomas and Ann Moody (1812) is in the possession of the family.
- 11 I would like to thank Mr C. P. T. Rebbeck, Hon. Archivist for Curator of the Soldiers of Gloucestershire Museum for supplying this information. Also that according to the regulations of the time ‘... only six soldiers of each Company were allowed to bring their wives on campaign, so Maunder must have been well regarded.’ The medals (including the Waterloo one) and the Family Bible are still held by the family – information supplied by Mr Philip Maunder on 2002 January 20. The date of marriage to Ann is taken from the Maunder one-name Web.
- 12 There does however appear to be some uncertainty; Ayles implies the twin died in Bristol, while Carson that he died soon after birth in Bayonne.
- 13 *Maunder Family Papers*, letter dated 1935 June 7; the original appears in the *Philosophical Transactions* for 1719. In a letter from Philip Maunder (dated 2002 August 21), Annie's claim that William Maunder was a Reverend appears to be based on the letter to the Royal Society; he may have been a rector of Tiverton or of Templeton, both near Cruwys Morchard. Records also held by Philip Maunder give a William Maunder married to Mary Drake, on 1717 April 30; and further that a Mary Maunder, wife of William of Templeton, was buried in Cruwys Morchard in 1719 March 27; possibly his first wife. In fact the letter does not actu-

- ally refer to William as 'reverend' nor does it imply him as holding any religious position, orthodox or otherwise. The title 'reverend' appears to have been given by Annie herself, or as an oral tradition passed down through the family.
- 14 Margaret C. S. Cruwys, *A Cruwys Morchard Notebook 1066-1874* (1939, Exeter.)
 - 15 This was not changed until the 1871 University Test Acts which opened up both Oxford and Cambridge to all.
 - 16 A niece of Sir William Wiseman; and daughter of Mary Ann Wiseman who was his sister, and whose mother, Jemima Wiseman, was granddaughter of Thomas Arne, composer of *Rule Britannia*. (Letter from Philip Maunder, dated 2002 August 21.)
 - 17 Obituary in the *Alliance News* cited by Carson. An entry exists for George in F. Boase's *Modern English Biography VI*; and gives his dates as 1813 December 6–1878 June 21.
 - 18 Information supplied by Mrs Janice Maunder of New Zealand and Mr Philip Maunder.
 - 19 It was fairly common at this time for the mother's surname to be used as one of the Christian names of the eldest child. His business address is given as 'Thomas Frid Maunder & Co., Public Accountants, Auditor and Arbitrators, 26 Martin's Lane, Cannon Street, London, E. C.' See e.g. letter dated 1890 August 27 in *BAA Early Letters*.
 - 20 See various lists in the *BAA Archives*, *Early Letters*, and also the Roll of Members vol. 1, in the BAA archives. Walter's name appears first, while Thomas' is number fifty.
 - 21 *BAA Archives: Council Minutes 1 1890–1898*: pp. 1–3. The meeting was held in the rooms of Mr William Henry Wesley in Burlington House. (It is possible that these rooms are those occupied by the BAA until 2006).
 - 22 *RAS Letters 1893*. Letter dated 1893 March 15. I would like to thank the RAS Council and Mr Peter Hingley, Librarian of the RAS for permission to reproduce this and others.
 - 23 *BAA Archives: Council Minutes 4 1916 October 16–1930 April 30*, pp. 242–244, and *5 1930 May 28–1941 March 26*: p. 144. The resignation would have been effective from the end of the session. That age appears to have been the reason is claimed in the 'Annual Report' in *JBAA* **38**, 282 (1928).
 - 24 I would like to thank John Lammings, Assistant Librarian, The Institute of Chartered Accountants in England and Wales and David Raymont, Assistant Librarian, The Actuarial Professor, Institute of Actuaries for this information. The obituary appeared in *JBAA* **45** (10), 408 (1935).
 - 25 *RAS Archives, Molesworth Papers 1 (3) E. W. Maunder File f.19*, letter dated 1904 October 16.
 - 26 *CUL/RGO 7/5 - Assistants' Memorial to the Astronomer Royal as to Improvement in their Financial Position*. Letter dated 1906 January 28.
 - 27 Jean & Alexander Heard Library, Vanderbilt Univ. *Edward Emerson Barnard Papers Special Collection: Box 22 Edw. W. Maunder*. Letter from Barnard dated 1901 November 20, in which Walter writes that he was staying with his sisters in Yorkshire for a few days to recover from a bout of malaria.
 - 28 Mary Lea Shane Archives, *Edward S. Holden Correspondence – E. W. Maunder File*. Letter dated 1891 July 4. See also Census return for 1891, Greenwich, ward no. 4; schedule no. 402. I would like to thank Ms Frances Ward, Senior Library Assistant, Greenwich Local History Library for this information.
 - 29 Augustus Wheeler was an original member of the BAA (no. 64), Curator of Lantern Slides 1892–1907, when he also resigned from the BAA. He also contributed to the family magazine, the *Sciolist*.
 - 30 'Entry of Birth for the Registration District of Grays Inn Lane, 1851. Birth in the district of Grays Inn Lane in the County of Middlesex; entry no. 185'; and the Census return for 1881 gives 5 Chesterfield Street. Kings Cross, Middlesex; the Census return for 1891 as St. Pancras, London. I would like to thank Mrs Janice Maunder (New Zealand) for supplying copies of the certificates, and Greenwich Local History Library for the copy of the 1881 and 1891 Census return.
 - 31 In personal communication received from Mr Alan Maunder, see also obituary in *Journal*. The map does not appear to have survived.
 - 32 Cited in the *University College School Magazine* (c1891), see entry on Maunder. I would like to thank Mrs P. S. Karet, Registrar, University College School, Frognal, for this information. During Maunder's time the headmaster was Thomas Hewitt Key FRS (1799–1879) from 1832–1875, who was a pioneer in the introduction of teaching of natural sciences in schools. H. J. K. Usher, C. D. Black-Hawkins and G. J. Carnick (1981), *An Angel Without Wings. A History of University College School 1830–1980*, London. It also contains a portrait of a future president and editor of the BAA, F. W. Levander, who was a master from 1869–1909.
 - 33 'Sciolist' is defined as a 'superficial pretender to knowledge', *The Concise Oxford Dictionary* (8th edn., 1990). I would like to thank Mr Philip Maunder for letting me examine a copy of this, and for photocopies of the introduction and contents pages.
 - 34 I would like to thank Ms Victoria Holtby, Archive Assistant, King's College London for this information.
 - 35 Retold by him in *The Heavens and their Story*, A. & W. Maunder, London; p. 103 (1908). It is of course **not** recommended that this should be done, as blindness can result.
 - 36 'Sunspots and Some of their Peculiarities', *Journal Victoria Institute* **50**, 72 (1918).
 - 37 Maunder, *History of the Royal Observatory Greenwich*, p. 181 (London, 1900); E. G. Forbes, A. J. Meadows & D. Howse, *Greenwich Observatory* (3 vols.) (London, 1975); and histories by W. M. Smart and Sir H. S. Jones.
 - 38 The earliest suggested link between sunspots and the magnetic field of Earth was suggested by Sir Edward Sabine in the 1850s.
 - 39 At this time De La Rue was responsible for photographing the solar surface at Kew Observatory (1858–1872).
 - 40 The Civil Service Commission was founded in 1855; an 'Order in Council' of 1870 June 4 by Gladstone directing that 'all entrance appointments to permanent situations in the civil departments of the state ... should be filled by open competition examinations ...' (Sir Robert Ensor *England 1870–1914*, (Oxford 1936), p. 147). An order in council is issued by the Sovereign as a result of the deliberations of the Privy Council and is a statutory instrument which has the same effect as an Act of Parliament. It is usually done in an emergency (e.g. War) or where a measure is required to be undertaken with urgency.
 - 41 A. Chapman, 'Porters, watchmen, and the crime of William Sayers: the non-scientific staff of the Royal Observatory, Greenwich in Victorian times', *Journal of Astronomical History and Heritage* **6**, 31 (2003). In a personal letter to the author (1999 July 23), Allan suggested that Airy's scathing remarks about Maunder may have been because he was the first Greenwich assistant to be appointed by the Civil Service Commission.
 - 42 *CUL/RGO 6/6 f.308*. Letter dated 1872 November 8 from George Maunder to the Secretary of the ROG.
 - 43 Arthur Matthew Weld Downing (1850–1917) was an original BAA member, President from 1892–1894. William Henry Finlay (1849–1924) was at the Cape of Good Hope from 1873–1924, and a member of the BAA (no. 504) from 1891 Feb to 1900, when expelled, presumably for non-payment of subscriptions.
 - 44 I would like to thank Andrew Holland of the Infrastructure Division, Historical Records Division, Cabinet Office for providing me with this information.
 - 45 Conversation with Philip Maunder, in letter dated 2000 Feb 3 and correspondence dated 2002 Aug 21.
 - 46 *Maunder Family Papers*, letter from Hall to Maunder, 1873 Nov 8.
 - 47 *CUL/RGO 6/7, f.184*, letter to Hall of the Admiralty, 1874 April 1.
 - 48 *CUL/RGO 6/7 f. 179*, letter from Airy to the CSC, 1873 Oct 24.
 - 49 *CUL/RGO 6/7, f. 182–183*, letter from Airy to the Secretary of the Admiralty, 1874 March 27.
 - 50 *CUL/RGO 6/7, f. 186–187*, letter from Airy to the Secretary of the Admiralty, 1874 June 9.
 - 51 *CUL/RGO 6/7, f. 189–190*, letter from J. Walrond to the Admiralty, 1874 June 19.
 - 52 *CUL/RGO 6/7, f. 191–193*, letter from Airy to the Admiralty, 1874 June 25.
 - 53 *CUL/RGO 6/7, f. 199*, letter Hall to Airy, 1874 July 13, and *f. 200*, Walrond to Hall, 1874 July 9.
 - 54 *CUL/RGO 6/7, section 12, f. 335*, letter Walrond to Airy, 1875 May 28.
 - 55 *Observatory Magazine* **25**, 427 (1902), the meeting report for 1902 October 29. So far no reference to this has been found in the RGO archives.
 - 56 A. Chapman, *op. cit.* (ref. 41)
 - 57 From discussion with Gilbert Satterthwaite, 2005 May 13.
 - 58 *CUL/RGO 6/52*. The full details, including the written account of Maunder, are given in ff. 242–244.
 - 59 *CUL/RGO 7/22* Memo dated 1879 Nov 24 from Airy to Maunder. Copies of these drawings are held in the RAS archives.
 - 60 Maunder, *History of the Royal Observatory Greenwich* (1900), pp. 116–117.
 - 61 *CUL/RGO 6/41* 'Occasional Memos to Assistant', ff. 168, 169, 174, 180, 198, 238, 239, 244.
 - 62 *CUL/RGO 7/20* 'Leave of Absence' letter to Christie, 1885 Aug 7.
 - 63 *CUL/RGO 6/32, f. 245*, memo Airy to Christie, 1873 Dec 26.
 - 64 *CUL/RGO 6/32, f. 249*, letter Christie to Airy, 1874 Jan 3.

- 65 'Entry of Marriage, 1875 Marriage Solemnized at the Wesleyan Chapel in the District of Wandsworth in the County of Surrey, no. 77. Entry of Birth, Registration District Shoreditch for 1852. Birth in the Sub-district of Kennington 2nd part in the County of Surrey, no. 205(?)'; and 'Entry of Death, Registration District Greenwich for 1888. Death in the Sub-district of Greenwich East in the County of Kent, No. 275'. I would like to thank Mrs Janice Maunder of New Zealand for supplying me with copies of these.
- 66 *The Fairy Princess and other Stories* by Irene Maunder, published by Longman Green and Co., London (1905). Maunder refers to this in a letter home while in Canada for the 1905 Eclipse (see *JBAA* 111(5), 272 (2001)). Adverts appeared in contemporary issues of the *Journal* (e.g. 16, 1906).
- 67 M. B. Ogilvie (p. 261), 'The Campbells and the Maunders', in H. M. Pycior et al. (eds), *Creative Couples in the Sciences*, Rutgers University (1996). Based on interviews with Alan Maunder in 1991.
- 68 In conversation with Philip Maunder, 2000 Feb 3.
- 69 See for example *RAS MSS Molesworth* 1(3) f.9, letter dated 1901 Sept 13. Refers to illnesses of both Annie, and his youngest son, Henry Ernest.
- 70 Jean & Alexander Heard Library, Vanderbilt Univ. *Edward Emerson Barnard Papers Special Collection: Box 22 Edw. W. Maunder*, Letter to Barnard, 1907 June 8. *Hale, Box 27, E.W. Maunder File*, Letter to Hale, 1907 June 17. At this time appendicitis and subsequent surgery was both dangerous and a life-threatening operation.
- 71 *ibid.*, Barnard to Maunder, 1907 June 8.
- 72 For an account of their work, see BAA Memoir *Total Solar Eclipse of May 1900* (1901), edited by Maunder.
- 73 In conversation with Philip Maunder, 2000 February 3.
- 74 Maunder is however referred to in various publications and meeting reports as giving talks (outside of BAA and RAS meetings), one when he deputised for Edward Ledger, Gresham Professor of Astronomy during 1902–1903. The Gorton lecture is referred to in *op. cit.* (ref. 70), letters dated 1911 June 3 and Aug 14.
- 75 E.g. *CUL/RGO* 7/224 Letter from Christie to Locke, 1906 Nov 12.
- 76 See *RAS MSS Molesworth* 1 (2) f.5, letter from Annie to Percy B. Molesworth, 1900 Dec 28.
- 77 *English Mechanic* 52 (1328) p. 34 (1890 September).
- 78 Elected on 12th February, proposed by Christie (personal knowledge), Dunkin and Cowpar Ranyard. He served on Council from 1885–1889, 1891–1898 and 1916–1921; as Vice-President 1897, and Secretary (and concurrently editor of the *Monthly Notices*) 1892–1897. I would like to thank Mary Chibnall, assistant librarian of the Royal Astronomical Society for providing me with this information. He also served on a number of committees.
- 79 The Charter of the RAS, while not explicitly preventing women from becoming Fellows, was apparently so worded that a legal challenge could have been made. Despite a number of attempts to change it, it was not until 1915 that the Charter was amended so as to allow unrestricted access for females, with the first being elected in 1916. See *History of the Royal Astronomical Society 1820–1920*, J. L. E. Dreyer et al., for more details.
- 80 *Juvisy Archives Flammarion Papers*: Letter dated 1887 Nov 21. I wish to thank Msr J. Pernet for obtaining a copy of this letter.
- 81 *Mary Lea Shane Archives, Edward S. Holden Correspondence – E. W. Maunder File*. Letter dated 1891 July 4.
- 82 At this time, Maunder was living at 20 Ulundi Road (Hyde House) Greenwich. The road's name commemorates the battle of Ulundi (1879) during the Zulu war of that year, in which 15,000 Zulus were killed for only 15 British dead. See G. Usher, *Dictionary of British Military History* (London, 2003).
- 83 Elizabeth Brown (1830–1899) was at this time a prominent member of the Liverpool Astronomical Society (LAS), and director of its Solar Section. She was to be the first director of the Solar Section of the BAA (1890–1899). See M. Creese 'Elizabeth Brown (1830–1899)' in *JBAA* 108, 193–197 (1998).
- 84 'Report of the Annual Meeting of the Association held on October 30, 1907, at Sion College, Victoria Embankment', *JBAA* 18, 21–22 (1908). See also *The History of the British Astronomical Association: First Fifty Years*, edited by H. Kelly (1948, 2nd edition edited by R. McKim, 1990), p. 7. All future references to the Histories will be given as either *History I* or *History II* (*The History of the British Astronomical Association: The Second Fifty Years*, ed. R. McKim (1990) with page references.)
- 85 *op. cit.*, ref. 84.
- 86 *English Mechanic* 51 (1321), 445–446 (1890 July 18).
- 87 *ibid.* 51 (1322), 463 (1890 July 25).
- 88 *ibid.* 51 (1324), 513; item 31416 (1890 August 8), and also the first chapter of *History I* on why the change from Society to Association. The BAA archives *Early Letters* contain correspondence of the events leading up to the foundation and first meeting.
- 89 *BAA Archives: Early Letters* 1 (1).
- 90 *English Mechanic* 52 (1327), 10 (1890 August 29).
- 91 In a letter to the *English Mechanic* 52 (1332), item 121 (1890 October 3) Thomas Frid announced that they had enrolled nearly 250 members in the seven weeks since the 8th August.
- 92 Founded by Christie in 1877, it was (and still is) an independent, privately owned publication (by the editors).
- 93 *English Mechanic* 52 (1332), item 31655; Maunder's reply (1333) 141–2, item 31683; 52 (1336) 203–204, item 31654 by Thomas Frid Maunder (all 1890). An account of the first year appears in 53 (1373), 452 (1891).
- 94 *English Mechanic* 53 (1353), 10, letter 'An Intra-Mercurial Planet - The Triumph of Philosophy.' (1891 February 27) The full title is *The Triumph of Philosophy or The True System of the Universe* (1890) by James Gillespie. Its subtitle includes 'Being an Earnest Endeavour to correct several Fallacies of the Accepted Theory of Astronomy.' His introduction includes 'Can any man in his sober senses believe that the earth could fly through space at the rate of one thousand miles a minute?' – shades of arguments made by early anti-Copernicans! Maunder also wrote to Wesley about an unauthorised use of his (EWM) name by the *Daily Mirror* – see *RAS Letters* 1910 letter dated 1910 January 1.
- 95 *CUL/RGO* 7/248 'Miscellaneous Correspondence with Secretaries'; letters from E. B. Knobel to W. H. M. Christie, 1891 Feb 13 and 1891 Feb 17.
- 96 See obituary by Hollis, in *JBAA* 40, 401–404 (1930). He went on to become President of the BAA (1910–1912) and served for many years on its Council.
- 97 Jean & Alexander Heard Library, Vanderbilt Univ. *Edward Emerson Barnard Papers Special Collection: Box 22 Edw. W. Maunder*. Letter Maunder to Barnard, 1896 May 15.
- 98 Arthur Cowper Ranyard (1845–1894), see *Dictionary National Biography* (2004).
- 99 *op. cit.*, ref. 97.
- 100 1919 saw the formation of the International Astronomical Union. The Royal Society was the UK-adhering body and in order to represent views of professionals and amateurs it formed the National Committee for Astronomy, and requested two representatives from the BAA as the leading national amateur body. An almost unique example of an amateur body being recognised at such a high level.
- 101 For example George Seabrooke was on Council from 1890–1917 (excepting 1915–1916), holding several offices at the same time.
- 102 Sir William Henry Mahoney Christie (1845–1922) Astronomer Royal 1881–1910. A grandson of the founder of the auction firm of Christie's. Obituary see *MNRAS* 83, 233–241 (1923) by H. H. Turner.
- 103 Obituary of W. H. M. Christie, *The Observatory Magazine* 45, 77–81 (1922).
- 104 See obituary in *MNRAS*, *op. cit.* (ref.102).
- 105 *CUL/RGO* 7/8, letter dated 1883 August 15. Also contains further references to various disputes.
- 106 *CUL/RGO* 7/8, letter from Evan MacGregor to Christie, 1884 Dec 23.
- 107 *CUL/RGO* 7/20. Letter to Christie, 1885 Aug 7.
- 108 *Mary Lea Shane Archives, Lick Observatory, Edward S. Holden Correspondence – E. W. Maunder File*. Letter Maunder to Holden, 1891 April 2.
- 109 *CUL/RGO* 7/156. Letter Turner to Holden, 1891 April 1.
- 110 *Op. cit.*, ref.108. Holden Copybook, vol. 21, 136–141. Letter dated [1891], April 19.
- 111 *Op. cit.*, ref.108. Letter dated 1891 June 12. Maunder's reply was dated July 4.
- 112 Burnham claimed Holden 'tried to rule the astronomers...' and that Holden's military approach was a cause for Burnham leaving. D. E. Osterbrock, J. R. Gustafson & W. J. Shiloh Unruh, *Eye on the Sky* (Berkeley, 1988) p.92.
- 113 *Op. cit.*, ref.108. Letter dated 1894 March 14. So far no other evidence has been found to confirm this, however it could well have been given verbally.
- 114 *CUL/RGO* 15/129, f. 547. Letter to David Gill, 1896 April 2. Dr Ralph Copeland was Astronomer Royal for Scotland from 1889–1905 and succeeded by Dyson. Obituaries in *MNRAS* 66, 164–174 (1906); *JBAA* 16, 28 (1905) and *Dictionary of National Biography*.
- 115 *CUL/RGO* 7/156. Untitled document.
- 116 *RAS Molesworth* 1(2). Letter dated 1900 Dec 28.
- 117 *Op. cit.*, ref.108. Letter of 1892 April 28. There is no reference to this (or to Maunder at all) in the *History of the Royal Astronomical Society 1820–1920* (ed. J. L. E. Dreyer et al., 1923).

- The *RAS Council Minutes 9 1890–1901*) makes no reference to this ‘contest.’
- 118 *RAS MSS Molesworth 1(3)*. Letter dated 1905 March 24. ‘Jimmy’ was William James Stewart Lockyer (1868–1936), the son of Sir Joseph Norman; (obituary in *MNRAS* **97** (1937). Maunder was a member from 1905–1911. Following his resignation he dined three times, on the last occasion with Annie. I wish to thank Dr I. P. Williams, Queen Mary College, London, for this information.
 - 119 In fact it may have been earlier, as Agnes Mary Clerke was offered a post at the ROG in 1889. This post was apparently specifically created for her, with a salary of £8, which she refused. See M. Brück, *Agnes Mary Clerke and the Rise of Astrophysics* (Cambridge, 2002) pp 73–75.
 - 120 See chapter 11 ‘A Field for Women’ in *The Harvard College Observatory, The First Four Directorships, 1839–1919* by B. Z. Jones and L. F. Boyd (1971). The only other person to achieve recognition was Alice Everett (1869–1945). See M. Brück, ‘Alice Everett and Annie Russell Maunder, torchbearing women astronomers’, in *The Irish Astronomical Journal* **21**, 281–290 (1994).
 - 121 Alice Everett (1865–1949) was an original member of the BAA, member of Council 1892–1893, Secretary 1893–1894. She went to Potsdam University, and although retained an interest in astronomy, later went on to be a pioneer in television technology. See M. Brück, *op. cit.* (ref.120)
 - 122 ‘Entry of Marriage, 1895 Marriage solemnized at St. Marks Presbyterian Church, South Street in the District of Greenwich in the County of London. Entry no. 124’. The marriage was also noticed in *The Times* for Tuesday 31 December 1895 and *The Observatory Magazine* **19**, 103 (1896). As required by the Civil Service rules, on her marriage Annie resigned her post at Greenwich, 1895 October 31.
 - 123 *BAA Archives, Add. MS I*. See M. Brück & S. Grew, ‘The Family Background of Annie S. D. Maunder (née Russell)’ in *The Irish Astronomical Journal* **23** (1996). The drawing was reproduced in *JBAA* **112**, 243–244 (2002).
 - 124 *Maunder Family Papers*. The letter appears in *JBAA* **111**, 272 (2001).
 - 125 For Annie’s life see M. Brück, *op. cit.* (ref.120); M. Brück & S. Grew, *op. cit.* (ref.123); and M. B. Ogilvie, ‘The Campbells and the Maunders’, in H. C. Pycior *et al.* (eds.) *Creative Couples in Science* (1996).
 - 126 See A. S-K. Pang, ‘The Social Event of the Season. Solar Eclipse Expeditions and Victorian Culture’, *Isis* **84**, 252–277, (1993).
 - 127 *op. cit.* Pang, p. 256. This total had since been exceeded, for example by J. Evershed.
 - 128 Cited in *BAA Memoir: The Total Solar Eclipse of May 1900* (ed. E. W. Maunder), 1901, p. 74.
 - 129 *op. cit.* Pang (ref. 126), p. 258. A brief account of the formation of the JPEC is given in *The History of the Royal Astronomical Society 1820–1920*, ed. J. L. E. Dreyer *et al.* (1923), pages 215–216. The first meeting was 1894 May 2; it was wound up in 1970, see R. O. Redman, ‘JPEC’, *QJRAS* **12**, 39–44 (1971). See also A. S-K Pang, *Empire and the Sun: Victorian Solar Eclipse Expeditions* (Stanford, California, 2002).
 - 130 For example see *op. cit.* (ref.128), page 6.
 - 131 *op. cit.* (ref.128), pages 6 and 57–58.
 - 132 E. W. Maunder, ed., *BAA Memoir: The Indian Eclipse*, London (1899); p. 1. The ‘Pickwickian Principle’ is given in the opening chapter of C. Dickens *Posthumous Papers of the Pickwick Club*, which expressed that ‘This Association cordially recognises the principle of every member of the Corresponding Society defraying his own travelling expenses.’
 - 133 The next total solar eclipse visible in England also occurs in Cornwall, in 2090 September. Should the BAA still exist the Council will be very busy, as in October the BAA bi-centenary will occur. The BAA planned an expedition to Russia to observe the eclipse of August 1914, but this was cancelled due to the start of the First World War. *JBAA* **24** (1913–1914) gives an account of individuals who undertook the hazardous journey to observe it.
 - 134 *Daily Graphic* 1896 August 28; cited by M. Proctor in *Romance of the Sun*, p. 183 (New York/London, 1927).
 - 135 E. W. Maunder, F.R.A.S. ‘The Total Eclipse of August 9, 1896’, *Knowledge* **19**, 203 (1896)
 - 136 M. Brück, *Agnes Mary Clerke and the Rise of Astrophysics*, Cambridge (2002).
 - 137 *op. cit.* (ref.132), p. 4.
 - 138 ‘Chota hazri’ means a little breakfast or morning tea. I would like to thank Mr Edwin Marsden, Director of the British Council, New Delhi, India.
 - 139 *Op. cit.* (ref.132), p. 12.
 - 140 *op. cit.* (ref.132), p. 26.
 - 141 Accounts of which are given in *The Observatory* **22**, 348–349 (1899), *Knowledge* **22** (NS 14) 155–157 (1899) and *Astronomy without a Telescope*.
 - 142 *op. cit.* (ref.132), p. 98.
 - 143 *op. cit.* (ref.128), p. 67. The hotel was the Hotel de la Régence, Algiers.
 - 144 *RAS MSS Molesworth 1 (2)*. Letter dated 1900 April 20.
 - 145 *op. cit.* (ref. 97). Letter dated 1900 Aug 23.
 - 146 *RAS MSS Molesworth 1 (2)*. Letter dated 1900 Sept 14.
 - 147 *op. cit.* (ref. 97). Letter dated 1901 Feb 9.
 - 148 *CUL/ROGO 7/201* contains extensive details on which photographic plates to be used, requesting quotes from various manufacturers for manufacture and delivery.
 - 149 *CUL/ROGO 7/201 Correspondence with or concerning Royal Alfred Observatory, Mauritius*. Letter Maunder to Claxton, 1901 March 8.
 - 150 The Boer War (1898–1902) eventually led to the inclusion of the two Boer republics (the Orange Free State and the Transvaal) within the British Empire, which were joined with Cape Province and Natal to form the Union of South Africa in 1910, when it also achieved Dominion status.
 - 151 *RAS MSS Molesworth 1 (2)*. Letter dated 1901 Aug 3.
 - 152 For an account of this and of the comet’s discovery, see *JBAA* **11(7)** 288–289 (1901).
 - 153 *CUL/ROGO 7/156: Astronomer Royal for Scotland* in an undated and unsigned foolscap sheet, appears to be a resumé of Maunder’s work at Greenwich.
 - 154 *CUL/ROGO 7/203: Mr Maunder’s Expedition to Labrador*. Maunder was recommended to apply to the JPEC for funding. Letter from E. H. Hills to W. H. M. Christie, dated 1905 May 12. Both this archive and *RAS Papers 55 (2) Joint Permanent Eclipse Committee* contain the correspondence concerning the funding (agreed at £40).
 - 155 *Ibid.* Letter dated 1905 June 22 and ‘Report of the Eclipse Expedition to Labrador, 1905 August 30.’
 - 156 *CUL/ROGO 7/203: Report of the Eclipse Expedition to Labrador, 1905 August 30*.
 - 157 *Maunder Family Papers*. Letter appeared in the *JBAA* **111**, 272 (2001). The article ‘To Labrador for the Eclipse’ appeared in *Sunday at Home*, p. 870–875 (1906)
 - 158 *CUL/ROGO 7/201: Mr Maunder’s Letters and Telegrams*. Letter 1901 May 26, Maunder to Christie.
 - 159 *CUL/ROGO 7/201: Miscellaneous Correspondence*. Letter dated 1901 Aug 6 (possibly) Dyson to Maunder, and 1901 Aug 16 Maunder to Dyson.
 - 160 *CUL/ROGO 7/21: Sickness Certificates and Leave of Absence*.
 - 161 *RAS Molesworth 1 (2)*. Letter dated 1901 Dec 13.
 - 162 *op. cit.*, ref. 97. Letter 1901 Oct 14. Walter was staying with John Mackenzie Bacon at this time.
 - 163 *op. cit.*, ref. 97. Letter 1911 Nov 20.
 - 164 I would like to express my appreciation to the Archivist of the Royal Free Medical School for information on Hester Scott Dill Russell.
 - 165 *Caltech Hale, Box 27, E.W. Maunder File*, Letter to Hale, dated 1907 May 18.
 - 166 *RAS Letters Maunder* (1909). Letter to Wesley dated 1909 April 20.
 - 167 Some of which occasioned notices in the *Journal* e.g. ‘Mr Maunder, who was unfortunately seized with an attack of malaria on the Monday following the eclipse’ in *JBAA* **11(9)** 358 (1901).
 - 168 *op. cit.*, ref. 97. Letters Barnard from Annie, 1909 July 20, from Walter 1911 March 20 and 1911 June 3; also makes reference to correspondence now lost or destroyed.
 - 169 *op. cit.*, ref. 97. Letter from Barnard dated 1895 Oct 25.
 - 170 See *RAS Papers 47, Jackson–Gwilt Medal and Gift and RAS Papers 57, Flamsteed Memorial*.
 - 171 *CUL/ROGO 7/223*. The four lectures were respectively ‘Flamsteed and the Founding of Greenwich Observatory’, ‘Halley and his successors’, ‘Airy and the Expansion of the Observatory’ and ‘Present Day Work at the Greenwich Observatory.’
 - 172 See various bound volumes of application in the records of the Royal Society.
 - 173 *Royal Society Archives: Larmor Letters, 1005*. Letter dated 1909 Feb 17
 - 174 For example, letter dated 1900 Feb 2, and A. S. D. Maunder ‘The Milky Way in Cygnus’, *Knowledge* **23** (NS 15) 273–275 (1900).
 - 175 P. Stroobant *et al.*, *Les Observatoires Astronomiques et les Astronomes*, p.132, Brussels (1907)
 - 176 2nd imp. 1903; 3rd imp. 1904, published at the *Knowledge* office, London. [Reviews: *Observatory Magazine* **25(325)** 443–444

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- (1902); *Knowledge* **25** (NS 17) 280 (1902); brief mention of 3rd imp. in 1905 Feb. p. 41; *JBAA* **13**, 34 (1903); *Nature* **67**, 201 (1903 January)]
- 177 H. Macpherson Jnr, *Practical Astronomy with the Unaided Eye* (Edinburgh and London, 1919) p. 92.
- 178 Obituary by Hollis, *The English and Amateur Mechanics* **3** 487, 507 (1928).
- 179 *JBAA* **13**, 363 (1902–1903).
- 180 *CUL/GO 7/5*. The letter from his brother George, Comptroller of Stamps and Taxes, Dublin (1906 January 28) is the only letter so far found to Edward by one of his siblings. As only part of the letter is reproduced, presumably the remainder referred to family matters.
- 181 *Royal Geographical Society/IBS Archive*: Letter dated 1908 May 15, Maunder to Gill. I wish to extend my appreciation for permission to reproduce this in part. He was also in South Africa during 1908–09, *JBAA* **34**, 42 (1923–1924).
- 182 *op. cit.*, ref. 97. Letter to Barnard dated 1911 Aug 14. ‘This summer was the hottest in England since 1868, shade temperature was frequently over 90°F in early days of August; on 9th August 97°F [normal body temperature is 98.6°F (36.8°C)] and a long drought not broken until 21st.’ R. Ensor, *op. cit.* (ref.40), 442.
- 183 *Daily Graphic*, ‘So-called Daylight Saving’, 1911 April 18.
- 184 *CUL/GO 7/5 E. W. Maunder – Services to be retained until completion of 40 years service*.
- 185 Psalm 19: 1–4, *The Holy Bible*, King James Authorised version, Oxford.
- 186 *CUL/GO 8/22*. Letter Maunder to Dyson 1920 Feb 12. The Victoria Institute (or the Philosophical Society of Great Britain) is a non-denominational organisation founded in 1865, with the aim of ‘Helping the non-specialist relate Christian thought to advancing knowledge and specialisation.’
- 187 The Catholic Apostolic Church founded in 1832 by the Reverend Edward Irving (1792–1834), from whom its alternative name the ‘Irvinites’ is taken. The last surviving priest died in 1971.
- 188 C. G. Flegg ‘Gathered under Apostles.’ *A Study of the Catholic Apostolic Church* (Oxford) p. 145.
- 189 *ibid.* p. 196.
- 190 *ibid.* p. 450 for both quotes.
- 191 *The Times*, 1928 March 22.
- 192 ‘The Red Planet, Mars’, *Sunday Magazine* pp. 30–33 (1882).
- 193 ‘Considering the Heavens’, *ibid.* p. 163–166 (1884).
- 194 Meeting report 1924 January 3, *JBAA* **34**, 90 (1923–1924).
- 195 *CUL/GO 8/33*. Letters dated 1916 March 24, April 27, May 5, May 6; 1919 Aug 22, Sept 13.
- 196 *CUL/GO 8/33*. Letters dated 1920 Feb 12, Feb 13 and Oct 23.
- 197 *Maunder Family Papers*, Letter dated 1916 Sept 7. Italics are mine (AJK).
- 198 ‘The Prolonged Sunspot Minima, 1645–1715’, *JBAA* **32**, 140–145 (1921–1922).
- 199 ‘Certified Copy of an Entry of Death’, (HC 158049 D. Cert. S. R.) I would like to thank Mrs Janice Maunder for providing me with a copy of this.

- 200 ‘Last Will and Testament of Edward Walter Maunder.’
- 201 He had purchased a plot for £100, in which his first wife Hannah, mother-in-law and youngest son Walter Antony (1884–1885) as well as himself are interred. Plot reference Shooter’s Hill, Greenwich Cemetery, Second General 1051. I thank Beverly of the Greenwich Parks and Gardens for this information, and the Superintendent and his colleague for assisting me in finding the grave.
- 202 See obituary, *JBAA* **38**, 165–168 (1927–1928).
- 203 *MNRAS* **89**, 318 (1929).
- 204 *op. cit.* (ref.202).
- 205 M. Crowe, *The Extraterrestrial Life Debate* p. 542 (Dover, New York, 1999).
- 206 Respectively 55km diameter, lat. 14.5°S, long. 93.8°W; 93km diameter, lat 50.0°S, long. 358.1°W. In an early map, Maunder has a sea named for him, later changed to *Mare Chronium*, see P. A. Moore, Presidential Address, ‘The Mapping of Mars’, *JBAA* **94**, 49 (1985).
- 207 J. A. Eddy, ‘The Maunder Minimum’, *Science* **192**, 1189–1202 (1979).
- 208 W. H. Soon & S. H. Yaskell, *The Maunder Minimum and the Variable Sun–Earth connection*, World Scientific Publishing, 2003, p. 108
- 209 Hector Macpherson (1888–1956) while still in his late teens wrote a series of biographies of prominent astronomers, using information mainly supplied by the astronomers themselves, which was published as a series in an Edinburgh newspaper (later published as *Astronomers of Today*, 1905).
- 210 *Dictionary of Scientific Biography*, **9** 183–185 (1974).

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