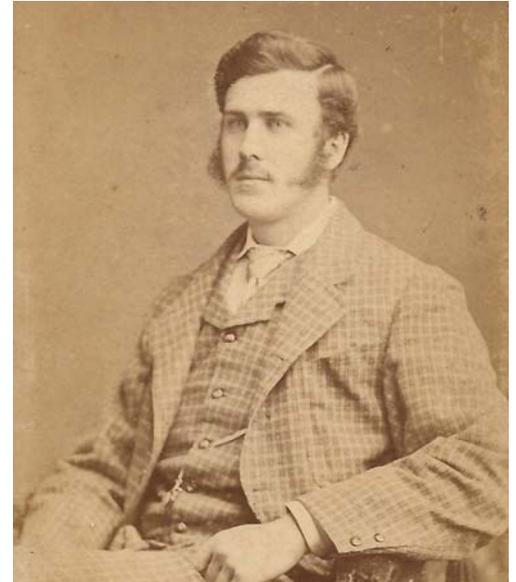


Charles Lewis Brook: third Director of the BAA Variable Star Section

Jeremy Shears

Charles Lewis Brook, MA, FRAS, FRMetS (1855–1939) served as Director of the BAA Variable Star Section from 1910 to 1921. During this time he was not interested merely in collecting the observations of the members (to which he also contributed), but he also spent considerable time analysing the data and preparing numerous publications on the findings. This paper discusses Brook's life and work, with a particular focus on his contribution to variable star astronomy.



Introduction

Charles Lewis Brook (1855–1939; Figures 1 and 2) was the third Director of the BAA Variable Star Section (VSS) serving from 1910 to 1921. As well as being an enthusiastic observer of variable stars, he undertook the analysis of variable star observations submitted by others, writing many papers and memoirs on the subject. His astronomical interests were not confined to variables and he observed a range of other astronomical objects. In addition to astronomy, he was an active meteorologist.

Brook led a busy professional life as a Director of the thread and textile company Messrs J. & P. Coates Ltd. He spent most of his life at Meltham, near Huddersfield in Yorkshire.¹ He was a member of the BAA, a Fellow of the Royal Astronomical Society and a Fellow of the Royal Meteorological Society. This paper discusses Brook's life and work,

with a particular focus on his contribution to variable star astronomy. It draws on four separate obituaries: one written for the BAA by a later VSS Director, W. M. Lindley (1891–1972),² one written for the Royal Astronomical Society by Annie (A. S. D.) Maunder (1868–1947),³ one for the Royal Meteorological Society⁴ and a brief one published in the *Huddersfield Examiner*.⁵ In addition I have reviewed Brook's published work, especially his papers published in the *BAA Journal*.

Personal life and professional activities

Charles Lewis Brook was born on 1855 June 12 at Meltham, Yorkshire, where he lived for most of his life, except whilst at school and University.⁶ His father was Charles John Brook (1829–1857), who died when Brook was an infant, and his mother was Mary Brook (née Jones; 1835–1919). Mary was the daughter of Revd Lewis Jones⁷ and Brook gained his middle name of Lewis from his maternal grandfather. He was usually referred to as Lewis, rather than Charles, to avoid confusion as several other members of the Brook family had Charles as their given name.⁸

Brook had two sisters, Ruth Mary Brook (1856–1932; Figure 3), who shared his interest in astronomy, and Esther Frost Brook (1857–1944). Brook was sent as a boarder to Uppingham School⁹ in Rutland, where he excelled at sport.¹⁰ He earned his Cricket colours twice (1872 and 1873), representing Uppingham School in their match against Surrey Club on 1873 June 30 and July 1 at the Oval (Surrey won by 9 wickets), and



Figures 1 (top) and 2 (left): Portraits of Charles Lewis Brook as a young man and in later life, courtesy Mr Hugh Darlington.



Figure 3. Charles' sister, Ruth Mary Brook. (Courtesy Mr Hugh Darlington).

his Rugby colours three times (1871, 1872 and 1873).¹¹ In later life he became a trustee of Uppingham School. He left Uppingham in May 1874 and went up to Trinity College Oxford where he took an MA degree.

In adulthood, Brook lived at Harewood Lodge in Meltham,¹² remaining a bachelor. Meltham has a long association with the Brook family which had established the thread manufacturer, Jonas Brook & Brothers (the brothers being James and Joseph). In its heyday at the end of the 19th century the mill complex at Meltham Mills employed over 1000 workers. The family were well-known philanthropists who took care of their employees, building housing and a convalescence home for them, as well as providing them with pensions. The Brook



Figure 4. St. James' Church, Meltham Mills. (Nigel Homer).



Figure 6. The goat's head logo of Jonas Brook & Bros. (Jeremy Shears). This motif appears on one of the mill buildings in Meltham Mills.

family built Meltham Hall, St James' Church in Meltham Mills (Figure 4) and Christ Church at Helme (Figure 5), a village near Meltham. Brook himself was an active member of St James' Church. His interest in Helme Church, which was built in memory of his father, lasted from the time when he laid the foundation stone at the tender age of three,¹³ to the offer of a bequest in his will.⁴

In 1896 Jonas Brook & Bros. amalgamated with three other thread manufacturers, J. & P. Coates Ltd of Paisley, Renfrewshire, James Chadwick & Bros. Ltd of Bolton, and Clark & Co. of Paisley to form the enlarged firm of J. & P. Coates Ltd,^{14,15,16} which later became known as United Thread Mills Ltd. Each company maintained its identity with the preservation of names and trademarks. The company logo for Jonas Brook & Bros was a goat's head (Figure 6) and this adorned their products which were sold worldwide.¹⁷ At the time of the amalgamation, the market value of the combined company was £22 million. The headquarters were in Glasgow, with 17 manufacturing centres and 21,000 employees around the world, the UK workforce totalling around 11,000. Some members of the Brook family, who were also Directors, migrated to Scotland as a result of the merger.⁸ The company



Figure 5. Christ Church, Helme. (Jeremy Shears).

continued trading as J. & P. Coates Ltd through the first half of the 20th century; several amalgamations followed, leading to the formation of Coates Viyella PLC, which eventually became Coates PLC in 2001 and is still trading.¹⁸

Brook himself was a Director of J. & P. Coates and was clearly a man of considerable personal wealth. He continued his family's tradition of charitable support and was active in both diocesan and hospital work.¹⁹ As we shall see, he made significant financial contributions to the publication of BAA and RAS *Memoirs*. He was also an enthusiastic supporter of the Meltham Mills Cricket Club²⁰ and the Huddersfield Chess Club.⁴

Brook died on 1939 May 9, having been ill for some years.⁵ He was buried in the churchyard of St James' Church, Meltham Mills on May 11.²¹ His gravestone is shown in Figure 7. In 1949, the lighting in Helme Church was installed in memory of Brook, his sister Ruth Mary, and her son, Arthur Charles Brook, who was killed in action during World War One (Figure 8).



Figure 7. Charles Lewis Brook's gravestone in the churchyard of St James' Church, Meltham Mills. (Jeremy Shears). At the time the photo was taken, the stone had been lain on the ground.

The BAA Variable Star Section

Brook was elected a Fellow of the Royal Astronomical Society in 1899 January, his application being signed by the Revd T. H. E. C. Espin (1858–1934) 'from personal knowledge'.²² Espin was one of the most accomplished amateur astronomers of the period.^{23,24} Brook's RAS application and Fellowship forms are shown in Figures 9 and 10. In June of the same year he was elected as a member of the BAA.^{25,26} He frequently attended meetings of the Association in London,

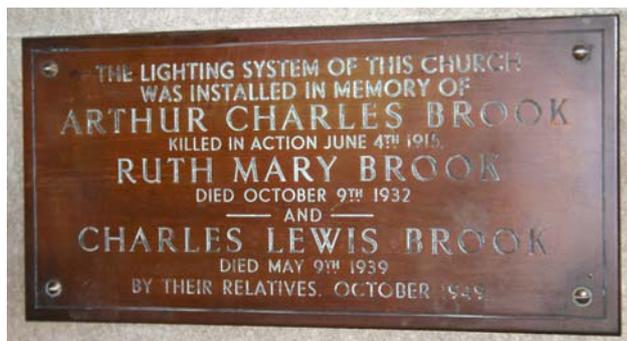


Figure 8. Brook family memorial in Christ Church, Helme. (Jeremy Shears).

Shears: Charles Lewis Brook, third Director of the BAAVSS

where he also spoke from time to time, and he served as Vice President six times between 1918 and 1926.²⁷ How soon he became interested in variable stars is not known, but by 1902 January he had begun submitting observations to the Variable Star Section. We know he also observed Nova Persei 1901, as will be discussed later; and one wonders to what extent the appearance of this bright nova might have stimulated his interest in variable stars. The VSS database contains a total of 7,648 of his observations, although this is likely to be an underestimate as not all observations have yet been entered, especially those from the early part of the 20th century.²⁸ Most of his observations were made with a 9-inch (22.9cm) reflector at his observatory at Harewood Lodge.²⁹ His last observations were made in 1924 when poor health forced him to stop.²

Brook's grasp of variable star science must have become evident fairly early on,³⁰ for in 1908 he edited the RAS *Memoir* on Norman Pogson's observations of 31 variable stars.³¹

Pogson (1829–1891) had observed from England and, from 1861, whilst government astronomer at the Madras Observatory.

In the introduction to the *Memoir*, Prof H. H. Turner³² (1861–1930; Figure 11), Savilian Professor of Astronomy at Oxford, paid generous tribute to Brook's work in analysing Pogson's



Figure 11. Prof H. H. Turner (1861–1930).

ROYAL ASTRONOMICAL SOCIETY.

Charles Lewis Brook MA FR Met Soc

of Harewood Lodge Meltham, Huddersfield

being desirous of admission into the ROYAL ASTRONOMICAL SOCIETY, We, the undersigned, propose and recommend him as a proper person to become a Fellow thereof.

Witness our hands, this 25th day of October 1898

T. H. E. C. Espin {from personal knowledge.

Thos. K. Mellor.

H. F. Newall.

Proposed 1898 Nov. 11.

Elected 1899 Jan 13

Figure 9. Brook's RAS membership application form.

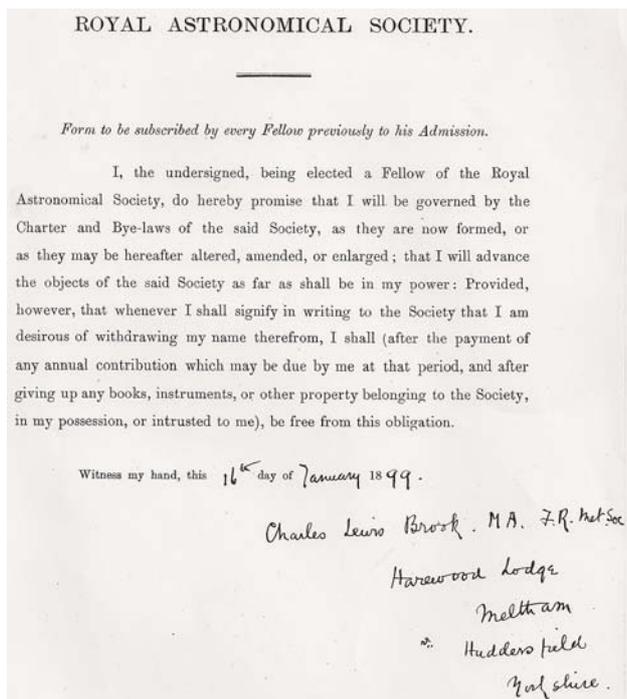


Figure 10. Brook's RAS Fellowship form.

observations and preparing them for publication. In addition, Brook contributed one-third of the cost of printing the memoir. H. H. Turner was later to provide advice to Brook on variable star science when Brook became VSS Director.³³

The BAA VSS was founded in 1890 October and the first Director was the Dublin-based amateur astronomer John Ellard Gore (1845–1910), who was a well known author of popular astronomy books as well as being an active variable star observer and a computer of binary system elements. However, the Section struggled to make headway and towards the end of Gore's tenure membership was shrinking.²⁴ Gore was succeeded as Director by Ernest Elliott Markwick (1853–1925; Figure 12) in 1899. Markwick, an officer in the British Army, was a natural leader and soon set about reinvigorating the Section, focusing observers' attention on a small programme of core stars and publishing regular reports in the *Journal* as well as *Memoirs*.²⁴ The Section was thus in good health when Markwick handed the Director's baton to Brook in 1910 January.

Brook introduced himself as the new VSS Director in a letter to the *JBAA* written on 1910 January 15,³⁴ in which he paid tribute to the great work Markwick had done as Director. He encouraged new observers to come forward to continue the Section's endeavours, stating that he would 'be most happy to enlist anyone who is willing to make systematic observations and will gladly give any information and render any assistance in my power'. Brook made a similar plea for more observers when he spoke at the BAA meeting a few days later on 1910 January 29.³⁵ He ex-

plained that whilst he did not envisage any major changes to the running of the Section, he hoped to add further stars to its programme over time, which he did. Like Markwick, Brook firmly believed in encouraging co-operation between observers.³



Figure 12. E. E. Markwick (1853–1925).

Where Brook really excelled was in preparing numerous and timely reports summarising the work of the Section which were published in the *Journal*. These included three series of annual reports on 'SS Cygni', on 'Long Period Variables' and on 'Three Irregular Variables', namely R CrB, U Gem, and U Sct (see Table 1 for a list of papers on these three groups of stars). The SS Cyg reports, which will be discussed in more detail later, covered the years 1910 to 1927, and thus continued beyond his time as Director. The other two series covered the years 1910 to 1920. Many of the reports were accompanied by lightcurves neatly drafted by Brook (he had undertaken similar work for Markwick under his Directorship). During his twelve years as Director, some 83,796 VSS observations were made and discussed, covering approximately 54 stars.³³ As examples of his work, lightcurves of the long period variable X Aur and of R CrB are shown in Figures 13 and 14.

Brook also published two BAA *Memoirs* on the work of the VSS. The first covers the years 1910–1914 and includes 16,217 observations.³⁶ The second covers 1915–1919 and contains 27,820 observations.³⁷ As Howard Kelly pointed out in his note on the first 50 years of the VSS:³³ 'Brook was a stickler for accuracy and he had a keen eye for spotting errors, and the *Memoirs* published during his period as Director are a model of careful and accurate editing. Markwick had previously standardised the presentation of the *Memoirs*, and Brook perfected that which Markwick had initiated'.

Not only did Brook undertake the hard work of collating the data, analysing the observations and preparing the manuscripts for publication, but he also made significant contributions towards the cost of publication from his own pocket. Thus he gave the sums of £50 and £100 towards publication of the two *Memoirs* (approximately 25% of the total cost in each case). Each was a significant amount of money at the

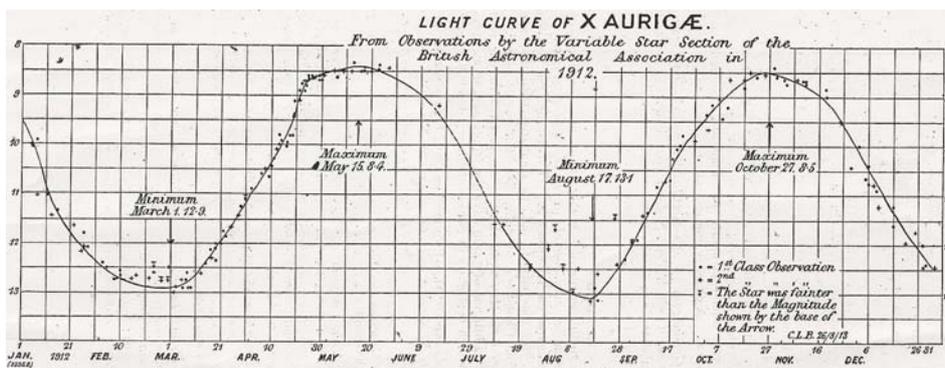


Figure 13. Lightcurve of X Aur in 1912. BAA VSS.

time and would be equivalent to several hundreds of pounds today. The second *Memoir* was sold to BAA members for 5 shillings (25p), thus Brook could have bought 400 copies with his donation! He also contributed financially toward the printing of other VSS *Memoirs* published by both his predecessor, Markwick,³⁸ and his successor, Félix de Roy.³⁹ Markwick acknowledged that Brook had also made a significant contribution to compiling the lists of observations published in the earlier *Memoir* during his Directorship. Clearly the BAA, and variable star research in general, has benefited from Brook's generosity in making these publications available.

Brook retired from the VSS Directorship at the end of 1921. He was evidently highly appreciated and respected by members of the VSS. Twenty-four leading members wrote to the *Journal* in 1922 January expressing their regret at his depart-

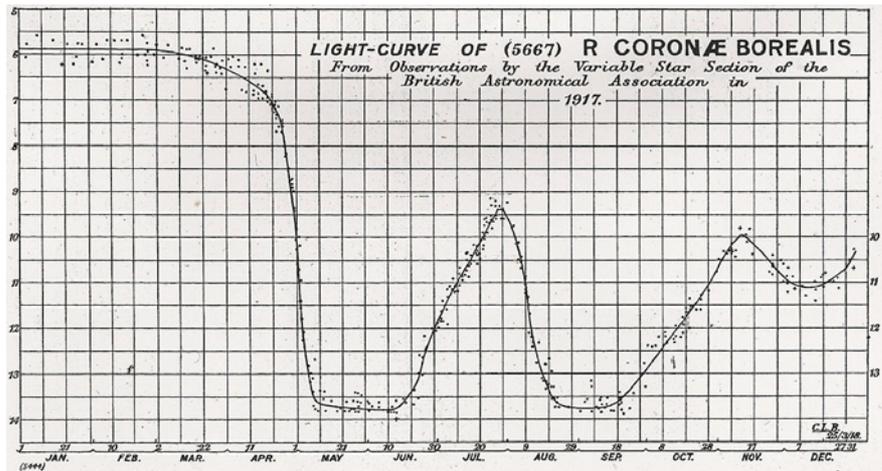


Figure 14. Lightcurve of R CrB in 1917. BAA VSS.

ture and putting on record 'their high appreciation of his unvarying kindness to each of them, of the great amount of time and trouble which he has bestowed upon their observations, and of the ability with which he has managed the affairs of the Section during the past 12 years'.⁴⁰ His successor was Félix de Roy,⁴¹ a Belgian national living in Antwerp, and de Roy immediately launched a collection of contributions from members to purchase a gift with which they could express their appreciation, with a suggested contribution of 10 shillings (50 pence).⁴² The gift they settled on was an album 'which contains 41 beautiful astronomical photographs'.⁴³ Even after his retirement, Brook remained active in the Section and produced many variable star charts (as well as continuing the series of reports on SS Cygni mentioned previously).

Annie Maunder,⁴⁴ writing Brook's obituary some 17 years after his retirement as Director, noted:³ 'Those who came into contact with Mr Brook agree in stressing two of his characteristics. First, he would approach any new problem slowly, and then after due consideration come to a decision about it that was invariably sound and showed a long view. Second, in spite of being an extremely busy man, his correspondence with his observers was voluminous, and no trouble was spared in discussing points of detail that might be of help to the observer or to the work'.

Observations of SS Cygni

One star in particular which fascinated Brook was SS Cyg and it was the star which he observed most according to the BAA VSS database.²⁸ SS Cyg was discovered as variable in 1896 by Louisa D. Wells of Harvard College Observatory,⁴⁵ and has been intensively monitored by astronomers around the world ever since. We now know that SS Cyg is a *dwarf nova*. Dwarf novae are semi-detached binary stars in which a white dwarf primary accretes material from a secondary star via Roche lobe overflow. The secondary is usually a late-type main-sequence star. Material from the secondary passes through an accretion disc

Table 1. Brook's papers in the BAA Journal on SS Cygni, Long Period Variables and Irregular Variables.

Title	Journal reference
SS Cygni in 1910	21, 255 (1911)
SS Cygni in 1911	22, 186 (1912)
SS Cygni in 1912	23, 179 (1913)
SS Cygni in 1913	24, 192 (1914)
SS Cygni in 1914	25, 219 (1915)
SS Cygni in 1915	26, 224 (1916)
SS Cygni in 1916	27, 145 (1917)
SS Cygni in 1917	28, 111 (1918)
SS Cygni in 1918	29, 124 (1919)
SS Cygni in 1919	30, 174 (1920)
SS Cygni in 1920	31, 188 (1921)
SS Cygni in 1921	32, 180 (1922)
SS Cygni in 1922	33, 277 (1923)
SS Cygni in 1923	34, 183 (1924)
SS Cygni in 1924	35, 270 (1925)
SS Cygni in 1925	36, 205 (1926)
SS Cygni in 1926	37, 317 (1927)
SS Cygni in 1927	38, 218 (1928)
Long Period Variables in 1910	21, 349 (1911)
Long Period Variables in 1911	22, 257 (1912)
Long Period Variables in 1912	23, 264 (1913)
Long Period Variables in 1913	24, 294 (1914)
Long Period Variables in 1914	25, 264 (1915)
Long Period Variables in 1915	26, 295 (1916)
Long Period Variables in 1916	27, 226 (1917)
Long Period Variables in 1917	28, 209 (1918)
Long Period Variables in 1918	29, 157 (1919)
Long Period Variables in 1919	30, 209 (1920)
Long Period Variables in 1920	31, 257 (1921)
Three Irregular Variables in 1910	22, 89 (1911)
Three Irregular Variables in 1911	22, 362 (1912)
Three Irregular Variables in 1912	23, 373 (1913)
Three Irregular Variables in 1913	24, 387 (1914)
Three Irregular Variables in 1914	25, 336 (1915)
Three Irregular Variables in 1915	27, 70 (1916)
Three Irregular Variables in 1916	27, 70 (1917)
and 1917	28, 182 (1918)
Three Irregular Variables in 1918	29, 187 (1919)
Three Irregular Variables in 1919	30, 286 (1920)
Three Irregular Variables in 1920	31, 257 (1921)

Shears: Charles Lewis Brook, third Director of the BAAVSS

before settling on the surface of the white dwarf. As material builds up in the disc, a thermal instability is triggered that drives the disc into a hotter, brighter state, causing an outburst in which the star brightens by several magnitudes.⁴⁶ In the case of SS Cyg the star spends about 75% of its time in a quiescent state at around magnitude 12.2, but brightens to around mag 8.3 every 4 to 10 weeks. Each outburst lasts one to two weeks.⁴⁷

SS Cyg was added to the VSS programme by E. E. Markwick in 1904.⁴⁸ Brook started to observe it in 1906 and from 1910 to 1927 he published an annual summary of VSS observations in the *Journal*, which was a continuation of Markwick's reports on the star (Table 1). Example light curves, from 1926 and 1927, are shown in Figures 15 and 16. When de Roy became Director in 1922, he asked Brook to continue to analyse and report the observations.⁴⁹ One aim of the work was to encourage observers to monitor the star as frequently as possible so that all outbursts would be recorded, and with such an observational database it was hoped that sufficient data would be available to predict future outbursts. In 1911 Brook wrote: 'SS Cygni is a fascinating and mysterious star. We cannot hope to explain its changes without a complete record of its history. Towards this end the VSS may claim to have done its share during the past 5 years'.⁵⁰

Brook was keen that variable star observers around the world should pool their observations to allow a more complete analysis of the star: 'owing to the peculiar character of the variation, it will be difficult for anyone to deal compre-

hensively with the problem of the star's changes unless the fullest evidence is available'.⁵¹ He wrote to Leon Campbell (1881–1951), Recorder of the American Association of Variable Star Observers (AAVSO), with an offer for 'the ASVSO [*sic*] and the VSS to compare notes and see if an agreed list of the maxima of this star since 1896 cannot be arrived at'.⁵² Campbell replied in positive terms, sharing some of the AAVSO conclusions.⁵³

In spite of the lofty aims of the monitoring programme, by 1914 the true difficulty of the task of predicting the star's behaviour was becoming apparent, as Brook commented:⁵⁴ 'It is to be feared that the available material is still insufficient and that we may have to wait some time to predict the star's movements'.

Evidently he could not bring himself to believe that the star's behaviour was completely erratic: 'the Director thoroughly agrees with Dr. Whittaker [Edmund Taylor Whittaker FRS (1873–1956)] that this cause cannot act wholly capriciously, and if he can solve the mystery it will be a matter of intense interest to those who observe the star'.⁵⁴ Other people also analysed the available data searching for periodicity. David Gibb, for example, in 1914 found an outburst period of 40.86 days although he admitted that it would probably not be possible to develop an accurate ephemeris, no matter how many terms were included.⁵⁵ Taking heed of Gibb's comments, Brook conceded in 1915 that: '[w]e do not therefore seem to have made much progress, but... the Director has not the slightest intention of throw-

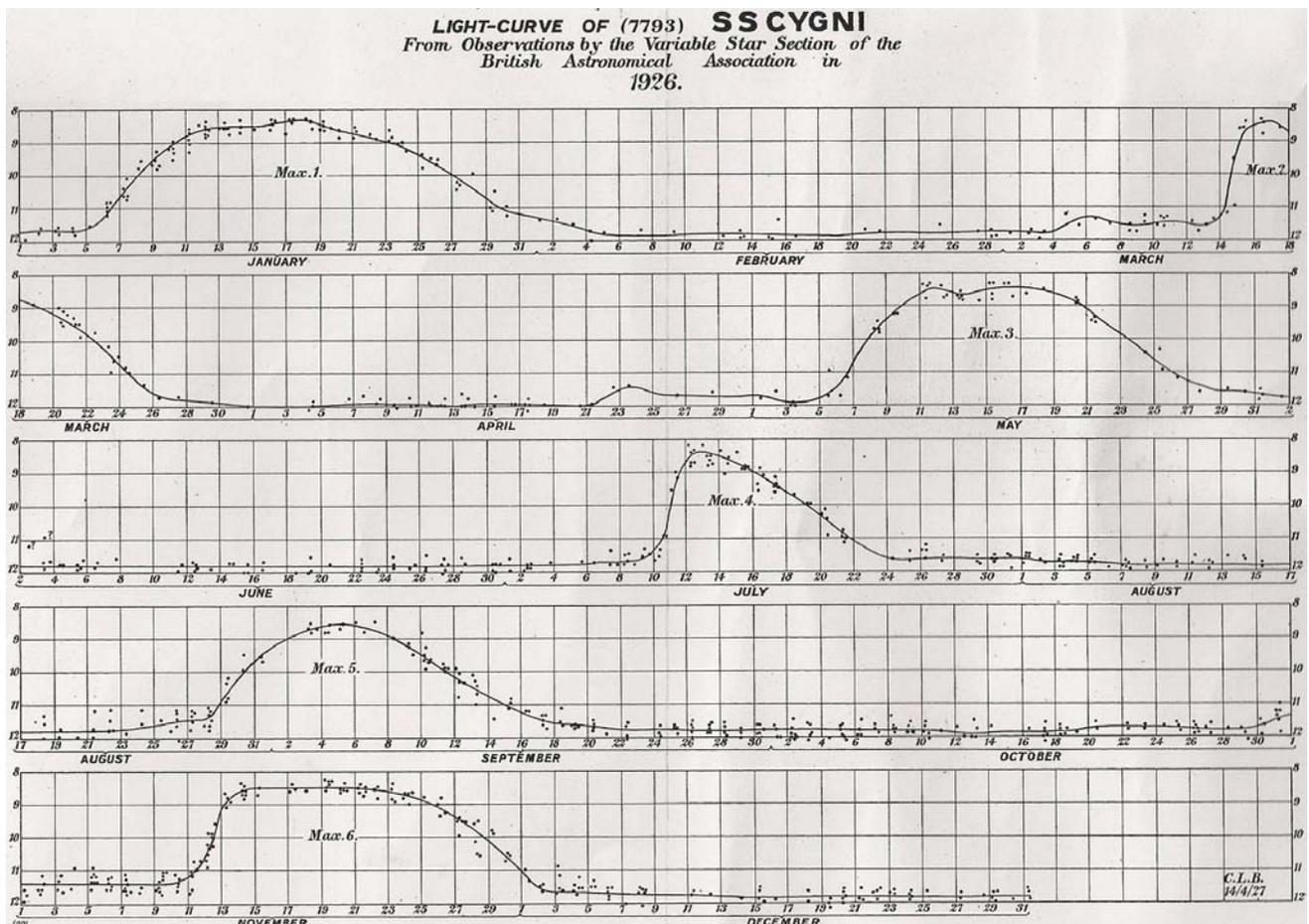


Figure 15. Lightcurve of SS Cyg in 1926. BAA VSS.

ing cold water on attempts to penetrate the mystery of the movements of SS Cyg'.⁵⁶

Even by 1920 Brook had not given up hope: 'no advance has yet been made in predicting its variations; occasional attempts have been made, only to fail. The Section, however, has not lost its interest in the star... and some day we may hope for more light'.⁵⁷

By 1926, thoughts of predicting SS Cyg's behaviour had all but faded, as Brook commented: 'I am aware that some attempts have been made to predict, but, as far as I am aware, none have succeeded. Two papers also appeared in [Monthly Notices of the RAS] dealing with the Harmonic Analysis of the star, but neither seemed in any way useful for predicting the future'.⁵⁸

We now know that outbursts of SS Cyg are, like all dwarf novae, only *quasi*-periodic, which means they cannot be predicted with certainty. Nevertheless, the observations submitted to the BAA VSS, as well as to other variable star organisations around the world, means that SS Cyg is one of the most intensively monitored of variable stars. As a result, it appears that no outbursts have been missed since it was discovered in 1896 and Brook can be credited for playing his part in encouraging such an intensive study.

The accumulated body of data has allowed other researchers to conduct studies into the behaviour of SS Cyg. For example, by examining the long-term lightcurve, Leon Campbell was able to categorise outbursts into four different classes, depending on the outburst profile.⁵⁹ A later

analysis by Cannizzo & Mattei⁶⁰ in 1992 divided the outbursts into type L (long outbursts, exceeding 12 days) and S (short outbursts, less than 12 days) and showed that the most common sequence is LS (134 occurrences), LLS (69 occurrences), LSSS (14 occurrences) and LLSS (8 occurrences). Together these series account for 89% of the outbursts in the study. Cannizzo went on to suggest that the factor which determines the outburst type (L or S) is the amount of material in the accretion disc when the thermal instability is reached.⁶¹ Even today, members of the VSS continue to monitor the 'ups and downs' of SS Cygni.

Observations of novae

The most exciting astronomical event of 1918, and possibly of Brook's Directorship, was the appearance of Nova Aquilae, the brightest nova of the 20th century. There were numerous independent discoveries of the nova, which is now known as V603 Aql, around the world. The first BAA member to have seen it was probably Miss Grace Cook, observing from Stowmarket, on 1918 June 8 at 21:30 UT.⁶² W. F. Denning (1848–1931) saw it from Bristol at 22:00 UT and Brook himself saw it at Meltham at 22:15 UT. Brook noted: '[i]t cannot be said to have been 'discovered'; anyone who had even the slightest acquaintance with the brighter stars in Aquila

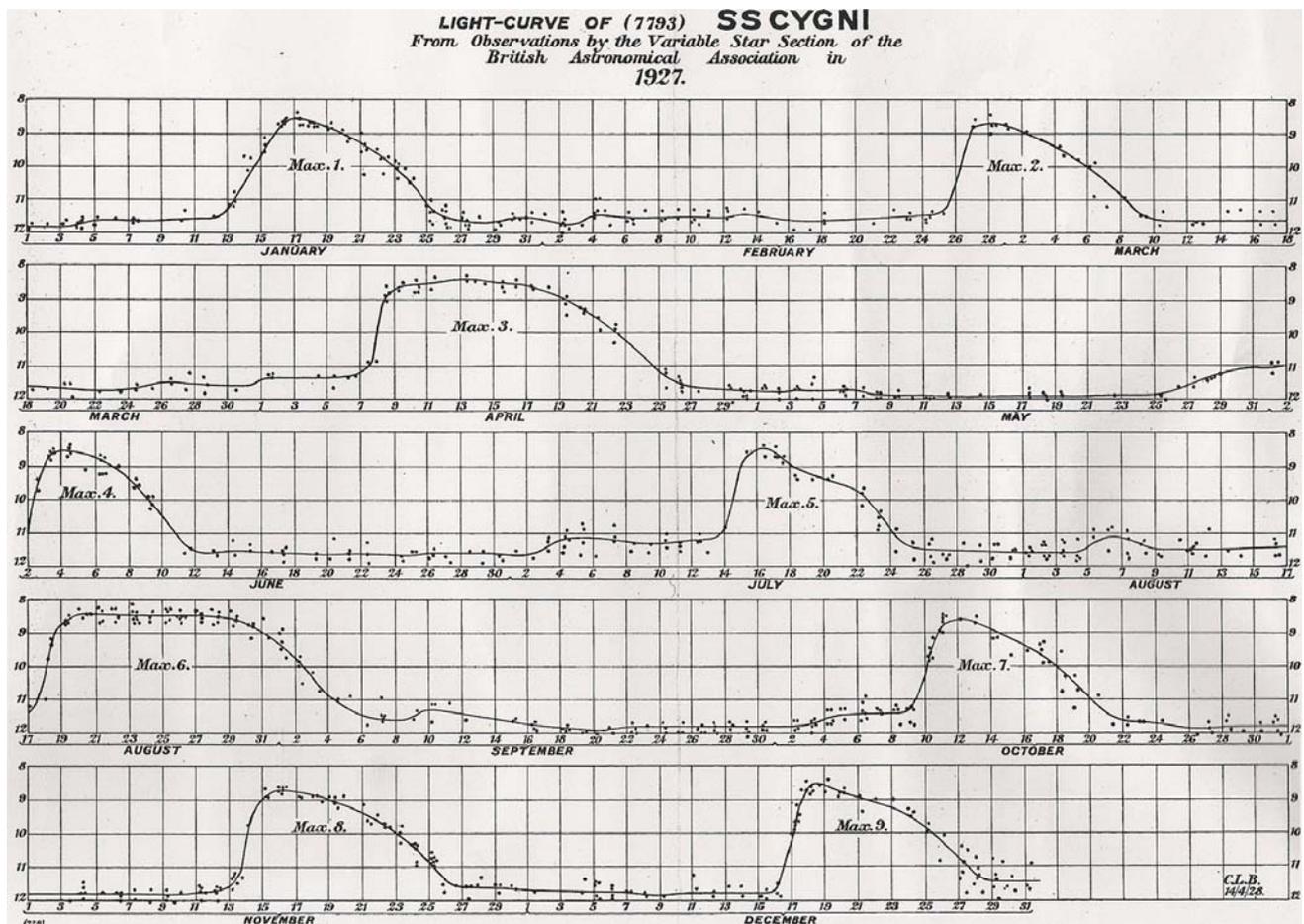


Figure 16. Lightcurve of SS Cyg in 1927. BAA VSS.

Shears: Charles Lewis Brook, third Director of the BAAVSS

could not fail to realise what it was; so the Director, having reached his observatory at [22:15 UT], turned round to glance over the Southern sky and the Nova stared him in the face'.⁶³

Other BAA members who reported the appearance of the nova that first evening included Mr Packer (22:00 UT),⁶³ W. H. Steavenson (22:30),^{63,64} Félix de Roy (22:45)^{63,65} and Harold Thomson (23:44).^{66,67} However, there were many claims by people around the world that they had seen the nova several days earlier, which by comparison with observations from reliable observers and with data by photographic sky patrols, were shown to be false.^{68,69} In his role as VSS Director, Brook also investigated at least one spurious claim, that of a Captain Piper. Brook's report states that Piper observed 'a bright strange star at 12h 45min on 7 June,⁷⁰ but did not report it because he thought astronomers knew all about it'.⁷¹ However, Brook's investigations revealed that a photographic patrol plate taken about 5 hours after Piper's observation showed the nova to be only of the sixth magnitude. On this basis Brook rejected Piper's discovery claim, but rather generously noted that it 'must be attributed to a *bona fide* mistake in the date'.⁷¹

Brook prepared and distributed a chart to allow observers to estimate the brightness of the nova using a common comparison star sequence, thereby improving the consistency of their observations. Between discovery and 1918 July 23 BAA members reported 392 estimates, of which Brook himself made 18 and Ruth Mary Brook made 13. Brook published a preliminary report in the 1918 September *Journal*, along with a lightcurve.⁷¹ He remarked on the superficial similarity of the outburst behaviour of the nova to the dwarf nova SS Cyg, but pointed out that the nova increased in brightness far more rapidly.^{71,72}

Several observers reported rapid changes in brightness as they watched the star, including Grace Cook, E. E. Markwick, Walter Goodacre (1856–1938) and three other observers. By contrast, according to Brook, 'Mr Steavenson and others do not believe in the reality of these short period changes'.⁷¹ Félix de Roy also appeared to doubt the validity of his observation: 'I don't believe in *real* short period fluctuations of the light of the Nova, but I think the aspect was peculiar. What this peculiarity *is* seems difficult to describe; it was something more glowing and piercing than an ordinary star, and quite independent of colour'.

Brook himself reported⁷¹ that the visual aspect of the nova was strange, saying that 'it seemed larger than its brightness warranted'. He noted that R. L. Waterfield (1900–1986) thought that variations of 0.2 to 0.3 magnitude were possi-

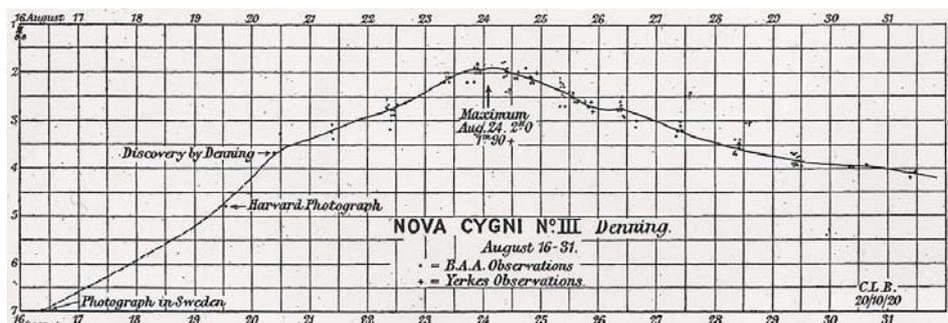


Figure 17. Lightcurve of Nova Cyg III (V476 Cyg) in 1920. BAA VSS.

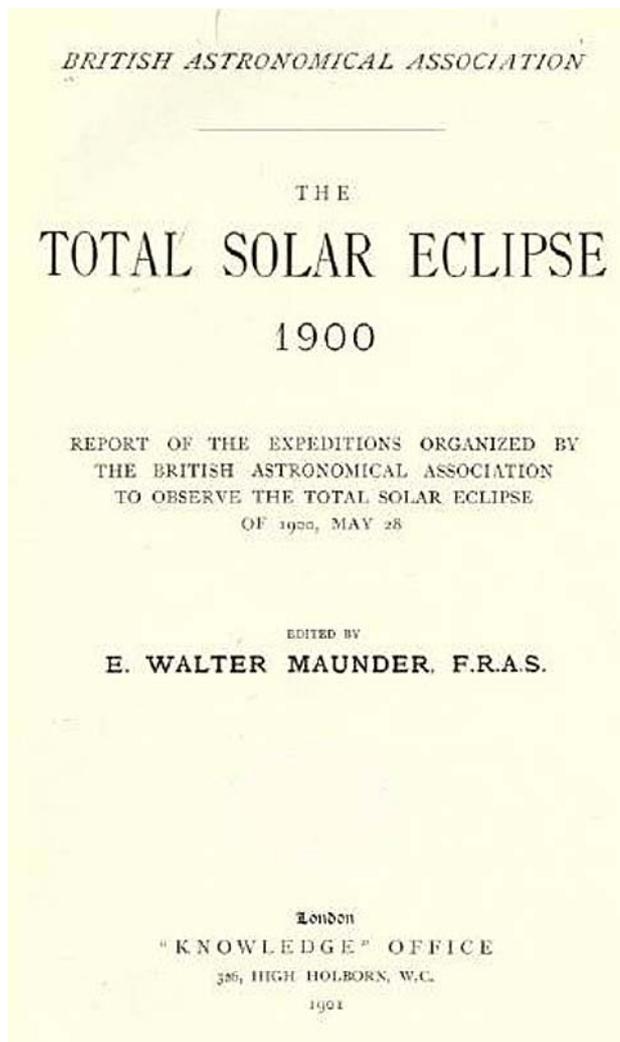


Figure 18. The BAA Memoir of the 1900 solar eclipse.⁸²

ble, but Brook went on to say that '[t]his would entail almost momentary variations of 25 to 30 per cent of the total integrated light, not of a 'fire flickering', but of an enormous volume of glowing gas, hundreds of thousands of miles in diameter. *It is difficult to believe this is possible*' [the italics are mine].⁷¹ Was it Brook's sheer incredulity that such a phenomenon could exist that prevented him from reporting it? Given that the phenomenon was reported by at least six observers in Nova Aquilae, it seems likely that it was real.

Brook also observed and reported on at least two other novae during his Directorship. He gave a talk on the observations that he and other members of the VSS had made of Nova Geminorum 1912 (later named DN Gem) at the 1912

April BAA meeting.⁷³ The nova reached third magnitude and initially was yellowish white, becoming orange as it faded. Unusually, his observations of the nova from Meltham were facilitated by the ongoing national coal strike:⁷⁴ 'we are practising severe economy in coal consumption in the north, and consequently every gas lamp in the valley has been extin-

guished, a result dear to the heart of a star-gazer⁷⁵ (in those days town gas was derived from coal). Given the industrial nature of Meltham at that time, with the large mill complex, one wonders to what extent local air pollution may have affected Brook's observational work. In 1904 December, while attempting to observe an occultation of a Jovian satellite, he noted that '[a] good deal of smoke-fog and poor definition made exact timing of observations difficult'.⁷⁶

In 1920 W. F. Denning discovered a nova in Cygnus (Nova Cyg III 1920 or V476 Cyg),⁷⁷ a large amplitude and extremely fast nova, increasing in brightness by nearly 13.5 magnitudes and then declining 3 magnitudes in 16 days. Brook's analysis and lightcurve (Figure 17) of the early stages of the outburst were presented in the *Journal*.⁷⁸

The BAA meeting of 1901 March 27 was largely given over to papers and a discussion on Nova Persei 1901 (GK Per). The nova had been discovered in the early hours of the morning of 1901 Feb 22 by the clergyman Thomas David Anderson (1853–1932) while walking home in Edinburgh. It reached its brightest two days later at mag 0.2. Six days after maximum, the nova had faded to second magnitude and two weeks later it reached the fourth. During the BAA meeting Brook shared his observations of the nova, including some basic spectroscopic studies made with a McClean spectroscope in combination with his 9-inch reflector.

Brook also became involved in discussing a mystery object observed by E. E. Barnard (1857–1923) in 1892.⁷⁹ Barnard was observing Venus with the 36-inch (98.6cm) Lick refractor in the morning twilight on August 13, when he noticed a star of about the seventh magnitude in the same field. Although he was unable to identify the star after consulting a star atlas, he did not report the observation until 1906.⁸⁰ On reading an abstract of this paper in *The Observatory*, Brook speculated '...the position of Venus on August 13, 1892, was, according to *Whitaker's Almanac*, R.A. 6h 52m 40s, Dec. +17° 12'. This places it close to (perhaps within) the border of the Milky Way in Gemini; we know that new stars, almost without exception, have appeared in or near the Milky Way; is it not possible that what Prof. Barnard saw was a Nova?'. The mystery has never been resolved. Barnard is renowned as a careful observer, so there is no reason to doubt his observation. It is entirely possible that Barnard indeed saw a short-lived nova as Brook had suggested. The object is listed in the New Catalogue of Suspected Variables as NSV 3313.

The total solar eclipse of 1900 May 28

The track of the 1900 May solar eclipse passed through the USA and across the

Atlantic, reaching land in Portugal, then onwards through Spain, over the Mediterranean and into Algeria. Members of the BAA observed the eclipse from each of these countries⁸¹ (as well as at sea off Portugal) and a report of their expeditions was published in a BAA *Memoir*,⁸² a page of which is shown in Figure 18, edited by E. W. Maunder (1851–1928; Figure 19). Upon their return to Great Britain, several members of the Association, including Brook, presented reports at the BAA meeting on 1900 June 27.^{83,84}

Brook travelled to Algeria with his sister Ruth Mary Brook (Figure 3). Ruth, usually referred to as 'Mrs Arthur Brook' in the *Memoir*, was the widow of Arthur Brook (1857–1888).⁸⁵ Ruth herself also had an interest in astronomy and joined the BAA in 1900.⁸⁶ She served on BAA Council four times between 1913 and 1918.⁸⁷ Like her brother, she observed variable stars and her observations of χ Cyg, W Cyg and R Leo were reported in *VSS Memoirs*.^{36,37} The Brooks joined E. W. Maunder's eclipse party at Marseilles where they boarded the steamer *General Chanzy*. The party included Maunder's wife Annie (Figure 20), who later wrote C. L. Brook's RAS obituary, their two daughters,⁸⁸ and Andrew Claude de la Chalois Crommelin (1865–1939) and his wife.⁸⁹ Other members of the BAA also observed the eclipse in Algiers, including R. F. Roberts, who was killed in an air raid on London during World War One.⁹⁰ The party's base in Algiers was the

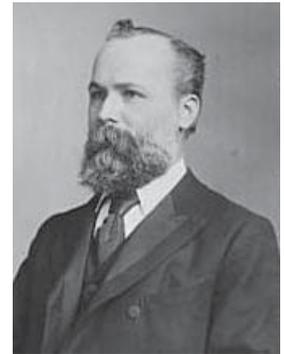


Figure 19. E. W. Maunder (1851–1928) in 1905.



Figure 20. Annie (A. S. D.) Maunder (1868–1947).

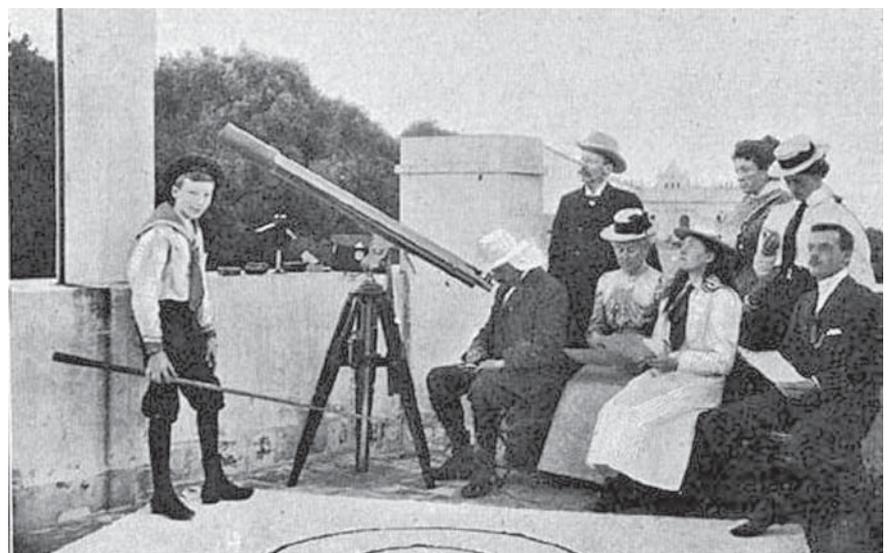


Figure 21. The eclipse observers at Algiers.⁸² Note the sheet with two concentric circles brought on the expedition by the Brooks for monitoring shadow bands, which is discussed in the text. The observers are named in reference 110.



Figure 22. Observer using a chimney as a telescope support on the roof of the Hotel de la Régence, Algiers.⁸²

Hôtel de la Régence, which afforded a flat roof from which they observed the eclipse in its full glory (Figure 21).⁹¹

E. W. Maunder noted that ‘[o]ur hotel was in the very centre of the city, facing its chief *Place*, a site which in a northern clime would not be ideal for an observing station, but which here in smokeless, fireless, subtropical Algiers had few drawbacks and not a few advantages... its roof was thoroughly well adapted for our requirements in an observing station’.⁸² The various chimney stacks on the roof were used as piers to support telescopes (Figure 22), although ‘their most serious defect was in presence of the vent, down which it was so easy to drop eyepieces and screws and other useful or indispensable articles’.⁹¹ In the days before the eclipse, there were many excursions from the hotel to visit the observing stations of other eclipse viewers in and around Algiers.⁹² Many visitors also came to inspect the roof-top observation area of the Hôtel de la Régence. One such visitor was Princess Amelie of Schleswig–Holstein, aunt of the Empress of Germany, who was also staying in the Hôtel.⁹³ A further visitor was the colourful adventurer Leo Brenner of the Manora Observatory on the Istrian coast.⁹⁴

The entirety of the eclipse passed off under clear skies; Crommelin was charged with observing the early stages and reporting progress to the rest of the party, informing them when totality was about to commence. He noted that ‘Mr

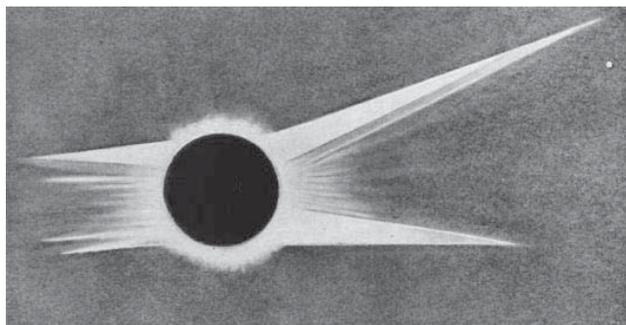


Figure 23. Drawing by Miss C. Stevens of the total solar eclipse of 1900 as observed from Algiers.⁸²

Brook kindly gave assistance in noting the time of first contact’.⁸² Everyone was able to see the corona during totality and several members obtained photographs. A drawing of the eclipse is shown in Figure 23.

The only optical aid Brook and his sister used during the eclipse was apparently binoculars. Brook himself noted the time of appearance of stars as the sky faded towards totality.⁹⁵ During totality he could see Castor and Pollux, Aldebaran and Mercury with the naked eye; ‘[m]y impression is that during totality I could have seen all second magnitude stars, or even 2½ magnitude stars, provided that they had been some distance above the horizon... Many stars escaped being seen because there is no time to search for them’.⁸² Totality lasted about a minute.

The Brooks also made meteorological measurements and observations of shadow bands during the eclipse, and Brook himself contributed a detailed report which appeared in the BAA eclipse *Memoir*. To facilitate detection of the shadow bands, they spread a large white sheet on the hotel roof upon which were sewn two concentric circles of black tape (the sheet can be seen in Figure 21). They hoped to use the circles to count the number of bands in a given distance, but this turned out not to be possible as the bands were rather indistinct, in reality being low contrast ripples.⁸³ As Brook himself noted: ‘the word ‘bands’ was quite inapplicable to what they saw; the shadows were more like ‘ripples’ on water’.⁸³

The ‘bands’ appeared about ¾ minutes before totality and moved at 1½ yards/second (~1.4 metres/second). Immediately at the end of totality, Ruth Brook reported the appearance of the sheet as ‘being covered with dark blotches of shadow which appeared to be in a state of violent agitation’.⁸³ These shadow patches, which lasted 7 or 8 seconds, are shown in Figure 24. They were noted immediately after the end of totality, but were apparently not visible leading up to it.

Brook set up a meteorological station comprising various wet and dry bulb thermometers, a Stevenson screen and a wind vane. Brook’s temperature measurements made during the eclipse are shown in Figure 25, although he commented ‘I am not quite sure of the value of the thermometer observations during an eclipse; they do not seem to have much bearing on eclipse phenomena’.⁸²

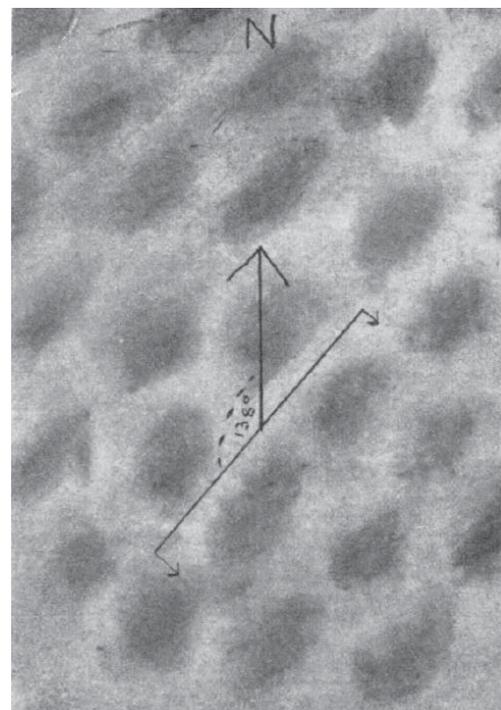


Figure 24. Drawing of the shadow bands by Ruth Mary Brook.⁸² The line at 138° from North indicates the orientation of the bands and the arrows at the end of the lines indicate the direction of travel.

Other astronomical observations

Although Brook mainly concentrated on observing variable stars, other subjects did not escape his scrutiny completely, especially in the years before he became VSS Director. These included Jupiter's satellites,^{76,96} eclipses, meteors and the zodiacal light. He observed a partial eclipse of the Sun from Meltham on 1908 June 28 during which 'there was a persistent impression that a *very small* portion of the edge of the Moon could be seen outside the Sun's disc at both cusps'.⁹⁷

In 1904 November he observed the Leonid meteor shower, finding the display was 'very feeble' on the night of November 14 to 15, whereas the following night the display was 'superior'.⁷⁶ He observed a fireball on the evening of November 16, which he described as 'much brighter than 1st mag. It gave a green flash and left a short streak amongst the stars low in the S.S.E. for 1 minute... duration of flight 1 second', according to a report in *The Observatory* compiled by W. F. Denning.⁹⁸ The report states that the fireball was also seen by three people at Greenwich and 'its apparent brilliancy much exceeded that of Jupiter. Near the termination of its flight it burst and lit up the entire sky'. Remarkably, Brook's sister, Ruth Mary Brook, observed the same fireball from Charmouth in Dorset. The three separate observations allowed Denning to compute the trajectory of 'not more than 60 miles' (97km) from a height of 88 to 44 miles (142 to 71km) from near Petersfield (Hampshire) to Hungerford (Berkshire).

Brook regularly recorded the presence of the zodiacal light and the gegenschein. For example, in 1901 he saw the gegenschein on at least eight nights from Meltham and several other times in 1902.⁹⁹ Subsequently, he saw the zodiacal light three times whilst staying on the Isle of Wight in 1903 March, which he described at the BAA meeting in London the following week.¹⁰⁰ We must conclude from the Meltham observations that the skies were often very clear and dark there, in spite of the problems with local air quality experienced at other times referred to previously.

On the evening of 1907 February 9 Brook was impressed by a spectacular aurora, which pulsed with reds and greens: 'This is the most remarkable auroral display I have ever seen; it may not have been as bright as that of 17th November 1882,... but I have never witnessed anything even approaching the extraordinary activity of the light pulsations as seen between 10.10 and 11.00 pm'.¹⁰¹

The next day he looked at the Sun with his naked eye, using a dark glass, and 'saw very distinctly three large sunspots... On using a binocular many other smaller spots were seen'.

Meteorology

Apart from astronomy, Brook's other great passion was meteorology,⁴ as exemplified by his meteorological measurements during the 1900 solar eclipse. He was elected as a Life Fellow of the Royal Meteorological Society on 1891 February 18 and he served on its Council in 1913 and as Vice

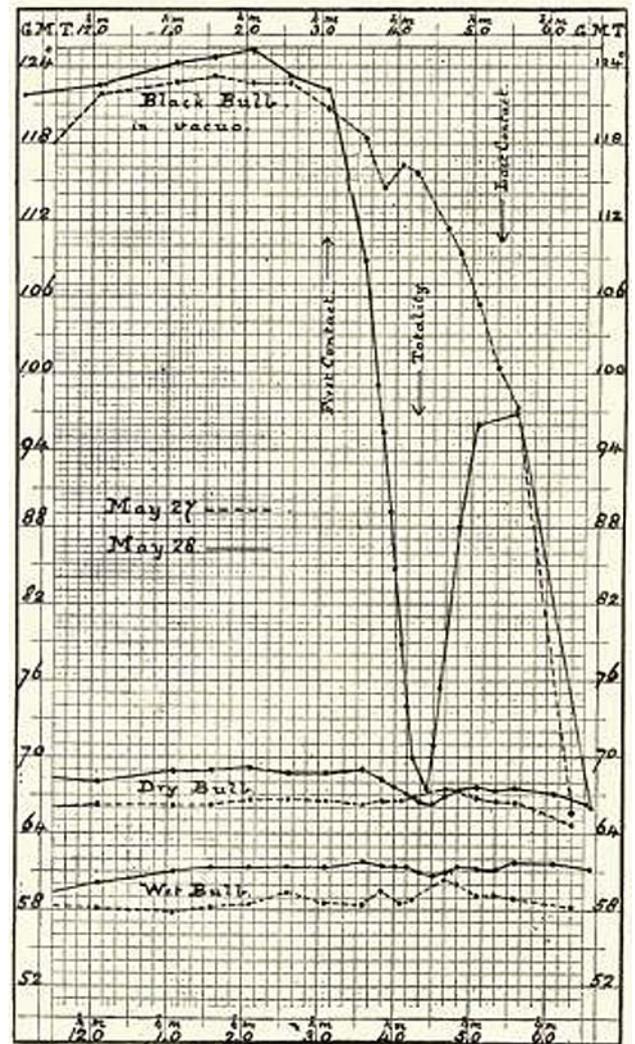


Figure 25. Temperature observations made by C. L. Brook on 1900 May 27 and 28 (the latter being the day of the eclipse) at the Hôtel de la Régence, Algiers.

President in 1922 (just after he resigned as VSS Director). He was a contributor of measurements to the British Rainfall Organisation,¹⁰² which he also aided financially, and he served on the Organisation's board of trustees from 1909 until 1919 when control of the Organisation passed to the Meteorological Office. Some years later, when the Thunderstorm Census Organisation¹⁰³ was formed, Brook was again a generous financial supporter.⁴

Brook began regular climatological records at Meltham in 1878 and maintained them until his death. He had a particular interest in the link between atmospheric phenomena and astronomy, writing on such subjects as lunar halos,¹⁰⁴ lunar rainbows^{105,106} and the presence of volcanic dust in the atmosphere leading to dark lunar eclipses,¹⁰⁷ as well as more mainstream meteorological topics such as severe snowfalls.¹⁰⁸

Conclusion

The BAA enjoys an international reputation for the quality of the observational work carried out by its members for

Shears: Charles Lewis Brook, third Director of the BAAVSS

more than 120 years. Charles Lewis Brook played an important part in developing that reputation in the work he did whilst Director of the VSS. He was not merely interested in collecting the observations of the members (to which he also contributed), but he spent considerable amounts of time analysing the data and writing numerous papers on the findings. These publications, which in many cases he generously funded from his own pocket, made the observations of many amateur astronomers available to the astronomical community and the data they contain are of lasting value. He deserves to be long remembered in the history of the BAA for his contributions to the Association.

Acknowledgments

I am most grateful for the assistance I have received from many people during my research for this paper. The Revd Maureen Read, Mr Duncan Crawshaw and Mrs Mary Crawshaw kindly hosted me for a day at Meltham, during which they showed me around the Meltham Churches and other landmarks associated with Brook, as well as providing interesting pieces of background information on the Brook family. Their local knowledge helped me to understand more fully the impact of the Brook family on life in Meltham. Hugh Darlington, great grandson of Esther Frost Brook (Charles Lewis Brook's sister), provided the photographs of Charles Lewis and Ruth Mary Brook used in the paper – until Hugh contacted me I had been unable to find any photographs of the family, so his contribution is highly valued. Nigel Homer¹⁰⁹ kindly gave me permission to use his photograph of St James' Church, Meltham Mills. Mike Saladyga (AAVSO) provided copies of letters between Brook and Leon Campbell from the AAVSO archives.

Peter Hingley (RAS) looked after me on numerous visits to the RAS Library and provided a copy of Brook's RAS Fellowship application. John Toone advised on various historical matters pertaining to the BAA VSS. Roger Pickard provided details of Brook's BAA VSS observations from the VSS database. Nicola Tyers (Uppingham School, Old Uppingham Association) provided information on Brook's school days. This research made use of SIMBAD, operated through the Centre de Données Astronomiques (Strasbourg, France), and the NASA/Smithsonian Astrophysics Data System. Finally I would like to thank both referees, Roger Pickard and Mike Frost for their helpful comments that have improved the paper.

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Notes and references

- 1 Meltham is located within the Metropolitan Borough of Kirkstall, West Yorkshire. It lies in the Holme Valley, below Wessenden Moor, 4½ miles (7.2 km) southwest of Huddersfield on the edge of the Peak District National Park.
- 2 Lindley W. M., *J. Brit. Astron. Assoc.*, **50**, 33 (1939)
- 3 Maunder A. S. D., *MNRAS*, **100**, 233 (1940)
- 4 Obituary (author not specified), *Quarterly Journal of the Royal*

Meteorological Society, **65**, 471 (1939)

- 5 Unknown author. I have not been able to obtain a copy of the original published obituary from the *Huddersfield Examiner* of May 1939. However local historian, Mr Duncan Crawshaw of St Bartholomew's Church, Meltham, kindly provided me with a typewritten copy.
- 6 According to local historian Mr Duncan Crawshaw, as a child Brook lived in Thickhollins Hall, Meltham, which for many years was the family seat. Thickhollins is now occupied by Meltham Golf Club.
- 7 Revd Lewis Jones was involved in some controversy in 1828. In that year the Vicar of Meltham, Revd Edmund Armistead, died and the people of Meltham favoured his curate, Robert Kean, as successor. In spite of their wishes, the Vicar of the neighbouring parish of Almondbury, Lewis Jones, was appointed instead. When Jones arrived in Meltham, Kean barricaded himself into the church, refusing to give up his place in the pulpit even when Jones broke into the church with the help of a contingent of special constables. Riots ensued and some men were arrested, later being bound over to keep the peace. Eventually the church courts found in favour of Jones who became vicar for the next 10 years. These events are described in the booklet *Worship for all: a history of public worship in Meltham*, available from St. Bartholomew's Church, Meltham.
- 8 Crawshaw D., *personal communication* (2010)
- 9 Brook boarded at The Lodge Boarding House at Uppingham. The Headmaster at the time, serving from 1853–1887, was Edward Thring (1821–1887) who developed an international reputation for his pioneering educational ideas, including installing the first gymnasium in an English school and later adding a heated indoor swimming pool.
- 10 Tyers N., Old Uppingham Association, *personal communication*, from the archives of Uppingham School (2010).
- 11 Brook was also in the Trinity College 1st eleven. The obituary in the *Huddersfield Examiner* notes that 'Mr. Brook... was known as a fielder of outstanding ability. He could throw a ball perfectly with either hand'.
- 12 Harewood Lodge was pulled down in the 1980s and is now the site of a church near the junction of Huddersfield Road and Meltham Mills Road (The Church of Jesus Christ of Latter Day Saints). I have spoken to several Meltham residents who were associated with the Lodge after World War Two, some even living there after it was converted to flats, but none can recall the site of an observatory.
- 13 The foundation stone and memorial to Brook's father can be found inside Helme Church (rather ungrandly, it is located inside the church WC as a result of more recent internal changes in the building). 'This Church was built and endowed in the memory of Charles John Brook of Thickhollins by his brothers and sisters... This stone was laid... by his only son'. His only son being, of course, Charles Lewis Brook.
- 14 Records of Coats Viyella PLC, thread manufacturers, Paisley, held at Glasgow University Archive Services, reference GB 0248 UGD 199/1, 28, 32.
- 15 Records of Jonas Brook & Bros. Ltd., thread manufacturers, Meltham Mills, Huddersfield, held at Glasgow University Archive Services, reference GB 0248 UGD 199/18.
- 16 Records of James Chadwick & Bros. Ltd., cotton manufacturers, Bolton, held at Glasgow University Archive Services, reference GB 0248 UGD 199/26.
- 17 The goat's head emblem of Jonas Brook & Bros. Ltd is the emblem of the Meltham & Meltham Mills Brass Band, which was established in 1846. The band enjoyed the support of the various Brook businesses and is still active as a brass band today. Being the Brook family coat of arms, the emblem is also in St James' Church at Meltham Mills, with the motto 'en dieu ma foy' (in God we trust).
- 18 Thread manufacture at Meltham Mills went into sharp decline after the First World War. David Brown Tractors took over the factories in 1939 and built tractors there, finally closing operations in 1988. The Meltham Mills factory is now divided into a series of separate units occupied by various light industrial and service companies.
- 19 Meltham residents still speak of the generous donations Brook made. As an example, on 1936 Feb 20 he donated £400 towards the cost of recommissioning the bells at St Bartholomew's Church, Meltham as recorded in *The Parish Church of St Bartholomew Meltham: tercentenary 1651 to 1951*, by J. E. Roberts (1951).
- 20 For many years, Meltham Mills Cricket Club played in the Huddersfield & District League and in 1895 they headed the league.

- They enjoyed much financial support from the Brook family. In 1925 a new cricket pavilion was opened, the gift of Jonas Brook & Bros. The club was dissolved in 1940, following the closure of the thread mills. For further details see: <http://www.cricketheritage.org.uk/MMHistory.pdf>
- 21 The obituary in the *Huddersfield Examiner* states that the funeral service was conducted by Archdeacon A. Baines and Canon H. F. T. Barter (Vicar of St. Bartholomew's, Meltham). The 'family and personal mourners' were: Col. C. J. Brook (nephew) and Mrs Brook, Col. C. J. Hirst (nephew), Mrs Fisher (niece), Miss D. Brook (niece), Mr T. W. Hirst (nephew), Lady Darlington (niece), Col. and Mrs Simpson, Admiral Watson, Miss Watson, Mr E. W. Brook, Mrs Crabbe, Maj. T. Brooke, Mr Harry Armitage, Mrs Watson and Mr Lart.
 - 22 Brook's RAS Fellowship application form was countersigned by Thomas K. Mellor FRAS and H. F. Newell. Prof Newell was for a time Director of the Solar Physics Laboratory at Cambridge, where he specialised in spectroscopy. Newell observed the total solar eclipse at Algiers in 1900, which Brook also observed and which is discussed later in this paper. However, they observed from different locations, with Newell being located in the grounds of the Algiers Observatory; see Turner H. H. & Newell H. F., *Proc. Royal Society of London*, **67**, 346–369 (1900).
 - 23 Chapman A., *The Victorian Amateur Astronomer*, John Wiley & Sons, 1998
 - 24 Toone J., *J. Brit. Astron. Assoc.*, **120**, 135 (2010)
 - 25 *J. Brit. Astron. Assoc.*, **9**, 347 (1899). 'List of people seeking election as members of the Association'. The proposer was Thomas K. Mellor (who also supported Brook's RAS Fellowship) and the seconder was J. G. Petrie, who was BAA Secretary at the time (serving 1894–1907).
 - 26 *J. Brit. Astron. Assoc.*, **9**, 398 (1899). 'List of newly elected members of the Association'. Date of election: 1899 June 28
 - 27 Sessions 1918–'19, 1919–'20, 1921–'22, 1922–'23, 1923–'24, 1925–'26; 'Minutes Book of Annual, Extraordinary, Special Meetings 1910–1968', British Astronomical Association.
 - 28 Pickard R. D., *Personal communication*; data from the BAA VSS database (2010).
 - 29 The 9-inch reflector is mentioned in several papers. However, one paper makes reference to a 10-inch reflector. Whether this was another telescope, or simply an error, is not known. In spite of investigations, I have not been able to determine the fate of the telescope. Mr R. A. Marriott, BAA Curator of Instruments, indicates that it was never part of the BAA Instruments Collection. If anyone knows of its fate, I would be delighted to hear from them.
 - 30 As early as 1902 November 26, Brook was discussing his observations of the variability of Betelgeuse at a BAA meeting. See: Brook C. L., *J. Brit. Astron. Assoc.*, **13**, 55 (1902).
 - 31 Brook C. L. (ed.), *Mem. RAS*, **58** (1908), 'Observations of Thirty-One Variable Stars by the Late N. R. Pogson', RAS, London.
 - 32 Herbert Hall Turner, FRS, was Chief Assistant at Greenwich Observatory (1884–1893). In 1893 he became Savilian Professor of Astronomy and Director of the Observatory at Oxford University, a post he held for 37 years until his death. H. H. Turner also observed the 1900 Algiers eclipse of the Sun which was observed by Brook (see reference 22 above).
 - 33 Kelly H. L., 'Variable Star Section', in 'The BAA: The First Fifty Years', *Mem. Brit. Astron. Assoc.*, **42**, part 1 (1989)
 - 34 Brook C. L., *J. Brit. Astron. Assoc.*, **20**, 142 (1910)
 - 35 Brook C. L., *ibid.*, **20**, 460 (1910)
 - 36 Brook C. L., *Mem. Brit. Astron. Assoc.*, **22** (1918)
 - 37 Brook C. L., *ibid.*, **24** (1924)
 - 38 Markwick E. E., *ibid.*, **28** (1912)
 - 39 de Roy F., *ibid.*, **31** (1934)
 - 40 Letter from 24 members of the BAA Variable Star Section, *J. Brit. Astron. Assoc.*, **32**, 133 (1922)
 - 41 Shears J., *ibid.*, **121**(4), 203 (2011)
 - 42 de Roy F., BAA Variable Star Section *Circular* 1 (1922)
 - 43 de Roy F., BAA Variable Star Section *Circular* 2 (1923). The whereabouts of this album is unknown to the author and any clues as to its location would be gratefully received.
 - 44 Annie Scott Dill Maunder (née Russell) was the second wife of BAA founder Edward Walter Maunder (his first wife, Edith Hannah Bustin, 1852–1888, died of tuberculosis). She was a professional astronomer at the Royal Greenwich Observatory before their marriage. Further details about E. W. Maunder and his wives and family may be found in Kinder A. J., *J. Brit. Astron. Assoc.*, **118**, 21 (2008)
 - 45 Pickering E. C. & Fleming W. P., *ApJ*, **4**, 369 (1896)
 - 46 Hellier C., *Cataclysmic Variable Stars: How and why they vary*, Springer-Verlag, 2001
 - 47 Malatesta K., AAVSO Variable Star of the Month June 2000: SS Cygni (2000) available at http://www.aavso.org/vsots_sscy
 - 48 *J. Brit. Astron. Assoc.*, **16**, 388 (1906)
 - 49 Brook C. L., *ibid.*, **32**, 180 (1922)
 - 50 Brook C. L., *ibid.*, **21**, 255 (1911)
 - 51 Brook C. L., *ibid.*, **23**, 179 (1913)
 - 52 Brook C. L., Letter to Leon Campbell, Recorder of the AAVSO, 1921 June 9, AAVSO Archives (1921)
 - 53 Campbell L., Letter to C. L. Brook, 1922 July 27, AAVSO Archives (1922)
 - 54 Brook C. L., *J. Brit. Astron. Assoc.*, **24**, 192 (1914)
 - 55 Gibb D., *MNRAS*, **74**, 768 (1914)
 - 56 Brook C. L., *J. Brit. Astron. Assoc.*, **25**, 219 (1915)
 - 57 Brook C. L., *ibid.*, **30**, 174 (1920)
 - 58 Brook C. L., *ibid.*, **36**, 205 (1926)
 - 59 Campbell L., *Annals of the Observatory of Harvard College*, **90**, 93 (1934)
 - 60 Cannizzo J. K. & Mattei J. A., *ApJ*, **505**, 344 (1998)
 - 61 Cannizzo J. K., *ibid.*, **419**, 318 (1993)
 - 62 Cook A. G., *J. Brit. Astron. Assoc.*, **28**, 208 (1918)
 - 63 Brook C. L., *ibid.*, **28**, 207 (1918)
 - 64 Steavenson W. H., *ibid.*, **28**, 208 (1918)
 - 65 de Roy F., *MNRAS*, **78**, 573 (1918)
 - 66 Thomson H., *Eng. Mech.*, **2777**, 5, item 214 (1918)
 - 67 Thomson H., *J. Brit. Astron. Assoc.*, **28**, 209 (1918)
 - 68 de Roy F., *Ciel et Terre*, **36**, 120 (1920)
 - 69 de Roy F., *ibid.*, **36**, 166 (1920)
 - 70 That is to say, 00:45 UT on 1918 June 8.
 - 71 Brook C. L., *J. Brit. Astron. Assoc.*, **28**, 239 (1918)
 - 72 Brook C. L., *Observatory*, **42**, 408 (1919)
 - 73 Brook C. L., *J. Brit. Astron. Assoc.*, **22**, 306 (1912)
 - 74 The miners' strike of 1912 was one of the first nationwide strikes that was led by the newly formed Miners Union, which was demanding a national minimum wage. The strike began in late February and by early March there was a national coal shortage.
 - 75 Brook C. L., *J. Brit. Astron. Assoc.*, **22**, 275 (1912)
 - 76 Brook C. L., *Eng. Mech.*, **2077**, item 637, 1905 Jan 15
 - 77 Denning W. F., *Observatory*, **43**, 328 (1920)
 - 78 Brook C. L., *J. Brit. Astron. Assoc.*, **31**, 21 (1920)
 - 79 A full account of the mystery is given by Richard Baum in a chapter entitled 'An Unresolved Mystery' in his excellent book *The Haunted Observatory*, publ. 2007 by Prometheus Books.
 - 80 Barnard E. E., *AN*, **172**, 25 (1906)
 - 81 The eclipse path went on into Libya, then part of the Ottoman Empire, but here the eclipse was very short.
 - 82 Maunder E. W., *The Total Solar Eclipse 1900. Report of the expeditions organised by the British Astronomical Association to observe the total solar eclipse of 1900 May 28*, publ. BAA (1901)
 - 83 Meeting report, 1900 June 27, *J. Brit. Astron. Assoc.*, **10**, 341 (1900)
 - 84 Maunder had hoped that a passage could be booked on a ship for the whole BAA party, as happened for the 1896 eclipse which was observed from Norway. However, this was not possible as many steamers were claimed as troop carriers for the Boer War which was in progress. at the time; see Ch. 5 of 'The British Astronomical Association, the First Fifty Years' (*op.cit.*, ref.33).
 - 85 It appears that Arthur Brook, who was originally from Essex, was no relation of the Brooks of Meltham.
 - 86 Ruth Mary Brook was elected to the Association on 1900 Dec 19 [*J. Brit. Astron. Assoc.*, **11**, 139 (1901)]. The proposer and seconder were Irene M. Maunder and Catherine Stevens respectively [*ibid.*, **11**, 96 (1901)]. Irene Matilda Maunder (1880–1977) was the daughter of E. W. Maunder and his first wife, Edith Hannah Maunder, and a member of the BAA (1899–1907). For further details see Kinder A. J., *op.cit.*, ref.44.
 - 87 Sessions 1913–'14, 1914–'15, 1915–'16, 1916–'17; *op.cit.*, ref.27.
 - 88 Maunder's daughters were Edith Augustus (1878–1966) and Irene Matilda, who signed Ruth Mary Brook's BAA membership application as noted previously.
 - 89 Crommelin, from the Royal Greenwich Observatory, went on to become President of the BAA 1904–1906. He was Director of the Comet Section 1897–1939. The eclipse was also observed from Algiers by two of Brook's associates, Prof H. H. Turner and H. F. Newell, although apparently they travelled independently of Maunder and Brook.
 - 90 R. F. Robert's daughter was also killed in the air raid; see Ch. 5 of 'The British Astronomical Association, the First Fifty Years'.

Shears: Charles Lewis Brook, third Director of the BAAVSS

- Roberts can be seen in the photograph taken on the hotel roof in Algiers, which appears in this paper as Figure 21.
- 91 Maunder also pointed out in the *Memoir* that a further advantage of the roof was that the observers were separated from the throng of people in the streets that might have disturbed their observations. Maunder commented that there were 20,000 or 30,000 people within sight of the roof-top. The hotel waiters also expressed patriotic concern on learning that 'the eclipse came to Spain before it passed through Algeria, and that it was total longer there'.
 - 92 One such observer was John Evershed (1864–1956) who had set up an encampment some 20 miles from Algiers to observe the flash spectrum. At night the eclipse party at Hôtel de la Régence took advantage of the clear skies to observe southern constellations, including Centaurus, Scorpio and Sagittarius, as well as to adjust their telescopes.
 - 93 Princess Amelie sailed to Algiers on the 'Argonaut'. She invited Maunder and his wife to visit her there to 'explain the circumstances of the eclipse'.
 - 94 Leo Brenner was the pseudonym of the political adventurer Spiridon Gopëevia. His colourful life is depicted in 'The Curious Career of Leo Brenner', which forms Chapter 21 of Joseph Ashbrook's *Astronomical Scrapbook: Skywatchers, pioneers and seekers in astronomy*, Sky Publishing Corp., 1984.
 - 95 Brook noted the times of appearance of stars of varying brightness after sunset during several evenings of the stay in Algiers. He had hoped to correlate these observations with those made during the eclipse, but the results were inconclusive.

- 96 Brook C. L., *J. Brit. Astron. Assoc.*, **17**, 137 (1907)
- 97 Brook C. L., *ibid.*, **18**, 383 (1908)
- 98 Denning W. F., *Observatory*, **28**, 54 (1905)
- 99 Brook C. L., *J. Brit. Astron. Assoc.*, **12**, 215 (1902)
- 100 Brook C. L., *ibid.*, **13**, 190 (1903)
- 101 Brook C. L., *ibid.*, **17**, 192 (1907)
- 102 The British Rainfall Organisation (BRO) was founded by Charles James Symons in 1860. Members (by 1900 there were 3,408 stations in Symons's network) made daily rainfall measurements. They sent their results to Symons, who analysed them and published them in the *British Rainfall* magazine
- 103 The Thunderstorm Census Organisation (TCO) was set up by S. Morris Bower of Huddersfield, who was presumably known to Brook, given the proximity of Huddersfield to Meltham. TCO became part of the Tornado and Storm Research Organisation (TORRO) in 1982.
- 104 Brook C. L., *Symons's Meteorological Magazine*, **34**, 88 (1899)
- 105 Brook C. L., *ibid.*, **35**, 138 (1900)
- 106 Brook C. L., *Observatory*, **28**, 107 (1905)
- 107 Brook C. L., *J. Brit. Astron. Assoc.*, **13**, 318 (1903)
- 108 Brook C. L., *Symons's Meteorological Magazine*, **35**, 25 (1900)
- 109 <http://www.nigelhomer.co.uk>
- 110 In the BAA Eclipse *Memoir*, the observers are listed as (left to right from the telescope) Mr Roberts, Mr Allen, Mrs Allen, Miss Allen (then 2 unnamed ladies standing, one of whom may well be Ruth Mary Brook) and Mr Roberts, Jr.

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BAA Notice

Nominations for the Council ballot

Each year in May, your Council prepares the balloting list from the names of those members nominated. The Balloting List is sent to members in August and the members elected serve from the AGM in October. The elected Council comprises:

1 President, 1 Treasurer, 3 Secretaries and 10 other members.

It obviously shows a robust situation if the number of proposed members exceeds the number of vacancies so that a true election occurs. The elected member of Council with the highest number of votes will become one of the Vice-Presidents for the following session. Council meetings normally take place during the afternoon of a Wednesday Ordinary Meeting or during the morning of a Saturday meeting. If you would like to be nominated you must be a paid-up member. Please ask two other paid-up members to propose and second you and then sign the letter yourself to show that you are willing to stand. Alternatively you may wish to nominate someone else, in which case the same conditions apply. Nomination forms are available from the Business Secretary.

All nominations must be in writing and sent to the BAA office to arrive by 2012 May 4.

Ron Johnson, Business Secretary

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