BULLETIN

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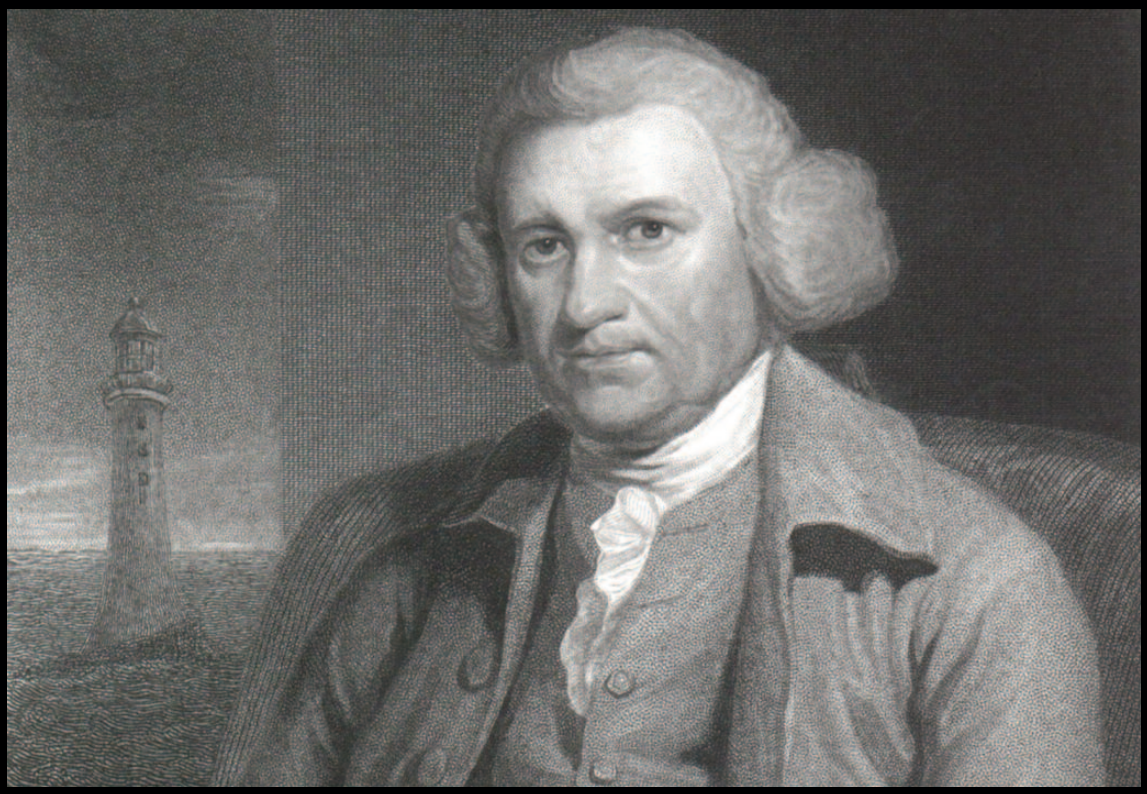
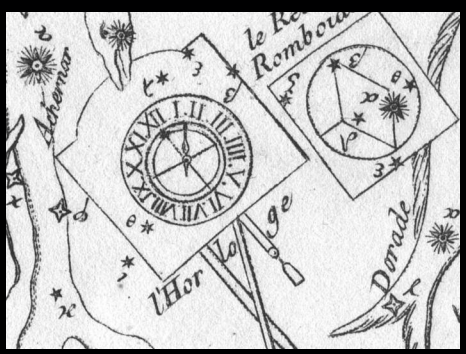


FROM STARS TO THE EDDYSTONE LIGHTHOUSE

The Astronomy of John Smeaton, FRS

Astronomy & Philately



Horologium

Frank Holden

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ISSUE 34 Winter 2020

The Bulletin of the Society for the History of Astronomy

Editor: Kevin Walsh

EDITORIAL

Everything that happens becomes a part of history. In the context of astronomy, our interests lie in the people, places, instruments and discoveries that have contributed to the richness of our knowledge. At a time when the present and the future are shrouded in uncertainty, the past has much reassurance and comfort to offer and I hope that this latest edition of *The Bulletin* reflects, once again, the society's continued, healthy pursuit of things from the past, whether recent or distant, that have helped us to fashion our understanding of the marvellous Universe of which we are a part.

For the furthering and sharing of such understanding we are always indebted to the tireless efforts and inspiration of individuals and in this issue we remember and pay tribute to two great friends of the society, Eddie Carpenter and David Le Conte, who both sadly passed away recently.

I am extremely grateful to David Sellers and Ian Ridpath for their enormous assistance (i.e. they did most of the work) in compiling this edition and, with the help and support of you, the readership, I look forward to helping to sustain the work of this remarkable society in future editions.

I hope you enjoy this one and I look forward to hearing from you.

KAPW

Collecting astronomy and space history on stamps

Katrin Raynor-Evans

I have always loved science and it was my father who encouraged my interest in astronomy when I was in my mid-teens. He would spend hours in the garden freezing cold setting up the telescope while I sat indoors, nice and warm, nipping out now and then to have a look through the eyepiece. Seeing Saturn through the telescope, its rings clearly visible, has always stuck in my mind. At that time, in the late 90s we were lucky enough to see some fantastic astronomical events including Comet Hale-Bopp and the solar eclipse of 1999. Some of my most cherished memories involve standing outside and looking up.

How lucky we are that achievements in astronomy and space have long been commemorated on postage stamps and other philatelic material. Collectable postage comes in many forms. Stamps are frequently affixed to specially designed envelopes called First Day covers. These often have a design known as a cachet, an illustration depicting the event or theme being celebrated. The cachet may be a printed image, or a piece of silky fabric fused to the envelope; in some cases, it is bordered with gold. The covers, some of which are issued as sets, are stamped on the first day of issue. Sometimes the postmarks or special hand-stamps, also known as *indicia*, further reinforce the theme through a picture of the event being celebrated.

The first astronomy stamp dates as far back as 1887 (Figure 1), when Brazil issued a stamp depicting Crux, the Southern Cross. Since then, postage stamps have been issued by countries around the world commemorating space flight, planets, astronomers, and even the discovery of gravitational waves, creating a wonderful way to document the history of space and astronomy. What follows is a small sample of some of my philatelic collection celebrating astronomy and space flight, mostly with a British theme.

Fig. 1: The very first stamp with an astronomical theme, issued by Brazil in 1887, depicts the five main stars that make up the Southern Cross.

***Fig. 2: Celebrating Newton's* System of the World**

Bicentenary of the Royal Astronomical Society

On 11 February 2020, the bicentenary of the Royal Astronomical Society was commemorated by a set of eight stamps issued by the Royal Mail. Formed on 1820 January 12 at the Freemasons Tavern in London, the RAS has now grown to 4,000 members and is one of the most eminent societies in the world promoting astronomy and geophysics.

Called *Visions of the Universe*, the eight stamps illustrate various astronomical phenomena: the nucleus of Comet 67P (aka Churyumov–Gerasimenko), as seen by Rosetta; the Cat's Eye Nebula; geysers on Enceladus; pulsars; Jupiter's aurorae; the radio galaxy Cygnus A; gravitational lensing; and black holes. One simple line of text on each stamp describes the subject. Illustrated by artist Robert Ball, the stamps are colourful in blues and reds, informative, and the perfect way to celebrate the bicentenary of a prestigious society and the

contribution that British scientists have made to research and study in this field (Figure 3).

Special hand-stamps sponsored by various companies who produce covers have been used to cancel the stamps on the First Day covers. Cancels include the original logo of the RAS showing William Herschel's 40-foot telescope, an image of a black hole, and an illustration of the Solar System.

Along with the individual stamps, the First Day covers, a presentation pack, and a set of postcards, the Royal Mail issued a wonderful Prestige Stamp Book. At 24 pages long, the PSB is packed with information about the RAS and includes panes featuring all eight stamps and two additional panes of Definitive and Country Definitive stamps.

Fig. 3: A set of eight stamps called* Visions of the Universe*, issued by Royal Mail in 2020 to celebrate the bicentenary of the Royal Astronomical Society.

The stamps in the *Visions of the Universe* set were not the first to celebrate an anniversary of the Royal Astronomical Society. On 1 April 1970, a stamp was issued to commemorate the society's 150th anniversary (Figure 4). It depicted William Herschel, Francis Baily (of Baily's beads fame), and John Herschel standing in front of William Herschel's 40-foot telescope, the original logo of the RAS.

Fig. 4: The 150th anniversary of the Royal Astronomical Society in 1970 was commemorated by the Royal Mail with this stamp showing three of the Society's famous founders, William and John Herschel and Francis Baily. In the background is William Herschel's 40-ft telescope, which stood at his home in Slough, and was depicted on the original RAS logo.

Apollo 16

The Apollo programme ran for 11 years from 1961 to 1972. In that time NASA successfully landed twelve humans on the Moon. An interesting autographed cover that I have commemorates the Apollo 16 mission. George Carruthers, an African-American space scientist, invented the ultraviolet camera/spectrograph which was deployed on the surface of the Moon during the mission. It was the first Moon-based space observatory. Signed by Carruthers, the cover is date-stamped 20 April 1972 the day that Apollo 16 astronauts John Young and Charles Duke landed on the Moon (Figure 5).

Comet Halley

Named after the famous astronomer Edmond Halley, this is perhaps the most famous short-period comet in history. With a return period of 76 years, some of us may even see it twice in our lifetimes. The comet has been recorded as far back as 240 BC in China and was embroidered onto the world-famous Bayeux Tapestry.

The last appearance of Halley's Comet in 1985 was celebrated globally on stamps. In the UK the Royal Mail issued a fantastic set of four stamps in 1986 illustrated by the famous cartoonist Ralph Steadman.

The colourful and imaginative stamps depict a rather comical-looking Halley with flowing wig; the European probe Giotto approaching the comet's nucleus (Figure 6); an image of two

comets to represent seeing it twice in a lifetime; and the comet orbiting the Sun. Designs printed on the First Day covers (the cache) include images

Fig. 5: Cover commemorating the landing of Apollo 16, which carried an ultraviolet camera for astronomical observations, signed by the camera's inventor, George Carruthers.

of the orbit of the comet, a portrait of Halley, and the Giotto probe. The UK issued special hand-stamps to accompany the commemoration including a postmark at Islington, the birthplace of Halley.

A set of silk First Day covers that I enjoy collecting are those that were issued by Presentation Philatelic Services (PPS), London, between (from what I gather) 1984 and 1995. Research on this wonderful collection has proven to be fruitless for me and I know little about the history or thought behind them. The card inlay does explain however that each issue depicts a fine-art painting or other collectable auctioned by Sotheby's of London.

Fig. 6: First Day cover with hand-stamps celebrating the return of Halley's comet in 1986 and the Giotto mission to encounter it.

The First Day cover issued to commemorate the Halley's Comet stamp set is number 19 in the 1986 series. A beautiful silk cachet of a portable refracting telescope manufactured by Peter Dollond adorns the cover. This telescope was sold by Sotheby's at auction in 1985 for £22,000 (Figure 7).

Observatories

A set of four stamps was issued by the Royal Mail on 16 October 1990 to commemorate the 200th anniversary of Armagh Observatory and the centenary of the British Astronomical Association. These stamps included illustrations of various observatories including Stonehenge, Greenwich, and Armagh, and instruments ranging from an armillary sphere to the William Herschel Telescope on La Palma. The PPS produced a silk cover which illustrated the *Head of a Young Girl at Night* painted by E. F. Brentnell (Figure 8). The original painting was sold at auction by Sotheby's for £1,300 in 1900.

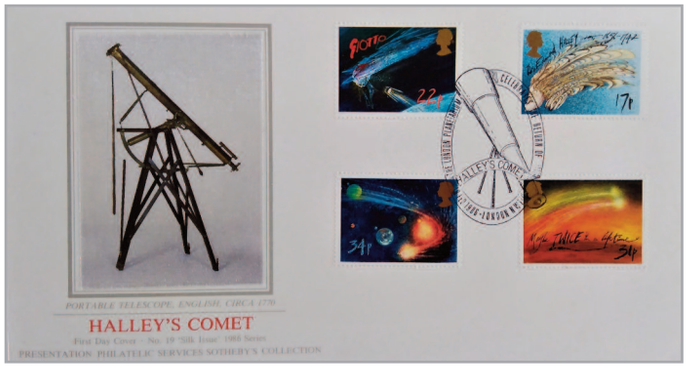


Fig. 7: A silk First Day cover issued by Presentation Philatelic Services depicting a refracting telescope from around 1770 by Peter Dollond.

Flamsteed House, the original home of the Royal Observatory at Greenwich, appeared on a stamp in 1975 marking the 300th anniversary of the observatory's founding. Nine years later, in 1984, a set of four stamps commemorated the centenary of the adoption of the Greenwich Meridian as Longitude Zero for the Earth. One of the stamps featured a diagram of Airy's transit telescope itself, which defines the meridian.

From Isaac Newton to Captain Cook

One of the greatest scientific books in history was Isaac Newton's Principia, in which he laid out his theories on gravity and the motion of bodies. To mark the 300th anniversary of its publication, in 1987 the Royal Mail issued four colourful stamps

bursting with information about Newton's achievements.

Fig. 8: The four astronomy stamps issued in 1990 on a First Day cover containing a painting called* Head of a Young Girl at Night *by E. F. Brentnell. These covers were hand-stamped at Stonehenge, which appears on the fourth postage.

The 18p stamp reproduces the title page of the *Principia*, over a bright red apple (Figure 9). The 22-pence stamp honours his study of planetary motion through the depiction of six planets orbiting the Sun, while the 34-pence stamp portrays a satellite above the Earth along with Newton's diagram on orbits. The 31p stamp recalls his work on optics.

Fig. 9: Newton's Principia commemorated.

Another event of great astronomical significance was James Cook's voyage aboard the *Endeavour* to observe the transit of Venus from Tahiti in 1769. In 2018 the Royal Mail issued a set of six stamps to commemorate the 250th anniversary of the Endeavour's departure from Plymouth. During the transit Cook and the astronomer Charles Green made drawings which were reproduced on a first-class stamp called 'The Endeavour Voyage', superimposed on an image of the Sun. One of the most interesting details of the drawings is the 'black drop' effect that they observed during the transit and which affected their timings. The stamp is also illustrated with a sextant, which was used for navigation purposes during the voyage (Figure 10).

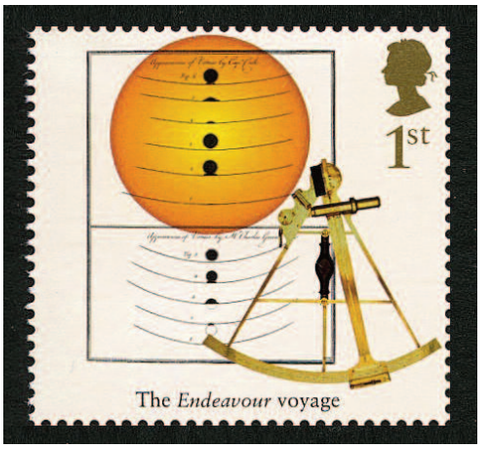


Fig. 10: A depiction of the transit of Venus in 1769 June as observed by James Cook and Charles Green, part of a set issued by the Royal Mail in 2018 to commemorate Cook's voyage on the Endeavour.

The Hubble Space Telescope

In April 1990, the Hubble Space Telescope (HST) was launched from the Kennedy Space Center in Florida. Several servicing missions have kept it operating for over 30 years. The second of these missions, STS-82, was launched on 11 February 1997.

Four covers in my collection have been signed by four of the five Mission Specialists on that flight: Joseph Tanner, Mark Lee, Steven Smith, and Steven Hawley. Lee and Smith carried out

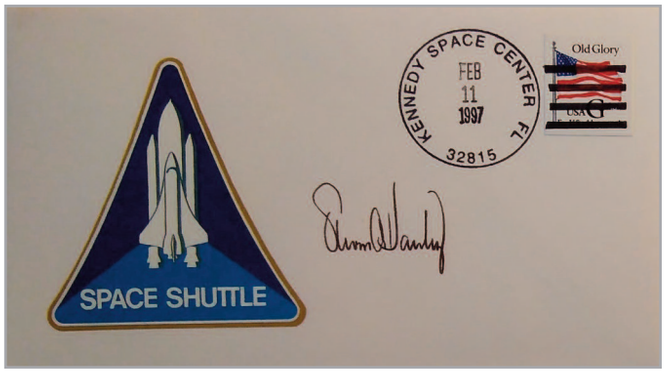


Fig. 11: Cover postmarked Kennedy Space Center and signed by crew member Steven Hawley aboard the Space Shuttle mission STS-82 to service the Hubble Space Telescope in 1997.

three of the five EVAs during the mission, while Gregory Harbaugh, also a Mission Specialist, and Tanner undertook the other two. Steven Hawley, an already accomplished astronaut was part of STS-31, the mission that launched the HST seven years earlier. (Figure 11).

As I am sure you will have gathered, the world of philately provides no end of joy and wonder for me. Learning and understanding the subjects and history of space flight and astronomy through collecting is unique and enjoyable, proving that this often-unexplored miniature world can open a huge window on our vast and beautiful Universe.

About the author

Katrin Raynor-Evans is a Fellow of the Royal Astronomical Society and Royal Geographical Society. She is a member of the European Astronomical Society, American Philatelic Society, American Topical Association, and Astro Space Stamp Society. She writes articles and interviews for popular astronomy magazines and is co-authoring her first book. Asteroid 446500 Katrinraynor was named after her.

NEW SHA PUBLICATION

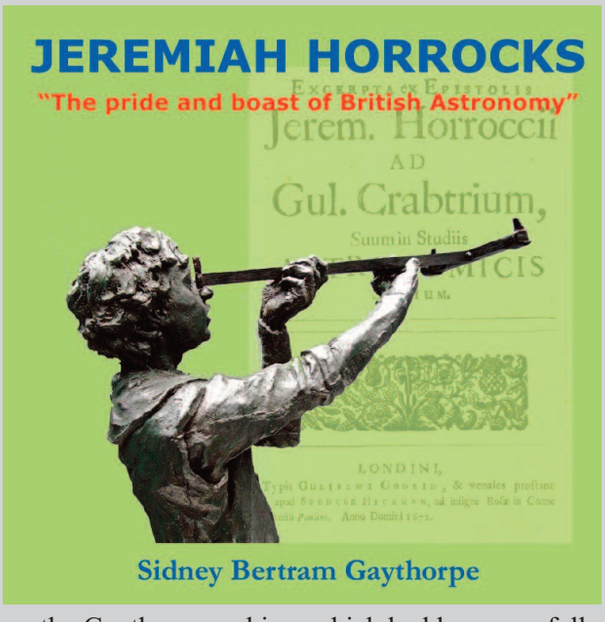
'Jeremiah Horrocks: the Pride & Boast of British Astronomy'

by Sidney B. Gaythorpe

The Liverpool astronomer, Jeremiah Horrocks (c.1618-1641), was described by Sir John Herschel as "the pride and boast of British Astronomy". Tragically, Horrocks died in his early twenties. Without a doubt, had he lived longer, he would have achieved great things. Even as a teenager he was a pioneer of new thinking in astronomy that ranked him with the leading astronomers of Europe. For almost 400 years his work has continued to elicit the admiration of succeeding generations.

On the basis of his own calculations, Horrocks predicted that on 24th November 1639 (old-style calendar) the planet Venus would pass in front of the Sun's disc—a rare event, which had never been seen before. He and his greatest friend, William Crabtree, of Salford, gained everlasting fame by observing this 'transit of Venus'.

The name of the Barrow-in-Furness historian, Sidney Bertram Gaythorpe (1880-1964) is familiar to most students of English astronomical history. His name is indelibly linked with the story of Horrocks and Crabtree. He spent much of his life researching for a biography of Jeremiah Horrocks that never came to fruition. His papers on the potential transit observation location, and on Horrocks' theory of the Moon, have been regularly cited over the years. Some of his manuscripts are amongst the 'Horroxiana', which have been kindly donated to the SHA Library by Alan Applebaum, of New York. These had formed part of



the Gaythorpe archive, which had been carefully preserved by the late Professor Wilbur Applebaum (1927-2019), Alan's father.

In this previously unpublished work from that collection, Gaythorpe recounts Horrocks's life and achievements, as seen through the prism of his correspondence with Crabtree.

This full-colour illustrated booklet (210 x210 mm) is published by the SHA. Length 44 pages; Price £8.00 (£10.30 including postage within the UK only). For purchasing details contact:

enews@shastro.org.uk

ANNIVERSARY PUBLICATION?

The SHA will be 20 in 2022

Attendees at the Founding Conference of the SHA at Wadham College, Oxford, on 29 June 2002 (above and below)

The Society for the History of Astronomy has thrived and grown substantially since its founding in Oxford. It will be 20 years old in June 2022. To mark this significant milestone, we intend to publish an attractive booklet with a series of thematic articles on people, observatories, plaques, places, sundials, etc, related to the history of astronomy in the UK.

The SHA's Survey of Astronomical History[1] provides a natural starting point for choosing material to include and the work of collating suitable items has already commenced. Readers of the Bulletin are encouraged to suggest topics or submit short articles for the booklet. Please let us know if you would like to be involved.

[1] https://shasurvey.wordpress.com/

THE ASTRONOMY OF JOHN SMEATON, FRS

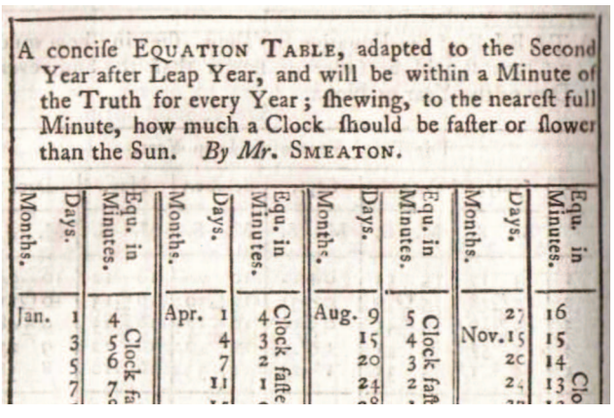
by David Sellers

In James Ferguson's celebrated book, *Astronomy Explained Upon Sir Isaac Newton's Principles* (1778), there is a table for the Equation of Time. It gives figures for how much a clock should be faster or slower than the Sun at different times of the year. Ferguson says that the table is 'by Mr Smeaton' (Figure 2).

This is John Smeaton (1724-92), who is justly famed for the design and construction of the third Eddystone Lighthouse. Many of his great engineering works – mills, harbours, bridges and waterways – are still in use today. Smeaton was the archetypal civil engineer, as opposed to the previous mainly military engineers.

So, how did it come to pass that an arcane astronomical table should be provided by a civil engineer?

Although Smeaton's later professional life was dominated by the civil engineering works for which he is still honoured, his election to the Royal Society at the age of 28 preceded any of these works and was the result of his earlier role as a maker of 'philosophical instruments'. Throughout his life his 'leisure' hours were dominated by an intense interest in astronomical matters. Indeed, such matters were the only things allowed to occasionally impinge upon his engineering work. His daughter, Mary, recounted that "his time was governed by a method as invariable as inviolable: for professional studies were never broken in upon by any one; and these (with the exception of stated astronomical observations) wholly ingrossed the forenoon".[1]



A concise EQUATION TABLE, adapted to the Second Year after Leap Year, and will be within a Minute of the Truth for every Year; shewing, to the nearest full Minute, how much a Clock should be faster or slower than the Sun. *By Mr.* SMEATON.

Months.	Days.	Equ. in Minutes.	Months.	Days.	Equ. in Minutes.	Months.	Days.	Equ. in Minutes.	Months.	Days.	Equ. in Minutes.
Jan.	1	4 Clock fa	Apr.	1	4 Clock faste	Aug.	9	5 Clock fast	Nov.	2	16
	3	5		4	3		15	4		15	15
	5	6		7	2		20	3		20	14
	7	7		11	1		24	2		24	13 Clo

***Fig. 2: Part of Smeaton's Equation of Time table from Ferguson's* Astronomy Explained (image: D. Sellers)**

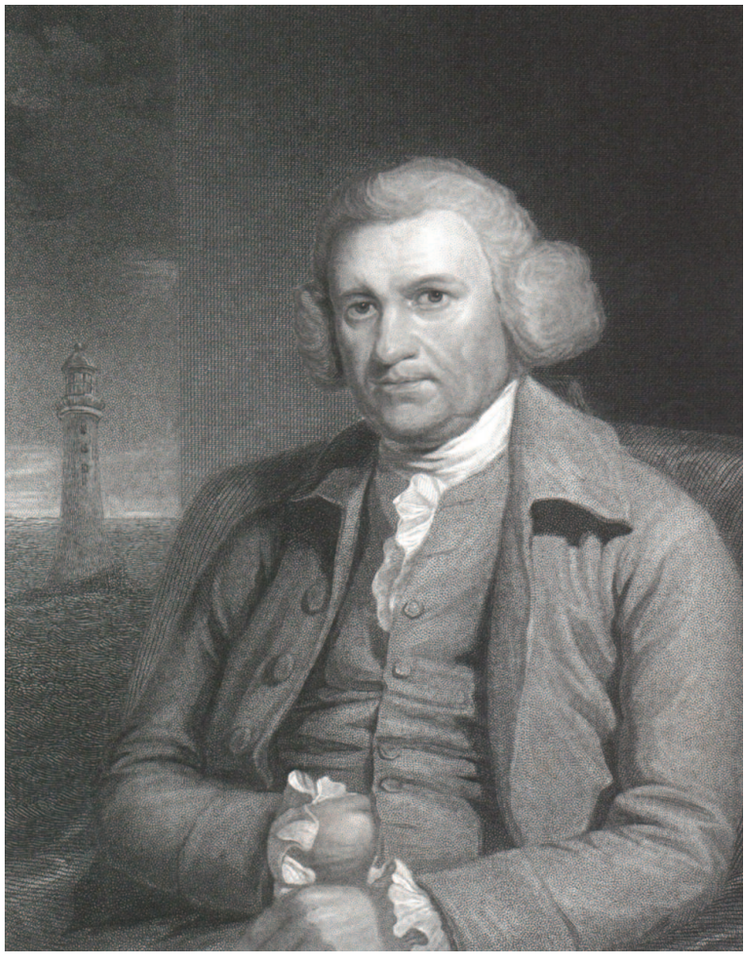


Fig. 1: John Smeaton and the Eddystone Lighthouse (image: Smithsonian Library)

John Smeaton was born at Austhorpe Lodge, in Whitkirk, East Leeds, on 8 June 1724 and lived there for much of his life. Unfortunately, the Lodge was demolished in the 1930s. Here we would have seen the tower that he built, on top of which he made his astronomical observations. One floor lower was the design office for his professional work and at the base of the tower was the workshop, where many of his experiments were conducted and his instruments were fabricated (Figure 4).

Smeaton's father had a legal practice in Leeds, but from an early age John seemed to be drawn more to the profession of his grandfather, who had been a watchmaker of some renown in York. Already, by the time he left Leeds Grammar School at the age of 16 he had his own workshop. A distant cousin, visiting John two years later, reported

that "in the year 1742, I spent a month at his father's house, and being intended myself for mechanical employment, a few years younger than he was, I could not but view his works with astonishment; he forged his iron and steel, and melted his metal; he had tools of every sort …He had made a Lathe, by which he cut a perpetual screw in brass, a thing little known at that day, and which I believe was the invention of Mr Henry Hindley, of York….Mr Hindley was a man of the most communicative disposition, a great lover of Mechanics, and of the most fertile genius. Mr Smeaton soon became acquainted with him, and they spent many a night at Mr Hindley's house till day light, conversing on those subjects."[2]

The prominence given to the perpetual screw, mentioned in this account, perhaps owes something to Smeaton's own estimation of its importance. This screw was essentially a precision worm gear for the careful adjustment of setting circles and arcs on astronomical instruments so as to achieve accurate measurements. The screw had an 'hour-glass' – rather than cylindrical – shape, which was calculated to reduce any play (or 'drunkenness') in the gearing. Its manufacture required a sophisticated dividing engine and Smeaton rightly saw such devices as being crucial for the advancement of astronomy.[3]

Instrument making

Not long after his first acquaintance with Hindley, the young Smeaton was sent to London to commence a legal education – perhaps by parents who were becoming alarmed at their son's bent for mechanical matters rather than more gentlemanly occupations. Within two years he returned, persuaded that legal circles were not for him. Whilst in London, however, he had met and formed crucial friendships with Benjamin Wilson and other Royal Society members and he continued a correspondence with them which frequently dealt with astronomy. Soon he resolved to make a profession out of building scientific instruments. This was to be a lifelong passion. By the age of 23 he had built his own telescope and had become, in his own estimation, "quite an artist" at grinding and polishing lenses.

In 1748, aged 26, with parental blessing, he departed once more for London to start his instrument building career. The first product of this endeavour was a vacuum pump that ended up being used (by Wilson and others) in electrical discharge experiments.

One of the next fruits of his industry was a marine compass (developed in collaboration with Dr Knight). Smeaton submitted a paper on this to the Royal Society in July 1750.[4] Other high-quality instruments followed – including a telescope for John Ellicott and a precision lathe for William Matthews. Around this time he also began his pioneering experiments on the power of water and wind. All in all, it was clear that, as well as being a formidable instrument builder, Smeaton was a first-class scientist. In December 1752, he was proposed by Lord Charles Cavendish for membership of the Royal Society and in March 1753, with the support of James Short, William Watson, and others, he was duly elected.

Eddystone lighthouse

Smeaton's career now turned decisively to engineering. He put his hand to the design of watermills, masonry bridges and drainage schemes. His scientific approach to these commissions – at once both analytical and experimental – made its mark with other Fellows of the Royal Society. So much so, that when the lighthouse on the Eddystone Rock was destroyed by a storm in 1755, the President of the Royal Society (Lord Macclesfield) advised the owners that Smeaton – an engineer with no previous experience of lighthouse construction – was the ideal man to take charge of the design and building of a new one!

Fig. 3: Leeds Civic Trust Plaque next to the Aire & Calder Navigation at Leeds (image: D. Sellers)

Fig. 4: Remains of Smeaton's Workshop, Austhorpe, Leeds (image: D. Sellers collection)

By October 1759 the new lighthouse – the third on the Eddystone Rock – was permanently operating and ultimately it became the archetypal symbol of civil engineering in Britain, featuring on the crest of the Institution of Civil Engineers. It also forms the centrepiece of the Smeaton memorial at Whitkirk Parish Church (Figure 6).

Around 1760 Smeaton, his wife Ann, and their baby daughter moved back to Austhorpe Lodge in Leeds and set about its renovation.

The demand for Smeaton's engineering skills continued to escalate and inevitably took up most of his time, but astronomical interests were not neglected.

Astronomical contributions

In the May of 1768 two papers of Smeaton on astronomical topics were read to meetings of the Royal Society: The first concerned the gravitational influence of the Moon upon the Earth and its effect on apparent planetary positions at different stages of the lunar month;[5] The second was on a method of accurately determining the position of a celestial body, using a transit telescope, even though the body was far away from the meridian.[6]

On 4 June 1769, the day after he missed seeing the transit of Venus, due to clouds, Smeaton made careful measurements of a partial solar eclipse (magnitude 0.576) from his Austhorpe observatory, using a Dollond refractor and a micrometer.[7]

Although he personally didn't witness the Venus transit, Smeaton still managed to contribute to the international observing effort, for it was he who had designed the portable observatories for the purpose taken to Tahiti by Captain Cook and to Hudson's Bay by William Wales and Joseph Dymond. Smeaton also designed fixed astronomical observatories for several sites in the UK, including Thorley Hall (Matthew Raper) and Deptford (Alexander Aubert). The current observatory in the Yorkshire Museum Gardens in York too is reputed to have been designed by him (Figure 5).

Fig. 5: Yorkshire Museum Gardens Observatory, York - designed by Smeaton? (image: D. Sellers)

From Austhorpe, John Smeaton maintained a regular correspondence with his scientific friends, including the Reverend John Michell of Thornhill, about twenty kilometres away, whom he sometimes visited. Michell is credited with first envisioning the existence of 'black holes' and with devising the experimental apparatus which allowed Cavendish to 'weigh' the Earth. Michell was also an ambitious telescope constructor and in this he received much encouragement from Smeaton, who visited his workshop and on occasion stayed at his house.

In the late 1780s Smeaton submitted further papers to the Royal Society on astronomical matters,

the first being a masterly survey of the history of the graduation of scales on observing instruments. This formed the introduction to a detailed description of the method invented by his deceased friend, Henry Hindley.

The next paper concerned observations of Mercury at greatest elongation that Smeaton had made in the autumn of 1786, using an 'equatorial micrometer' of his own design and construction.[8] This was followed by a report describing a patented improvement (a 'quadrant of altitude') that he had devised for the celestial globe and how it could be used to solve problems of positional astronomy.[9]

Fig. 6: Memorial plaque to Smeaton, along with a representation of the Eddystone Lighthouse, at Whitkirk Church (image: D. Sellers)

John Smeaton died on 28 October 1792, six weeks after having a stroke as he walked through his beloved garden at Austhorpe. According to his daughter, "He always apprehended the stroke, as it was hereditary in his family; he dreaded it only as it gave the melancholy possibility of out-living his faculties, or the power of doing good: to use his own words, 'lingering over the dregs, after the spirit had evaporated!'". Thankfully, however, his memory and intellect during his final weeks seemed to have been spared. "He would sometimes complain of his own slowness (as he called it) of apprehension, and then would excuse it with a smile, saying, 'It could not be otherwise, the shadow must lengthen, as the sun went down!' There was no slowness in fact to lament; for he was as ready at calculations, and as perspicuous in explanation, as at any former period….. The body gradually sunk, but the mind shone to the last.'"[10]

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About the author

David Sellers is a retired flood defence engineer, living in Leeds, Yorkshire. He is a founder member of the *Society for the History of Astronomy* and is the author of *The Transit of Venus: the quest to find the true distance of the Sun* (2001), co-author of *Vénus devant le Soleil* (2003), and author of *In Search of William Gascoigne: seventeenth-century astronomer* (2012). He is currently writing a biography of the Victorian astronomer and educationalist Charles Thomas Whitmell.

Dr Frank Holden Observing under Southern Skies

by Graham McLoughlin

Frank Holden was a founder member of Preston and District Astronomical Society (PADAS) in 1945 after the end of the Second World War and the split away from Preston Scientific Society.

Preston Scientific Society was formed in 1876 following a meeting of gentlemen chaired by Alderman Watson, who had his own Astronomical Observatory at his home in French Wood, Preston. Following his death Preston Corporation purchased this Observatory from the late Alderman Watson's Estate for the sum of £500. It was relocated to the Deepdale enclosure, opposite the Royal Preston Infirmary Hospital on 8th October 1881. The Observatory had a wood and canvas structure and housed an equatorial 18-inch speculum mirror, Newtonian telescope. This Municipal Observatory was possibly the first public observatory in the United Kingdom.

Preston Scientific Society had various sections, the Astronomical Section was well supported and popular—the society had over 450 members.

Frank was born in Preston 14th January 1917. At the age of 10, he observed the total solar eclipse of Wednesday 29th June 1927 from Moor

Fig. 2: Jeremiah Horrocks Observatory with war time camouflage circa 1940 (photo by Frank Holden, credit: Graham Mcloughlin Collection)

Fig. 1: Frank Holden (credit: Graham McLoughlin collection)

Park, Preston, with over 30,000 Prestonians, gathered to witness the event beside the new Jeremiah Horrocks Observatory, which had opened to coincide with eclipse: the first total eclipse observed in the UK for 203 years. The Honorary Curator, George Gibbs, FRAS, served as Lead Observer. At Moor Park, located along the central line of the Eclipse—with totality at 0623 hours lasting a mere 23 seconds—the eclipse was successfully observed, though many other observing locations on the central line had been clouded out.

The Eclipse made a big impression on Frank Holden and stimulated an interest in Astronomy that lasted for the rest of his life—from being an active amateur Astronomer and assistant curator at Jeremiah Horrocks Observatory and later in life becoming a professional astronomer. The astronomical interests of George Gibbs—solar observing and the observation of double stars with the 8-inch Cooke refractor—influenced the young Frank Holden, who later, as professional, went on to become the Director of the Lamont Hussey Observatory in South Africa measuring double stars.

In a letter to Keith Robinson in 1982, Frank writes: "Mr Gibbs was my unpaid tutor in Astronomy and thanks to this I was the first Prestonian to gain a Masters degree in the Department of Astronomy at Manchester University"; He also writes, "Please give the 8-inch Cooke Refractor a

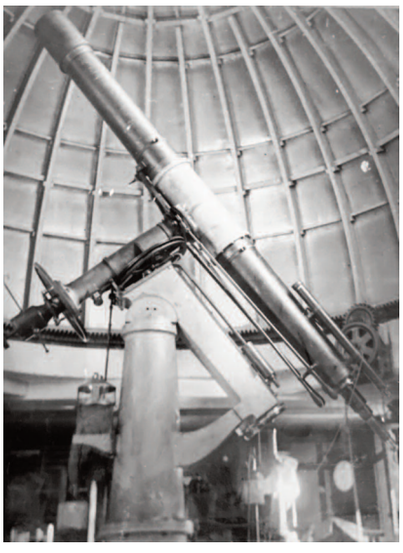


Fig. 3: Jeremiah Horrocks Observatory 8in Cooke Refractor (photo by Frank Holden circa 1940, credit: Graham Mcloughlin Collection)

friendly pat from me, as I had many hours of enjoyable observing with it. It was a fine Telescope".

From 1938 until 1956 Frank was assistant honorary curator at the Jeremiah Horrocks Observatory, working alongside George Gibbs, the Curator and designer of the Observatory in 1927, until the latter's death in February 1947. Until the arrival of Professor Vin Barocas in 1949, Frank may have taken a leading role as Curator. Frank served on the Committee of Preston and District Astronomical Society until 1958, with eight years as Secretary. In 1959 he gained an M.Sc. Degree in Astronomy at the University of Manchester with a thesis on *Interferometric Observation in Double Star Astronomy*, after which he gained a position at the University of Michigan at Ann Arbor. Subsequently, alongside a position teaching at the Drexel Institute, he was also performing double star observations at the Lowell Observatory.

The rest of this article consists of two memoirs by Frank Holden describing his life and work observing in Southern Skies: firstly in South Africa and secondly in Chile. These are followed by an obituary published in 1993.

Lamont-Hussey Observatory
by Frank Holden

The Lamont-Hussey Observatory and the Lamont Telescope was unused from the end of 1952 until 1963, except for the photography of Mars by Dr E. C. Slipher, Lowell Observatory, in 1954 – 1956, and observations of Saturn's rings by Dr F Franklin of Harvard.

The discoveries made by Professor Rossiter and his two assistants are outlined in the Preface *to the* Hussey Memorial Volume (xi) of the Publications of the Observatory of the University of Michigan. *The details of the measures are given in the bulk of that Volume, which was typed by Rossiter; they are solid testimony to the skill and energy of the observers, the excellent lens of the Lamont Telescope and the fine seeing at Bloemfontein. The combination of these factors enabled the Lamont-Hussey Observatory to set a world record for the number of discoveries made from one site, 7368 in total. Of these, 5534 were found by Rossiter and constitute another world record for discoveries made at the telescope by any one person. (The previous record was made by Sir John Herschel, also in South Africa)*

Professor Rossiter made remeasures of many of the pairs found by him and by Donner and Jessop. But there were some 3000 pairs either not measured since discovery or re-measured at so short an interval thereafter that relative motion was uncertain. This was the situation in May 1962 when Dr W.H Van den Bos strongly recommended that these neglected pairs should be examined. Frank Holden, who was measuring double stars at Lowell Observatory and who had cooperated with Van den Bos, approached Director O.C Mohler for permission to use the Lamont Telescope for remeasuring many of the Lamont-Hussey Observatory pairs. Reports sent from Bloemfontein by Dr D.H Menzel and Mr E.G Burton indicated that the Observatory could be salvaged. The National Science Foundation approved the project and a formal proposal, requesting financial support for

Fig. 4: Lamont-Hussey Observatory (credit: Boyden and Naval Hill Observatory)

Fig. 5: Frank Holden & Professor Richard Rossiter (credit: Boyden and Naval Observatory South Africa)

re-activating the Lamont-Hussey Observatory, was submitted on behalf of the University of Michigan. The initial grant covered the three years 1962-65.

Holden, accompanied by his wife and their two sons, sailed to South Africa and arrived at Bloemfontein via Durban in December 1962. The first inspections of the Observatory were discouraging, the dome would not move and its shutters were stuck closed. Electric wiring was bare and dangerous, the drive of the telescope was inoperative and the exterior and interior paintwork in bad condition, due to numerous leaks in the roof and dome. The fences around the building were broken and the grounds and paths were overgrown with tall grass and weeds.

The co-operation of the Town Council of Bloemfontein was sought. They responded helpfully by installing new fences and improving the water, drainage and sewage systems and provided new paths. Contractors responded to advertisements in the local press calling for tenders for the repair, caulking and painting of the dome; waterproofing of the roofs; modernisation of the electric systems for the dome, telescope and offices and general decoration of the interior and exterior of the observatory.

Restoration work proceeded vigorously and in May 1963 the official re-opening of the Observatory took place. Professor Rossiter and his wife came from Pietermaritzburg to be guests of honour at the ceremony, which was attended by officials of the U.S. Embassy from Pretoria, the Administrator of the Orange Free State, the Mayor and Officials of the City of Bloemfontein and prominent citizens. Emeritus Professor Rossiter, in a short speech, expressed his pleasure at seeing the Observatory again in working order and his gratification that the re-measuring of Lamont-Hussey Observatory pairs would be given priority.

The pairs on the re-measurement programme had been selected by Holden from the pairs in the Hussey Memorial Volume*, during the Atlantic Voyages. The criteria for placing pairs on the working lists were:*

Pairs not observed since discovery.
Few measures at one epoch only.
Measures all made within five years.
Relevant movement apparent from data given.
Discordant measures.

Thus 2611 pairs were selected and 280 not in the volume added as being of special interest, e.g. Sirius. All the objects were contained on or added to the finding charts which Rossiter had used. The re-use of the charts precluded speed in searching for the faint pairs which made up so large a proportion of the Lamont-Hussey Observatory double stars. Nevertheless, the procedure was justified because it ensured correct identification of the pairs.

Fig. 6: The Lamont 27-inch Refractor

The work of re-measuring began in June 1963 and proceeded steadily throughout the first and succeeding grants from the National Science Foundation. During that time visitors were admitted to the regularly scheduled public open nights each month and shown celestial objects with the Lamont Telescope. Public demand was high for the tickets of admission, which were issued free by the Information Bureau of the City of Bloemfontein. There were two sessions, each of one hour's duration, on each public night and the number of visitors was limited to 30 a session. Schools in the Orange Free State were allotted extra sessions, as were service clubs such as Rotary and Lions, When the scheduled night was cloudy the visitors were given a short talk prior to answering of their questions on astronomical subjects. This public relations work with 1000 visitors was worthwhile because it earned goodwill and dispelled the notion that the Lamont-Hussey Observatory was engaged in military operations.

The results of the re-measuring were given in four lists published in Volumes IX *and* XII *of the* Publications of the Observatory of the University of Michigan*. In general, they show that a large majority of the Lamont-Hussey Observatory pairs have long periods. This finding is not surprising, but it could not be assumed: it had to be demonstrated. Other useful results were obtained from the establishment or confirmation of relative motions in many pairs.*

Fig. 7: Frank Holden at Observatory Entrance (credit: Boyden and Naval Hill Observatory South Africa)

Professor Mohler's term as Department Chairman and Director of the Observatories ended late in 1970. His positive attitude towards the re-opening of the Lamont-Hussey Observatory and his continuing interest in its operation had contributed much to the success of the project. He was succeeded by Dr W.A. Hiltner who had visited the Observatory for a few days in April 1970. Unfortunately, he adopted a narrow and negative policy and decided that the Observatory should be discontinued.

The Lamont-Hussey Observatory was visited by Professor Mohler during February 1972 and officially closed at the end of that month. The Lamont Telescope's tube and mounting were covered in plastic sheets for protection against moisture and dust. The bifilar micrometer was sent to Ann Arbor and the books, records and correspondence also shipped there.

Following the closure of the Lamont-Hussey Observatory, Frank returned to the U.S. and continued observation of double stars at the Lick and Lowell Observatories as Visiting Astronomer from the University of Michigan. He had an opportunity to observe Southern Hemisphere double stars from South America at Cerro Tololo Inter-American Observatory (CTIO).

Cerro Tololo Observatory
by Frank Holden

When I was measuring double stars at Lick Observatory it became apparent that the early part of the year was not the time of good seeing there. So I searched to find a suitable site for observing Southern double stars during that time. I found it at Cerro Tololo Inter-American Observatory in the Chilean Andes, where the best seeing occurs from November to April. This observatory is owned and operated by the Association of Universities for Research in Astronomy (AURA for short), which has financial support from the National Science Foundation. The Foundation is an

Frank Holden 1917-1992 Obituary

Frank Holden, formerly of Preston, died in Stafford at the age of 75 on Friday 21st February following a series of strokes.

Dr Holden was educated at St Ignatius School and the Catholic College Preston and Skerry's College Liverpool. During his civil service career as a Land Drainage Engineer for the Ministry of Agriculture and River Gauging Engineer for the Lancashire Rivers Board, he was an active amateur astronomer, his interest in astronomy having resulted from viewing the total eclipse in Preston in 1927. He was a member of the British Astronomical Association for 49 years and a Fellow and Life member of the Royal Astronomical Society.

Fig. 8: Frank Holden at the Jeremiah Horrocks Observatory c.1940

He was Honorary Assistant and Demonstrator at the Jeremiah Horrocks Observatory, Preston, (1938-1956) and Honorary Secretary of Preston and District Astronomical Society, of which he was a founder, from 1945-1955. He also lectured in *Astronomy* for Workers Educational Extension Courses, North West Region (1952-1958). Throughout his life he encouraged others to take an interest in Astronomy. In 1956, having been awarded a UK State (Mature Student) grant, Holden attended the University of Manchester as a graduate student and received his M.Sc. degree in 1959 with a thesis on *Interferometric Observation in Double Star Astronomy*. The observational work for the thesis was carried out at the Royal Greenwich Observatory and the Pic du Midi in the French Pyrenees.

Dr Holden left Preston with his family in August 1959 to work in Pennsylvania where he taught at Swarthmore College. His teaching duties there and at the Drexel Institute, Philadelphia, did not prevent him carrying out research at Sproul Observatory. Later he continued his double star observations at Lowell Observatory, Flagstaff, Arizona, before being appointed Astronomer in charge of the University of Michigan's Lamont-Hussey Observatory in Bloemfontein, South Africa in 1962.

The 27-inch refractor, which in Rossiter's hands had made such a major contribution to our knowledge of visual double stars in the southern hemisphere, had been idle since Rossiter retired in 1952. Holden not only restored it to working condition but left the telescope in better repair than it had been when originally installed. More importantly he made an invaluable contribution to the completion of the second epoch observations of the close pairs discovered by Rossiter. Unfortunately in 1972 the University of Michigan decided to close the Observatory ostensibly for reasons of retrenchment and an opportunity was lost really to build on earlier work. With the subsequent closure of the Republic Observatory of Johannesburg research into southern visual double stars came to a virtual halt.

Holden transferred to California and became a guest investigator at Lick Observatory using the 12-inch and 36-inch refractors and he was a Visiting Observer at Mount Wilson in 1974. He made several trips to Cerro Tololo and Las Campanas in Chile between 1974 and 1977. This brought his total number of micrometer measures to over 10000 and the WDS lists some 48 discoveries to his name. He retired from active astronomy in 1979 and returned to England to live in Stafford. During his retirement he paid visits to the astronomical observatories at Pulkovo and that of Ulugh Begh in Samarkand.

While in South Africa Holden Served on the National Committee between 1964 – 1971. He was a member of IAU Commission 26, He joined the British Astronomical Association on 26th February 1941 and was elected a Fellow of the Royal Astronomical Society on 12th October 1945. He is survived by his wife Dorothy (née Whittle), daughter Dr Christine Holden of Lewiston, Maine, USA and son Bernard and family of Haddenham, Bucks; a younger son, Edmund, died in South Africa in 1970.

Dr Robert W Argyle.

agency of the Federal Government and was established to advance scientific progress in the United States. AURA has 12 members, all Universities with strong research and graduate training programmes in astronomy. They also operate Kitt Peak National Observatory in Arizona. Both of these observatories allocate 60% of their telescope time to qualified visiting astronomers from all over the world. Selection of users is based upon the merit of the research programmes proposed.

My individual proposal to use the telescope at Cerro Tololo for double star measures was approved and I first went there in 1974. The Observatory is near the southern edge of the Atacama Desert at 2400 meters altitude and a latitude of 30 degrees. Its administration is located in the coastal town of La Serena, some 460 km north of Chile's capital city of Santiago. The observing facilities are 60 km east of La Serena, on a peak of the Andes named after a local Indian and called Tololo. Cerro is Spanish for hill and these words jointly give the name of the observatory, Cerro Tololo. It is inter-American in title and fact because Chile has assisted in levelling the top of the mountain, in making roads, in establishing the telescopes and in sending graduate students from the University of Chile to work at the Observatory. In addition, astronomers from Argentina and other South American countries came to use the telescopes on Tololo.

The instruments owned by Cerro Tololo Observatory were six in number at the time of my visits. They were all reflectors; the largest was the four meter (158-inch) aperture, then newly completed and undergoing tests. The other telescopes had been on the mountain for several years and had done good work. To operate this impressive cluster of telescopes there were 8 resident astronomers and about 100 supporting staff. In addition there were scores of visiting astronomers who came at various times of the year.

The Final Years

In 1979 Frank retired and returned to the UK, living in Stafford. On his return he became a founder member of Stafford Astronomical Society, revisiting Preston occasionally to visit friends and family. In October 1983 Frank returned to his roots at the Jeremiah Horrocks Observatory and delivered a talk to Preston and District Astronomical Society about his work at Lamont-Hussey Observatory. Maybe some members will remember his visit and talk. He also wrote an article for the society Journal *Cosmos*, published in 1984 with the title *Under Southern Skies*: a copy is located in PADAS *Cosmos* Archive.

ACKNOWLEDGMENTS

The author thanks: Dr Robert Argyle, Director of the Webb Society, for donating an archive of Frank Holden's photographs and articles; Dawid Van Jaarsveldt UFS, Naval Hill and Boyden Observatory, South Africa, for providing Historical Archives. Photographs from Lamont-Hussey Observatory, South Africa.

THE COMET AT YELL'HAM

by Thomas Hardy

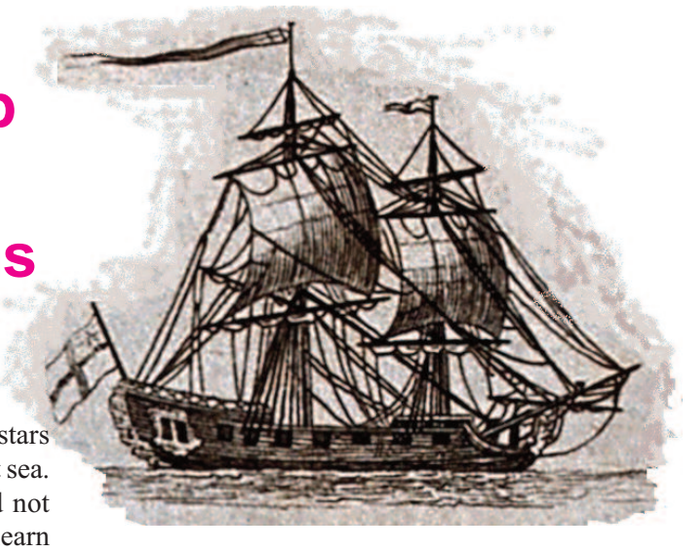
It bends far over Yell'ham Plain,
And we, from Yell'ham Height,
Stand and regard its fiery train,
So soon to swim from sight.

It will return long years hence, when
As now its strange swift shine
Will fall on Yell'ham; but not then
On that sweet form of thine.

This romantic poem of Hardy was inspired, he said, by 'the comet of 1858'. There have been conflicting views about which comet this was (there were two significant apparitions that year). Since he said that the description was 'true' to his observation of it, the consensus is that this was Donati's Comet. Due to its extraordinary orbital ellipticity, it is estimated that this comet will not be seen passing by Earth again until sometime after 4000.

Donati's Comet, 5 Oct 1858
(*The Heavens, *A. Guillemin, 1883, 254)

Rhymes from the age of sail to help remember stars and constellations



by Rob Peeling

Centuries ago, a good knowledge of the stars was essential for successful navigation at sea. Star atlases and globes were expensive and not available to young mariners just starting to learn their profession. These boys could only have learned the principal navigational stars by being shown them by their more experienced seniors. They would also need a way of remembering what they had been shown, to help them find the stars again.

Fig.1: William Henry Smyth

Simple memory rhymes are the obvious answer, but few traces of these exist. Eighteenth- and nineteenth-century navigational texts aimed at training navigators make no mention of such mnemonics, and do not provide star charts either. Prior knowledge of the stars seems to have been assumed.

It is also perhaps surprising not to find any mention of memory aids for naming the stars in the prolific literature about the age of sail. Even nautical novels such as those by Patrick O'Brian, who wrote a famous series about Captain Jack Aubrey of the Royal Navy, make no mention of such aids even though Jack spends much time at sea teaching the youngsters under his command.[1] We can only assume that these rhymes were so well-known, and so obvious, that nobody saw the need to record them in writing.

The one place such rhymes do appear is in Captain William Henry Smyth's Cycle of Celestial Objects (1844). In Volume II, known as the Bedford Catalogue, Smyth quotes what he terms 'brackish rhymes' or 'galley rhymes' associated with various stars and star groups.[2]

Smyth himself could have learned rhymes like this in his teens, during his early naval career. The rhymes in the Bedford Catalogue include too many stars to suggest that they were required knowledge on land, but a wide selection of stars to cover all seasons and to deal with partly clouded skies would make sense at sea.

Many of Smyth's rhymes seem too erudite to be of naval origin, and it is possible that he was his own 'salt-water poet' in these cases.[3] Smyth certainly wrote poetry, as evidenced by his Farewell to the Double Star Gamma Virginis published in his Speculum Hartwellianum.[4]

I have found similar rhymes in only one other place, a book of poems and songs by Samuel Lyons, a Belfast schoolmaster, published in 1817, 27 years before Smyth's Bedford Catalogue. Lyons called the rhymes an 'Excursion through the Starry Heavens'.[5] He gave no source for the

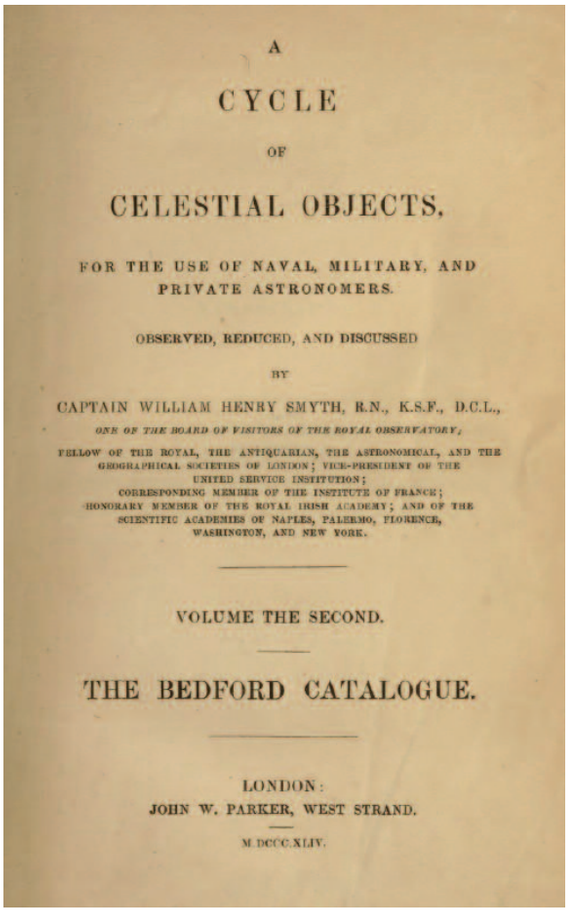
rhymes but stated that he had never seen them in print, which supports the idea that they come from an oral tradition.

There is a strong family resemblance between the two sets of verses by Lyons and Smyth. Some verses are identical and others very similar.[6] Yet, while they clearly share a common origin, they are distinct, using different routes and guides to find some of the stars. The stars covered are not quite the same either.

Both versions use Bayer letters to identify stars as well as proper names. This imposes an earliest possible date for the rhymes' origin of 1603, when Bayer published his Uranometria. Indeed, such rhymes were probably not needed for training navigators before this.

We can speculate that Smyth learned rhymes like these on the deck of a ship sometime between 1803 and 1811. By then he was rated Master's Mate and would have been reasonably proficient at navigation.[7]

It would be interesting to know if any more relics of these important teaching aids exist, particularly from other nations such as France, the Netherlands, Spain, and Portugal, all of which would have had a similar need to teach young men the stars while learning to become navigators.



A

CYCLE

OF

CELESTIAL OBJECTS.

FOR THE USE OF NAVAL, MILITARY, AND PRIVATE ASTRONOMERS.

OBSERVED, REDUCED, AND DISCUSSED

BY

CAPTAIN WILLIAM HENRY SMYTH, R.N., K.S.F., D.C.L.,

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CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE;
HONORARY MEMBER OF THE ROYAL IRISH ACADEMY; AND OF THE SCIENTIFIC ACADEMIES OF NAPLES, PALERMO, FLORENCE, WASHINGTON, AND NEW YORK.

VOLUME THE SECOND.

THE BEDFORD CATALOGUE.

LONDON:
JOHN W. PARKER, WEST STRAND.
M.DCCC.XLIV.

Fig.2: Cycle of Celestial Objects (image: Hathi Trust)

What are these rhymes like? They are certainly not fine art. True to their original purpose, they employ a simple four-line rhyme scheme to help with learning by rote, and provide an intriguing insight into Britain's maritime past.

On the following pages are the rhymes as recorded by W. H. Smyth in the Bedford Catalogue of 1844. The number in the left-hand column is the object number in Smyth's catalogue, followed by the Bayer designation and the popular name as approved by the IAU; note that Smyth's spellings of names sometimes differ from the modern versions.

REFERENCES AND NOTES

[1] See, for example, the first of the series, *Master and Commander* (London, Collins, 1970).

[2] Smyth, W. H., *A Cycle of Celestial Objects*, Volume 2 (London, J. W. Parker, 1844).

[3] Hunt, George, *Astronomical Register*, 5 (1867), p. 136.

[4] Smyth, W. H., *The Cycle of Celestial Objects Continued at the Hartwell Observatory to 1859* (Speculum Hartwellianum), (London, John Bowyer Nichols and Sons, 1860), 453–460.

[5] Lyons, Samuel, *Pieces of Original Poetry, National, Descriptive and amusive; with a few Songs*, (Belfast, privately published, 1817), 48–54. Online at https://books.google.co.uk/books?id=akV-gAAAAcAAJ

[6] Compare, for example, Smyth's rhyme for Rigel in the accompanying table (star #190) with Lyons's version:

> 'With brilliant gems his belt, his sword,
> His broad spread shoulders blaze:
> While radiant Rigell [sic] at his feet
> Pours forth its silver rays.'

[7] Marshall, John, *Royal Naval Biography*, Volume 3, Part 1, (Longman, Rees, Orme, Brown and Green, London, 1831), p. 142.

[8] Smyth is here referring to the Arabic lunar mansion Iklil al Jabhah of which this star was part. Iklil is now the IAU name for Rho Scorpii.

[9] Alcides was an alternative name for the young Hercules.

[10] Amorphotæ were 'unformed' stars not belonging to any constellation.

[11] Piscis Notius was an old alternative name for Piscis Austrinus.

1 **Alpha Andromedae** **Alpheratz**	And on, from where the pinion'd maid, Her cruel fate attends, Wide o'er the heavens his fabled form Wing'd Pegasus extends.	From Alpherat [sic] down to Markab's beams, Let a cross line be sent, Then will four stars, upon the horse, A spacious square present.
2 **Beta Cassiopeiae** **Caph**	In yonder stars, which form a Cross, lo, Caph precedes the whole,	A Cross more glorious than that which decks the austral pole.
20 **Alpha Cassiopeiae** **Schedar**	From alpha Ceti, to the east of Al'mak, towering rise,	You'll mark on Cassiopea's breast, where Shedir decks the skies.
43 **Beta Andromedae** **Mirach**	From Markab run a line beneath th' imprison'd Lady's head,	And over delta on her back to Mirach 'twill be led.
44 **Alpha Ursae Minoris** **Polaris**	The ever watchful Kokab guards while Dubhe points the Pole;	The Pole at rest, sees Heaven's bright host unwearied round him roll.
85 **Alpha Arietis** **Hamal**	From Ras Mothallath shoot a ray, in a south-following line, And where expand huge Cetus' jaws, to gamma let it join;	One-fourth the distance thus express'd from Triangle to Whale, (If thus can such odd fish be termed,) will strike upon Hamal.
125 **Alpha Ceti** **Menkar**	To know the bright star in the Whale, the lower jaw which decks, From fair Capella send a glance through Pleiad's beauteous specks;	And bear in mind this cluster fine, so admirably seen, From Cetus' head to th' Charioteer lies just half-way between.
183 **Beta Eridani** **Cursa**	Where Rigel shows the Hero's foot, north-westerly – not far –	Against his leg in glory shines the River's second star
186 **Alpha Aurigae** **Capella**	From Rigel rise, and lead a line, through Bellatrix's light, Pass Nath, upon the Bull's north horn, and gain Capella's height –	Where a large triangle is form'd (isosceles it seems), When beta is with delta join'd to lustrous alpha's beams.
190 **Beta Orionis** **Rigel**	With glittering gems Orion's belt, his sword, his shoulders, blaze;	While radiant Rigel on his foot pours forth its silver rays.
199 **Beta Tauri** **Elnath**	From centre of Orion's belt to where Capella's seen,	Will point to the observant eye Nath in mid-way between.

200 **Gamma Orionis** **Bellatrix**	From Bellatrix now pass a line, to Betelgeuze the red,	And, to the north, three little stars will mark Orion's head.
211 **Delta Orionis** **Mintaka**	In the blue vast, Orion's Belt shines with its bullions three,	And of those bright conspicuous gems the first as delta see.
213 **Alpha Leporis** **Arneb**	Orion's image, on the south, has four stars – small but fair;	Their figure quadrilateral points out the timid Hare.
219 **Epsilon Orionis** **Alnilam**	Our Lady's wand is bless'd by all who watch those gems on high,	And centre of that brilliant zone epsilon meets the eye.
232 **Beta Aurigae** **Menkalinan**	From the Pole-star direct a glance, with Betelgeuze to mix, About mid-distance, near the Goat, Menkalinan you'll fix:	And there behold how neat it forms with Capra bright a base, While delta as a vertex stands, the triangle to grace.
246 **Beta Canis Majoris** **Mirzam**	Where Sirius blazes in the south, and leaves the ship behind,	Look west-south-west, just four degrees, and beta there you'll find.
262 **Alpha Canis Majoris** **Sirius**	Let Procyon join with Betelgeuze, and pass a line afar, To reach the point where Sirius glows – the most conspicuous star;	Then will the eye delighted view a figure fine and vast, Its span is equilateral, triangular its cast.
292 **Alpha Geminorum** **Castor**	From gamma on the Great Bear's flank let a long ray be cast, Conduct it under Merak's blaze to south-west regions vast;	Across the Lynx to Gemini this line will thus be led, And carried further on will reach bright Betelgeuze the red.
298 **Alpha Canis Minoris** **Procyon**	Orion's belt from Taurus' eye, leads down to Sirius bright,	His spreading shoulders guide you east, 'bove Procyon's pleasing light.
305 **Beta Geminorum** **Pollux**	If Betelgeuze and Procyon with Pollux bright be cast, Amid the glories of the sky, shines a triangle vast;	To gauge with practised studious eye the form that shines afar The angle of twice forty-five, shows 'tis rectangular.
356 **Alpha Hydrae** **Alphard**	Thro' Cancer's sign, whence no bright stars distinguish'd light impart,	Pollux from Castor leads you down to hideous Hydra's heart.

374 **Alpha Leonis** **Regulus**	From Hydra's pass through Leo's heart, (which marks th' Ecliptic Line,)	You'll rise to where, in Ursa Great, the third and fourth stars shine.
395 **Alpha Ursae Majoris** **Dubhe**	Where yonder radiant hosts adorn the northern evening sky, Seven stars, a splendid glorious train, first fix the wand'ring eye.	To deck great Ursa's shaggy form, those brilliant orbs combine; And where the first and second point, there see Polaris shine.
425 **Beta Leonis** **Denebola**	From Deneb, in the Lion's tail, to Spica draw a line	Then will these two with Arcturus a bright triangle shine.
449 **Beta Corvi** **Kraz**	Mark in the space along the sky, where Hydra's volumes are,	And 'twixt the Cup and Virgin's spike, you'll find the Raven's square.
466 **Alpha Canum Venaticorum** **Cor Caroli**	When clear aloft, Boötes seek, his brilliance leads the gaze, And on each side its glitt'ring gems the spacious arch displays;	Arcturus east to Wega join, the Northern Crown you'll spy; But west, to Ursa's second star, he marks Cor Caroli.
469 **Epsilon Virginis** **Vindemiatrix**	Would you the star of Bacchus find, on noble Virgo's wing, A lengthy ray from Hydra's heart unto Arcturus bring;	Two-thirds along that fancied line, direct th' inquiring eye, And there the jewel will be seen south of Cor Caroli.
479 **Alpha Virginis** **Spica**	From the Pole-star through Mizar glide with long and rapid flight Descend, and see the Virgin's spike diffuse its vernal light, And mark what glorious forms are made by the gold harvest's ears,	With Deneb west, Arcturus north, a triangle appears; While to the east a larger still, th' observant eye will start, From Virgo's spike to Gemma bright, and thence to Scorpio's heart.
504 **Alpha Draconis** **Thuban**	Though long the captain of the stars, which Draco's body grace,	Thuban has given up the pas, and beta's in the place.
506 **Alpha Boötis** **Arcturus**	From staid Polaris cast a glance, to beauteous Lyra's lines, 'Twill guide, rectangular from these, to where Arcturus shines:	Or lead a line from two bright stars, in Ursa's tail the last, The same prolonged thrice ten degrees, will on that gem be cast.
521 **Alpha Librae** **Zubenelgenubi**	Where yon gaunt Bear disports a tail, seek Alkaid at its tip, – From thence a ray athwart the space to south-south-east must dip;	And when Arcturus has been pass'd, prolong th' imagined line, 'Twill mark a star, as far again, the first in Libra's sign.

526 **Beta Ursae Minoris** **Kochab**	Kocab, one bright, and two faint stars, grace Lesser Ursa's side,	In oblong square; trace her bent tail, and to the Pole you'll glide.
536 **Beta Librae** **Zubeneschamali**	Two stars from Scorpio's heart, will form a westward rising line,	This Scorpio's second star, and that the same in Libra's sign.
548 **Alpha Coronae Borealis** **Alphecca**	From epsilon in Virgo's side Arcturus seek, and stem, And just as far again you'll spy Corona's beauteous gem:	There no mistake can well befal [sic] e'en him who little knows, For bright and circular the Crown conspicuously glows.
552 **Alpha Serpentis** **Unukalhai**	To strike th' insidious Serpent's heart, a line from Altair wield, From thence below Ras Alague, across th' Arabian Field;	And when as far again you've reached, as those two stars may be, The middle one of three fair gems, Serpentis Cor you'll see.
559 **Beta Scorpii** **Acrab**	From Virgo's spike to east-south-east, direct th' inquiring eye;	You'll pass between the Scale's bright stars to where Iklil doth lie.[8]
574 **Alpha Scorpii** **Antares**	Through Ras Alague, Wega's beams direct th' inquiring eye,	Where Scorpio's heart, Antares, decks the southern summer sky.
578 **Beta Herculis** **Kornephoros**	Where in the heav'ns they strangely paint Alcides on his knees,[9] His beta should you wish to find, adopt such rules as these:	Bright Gemma and Rasalgeti mark beta in mid-way, And far to the north of Scorpio's heart does Kornefóros stay.
601 **Eta Ophiuchi** **Sabik**	From Scorpio's deadly heart to trace the Serpent-bearer's knee,	Look for the Eagle's tail, and then one third that way 'twill be.
605 **Alpha Herculis** **Rasalgethi**	Amid yon glorious starry host, that feeds both sight and mind, Would you the Serpent-bearer's head, and that of Herc'les find,	From Altair west direct a ray to where Arcturus glows, One-third that distance, by the eye, will both those heads disclose.
616 **Beta Draconis** **Rastaban**	From Alkaid on the Great Bear's tail, to Cygnus cast your eye;	Midway between the Bird and Beast the Dragon's head you'll spy.
619 **Alpha Ophiuchi** **Rasalhague**	From Altair let a ray be cast, where we Arcturus view,	One-third that distance will reveal the star Ras-al-hague.
629 **Gamma Draconis** **Eltanin**	A line from Dubhe, in the Bear, sent right the Guards between, The stars which form the Dragon's tail in midway will be seen.	Far to the east the body winds, where Lyra's lustres glow, A ray from Wega to the Pole, its lozenge-head will show.
639 **Mu Sagittarii** **Polis**	From Deneb in the stately Swan describe a line south-west,	Through bright Altair in Aquila 'twill strike the Archer's beast.

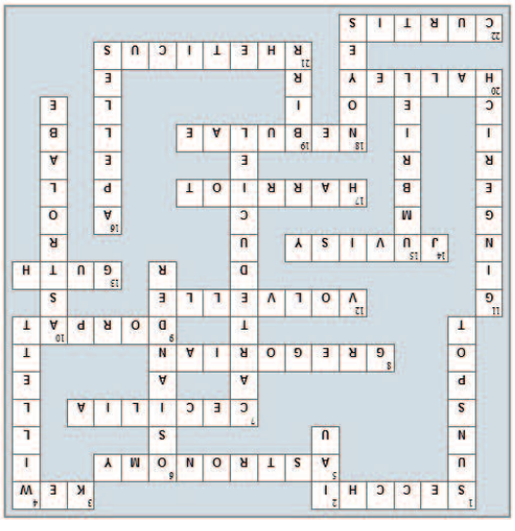
655 **Alpha Lyrae** **Vega**	Altair in Aquila that flames, and Wega's lucid light, To Rasalague westward join'd, form a triangle bright.	Of which the apex to the north, the Lyre pertains unto, A truly noble point it forms, a gem of sapphire blue.
666 **Beta Lyrae** **Sheliak**	Along the line from Wega down, near six degrees in space,	Tow'rds Altair, in the Eagle's neck, you'll pitch on Sheliak's place.
720 **Alpha Aquilae** **Altair**	In Via Lactea's beauteous stream beneath the Swan and Lyre, See where Jove's Eagle soars on high, the type of strength and fire;	And mark the triangle in which his lucida partakes, Which form, if join'd with Deneb's beams and Wega bright, it makes.
740 **Alpha Capricorni** **Algedi**	A startling monster's hybrid form your eyes will there assail, That sign so often dubb'd the Goat, yet with a fish's tail;	And though its figure is not large, it brightly still doth glow, Its stars within the outline placed, no *amorphotæ* know.[10]
758 **Alpha Delphini** **Sualocin**	To heaven's grand arch from deepest seas, behold the Dolphin rise, The grace, as old Manilius saith, of ocean and the skies:	'Tis placed between that space wherein the Eagle's wings are spread, And those few stars unto the east which mark the Horse's head.
760 **Alpha Cygni,** **Deneb**	From the wing's tip, Alpheras through, now skim aslant the skies, And lo! bedeck'd with glorious stars, the soaring Cygnus flies:	Or, from the westward should you wish the same to gaze upon, Arcturus, Gemma, Wega, join to lead you to the Swan.
780 **Delta Equulei**	When Pegasus within our view, his spacious square doth spread,	Midway from Markab to Altair you'll find the Horse's head.
783 **Alpha Cephei** **Alderamin**	Near to his wife and daughter see aloft where Cepheus shines. That wife, the Little Bear, and Swan, with Draco bound his lines; Beneath Polaris, twelve degrees, two stars the eye will meet, Gamma, the nomade shepherd's gem, and kappa, mark his feet;	Alphirk, the Hindu's Kalpeny, points out the Monarch's waist, While Alderamin, beaming bright, is on the shoulder placed: And where o'er regions rich and vast, the Via Lactea's led, Three stars, of magnitude the fourth, adorn the Æthiop's head.
794 **Epsilon Pegasi** **Enif**	Where Alpherat so brightly decks the captive Lady's head, Across yon square project a ray, (south-west it must be led,)	And pass between the two first stars, so nearly north and south; Extend beyond, twice ten degrees, and reach the Horse's mouth.
801 **Alpha Aquarii** **Sadalmelik**	From Scorpio, to where Aries shines, you catch no brilliant ray, Through twice two interjacent signs, to mark your trackless way; Yet would you know where, from his urn Aquarius pours the stream,	From fair Andromeda descend, o'er Markab's friendly beam. Or from bright Wega cast your glance, and through the Dolphin's space, Then just as far again you'll find, the Water-bearer's place.
824 **Alpha Piscis Austrini** **Fomalhaut**	He who would trace where dimly seen the austral Fish doth glide, Must start from Scheat, and through Markab his occult line will guide: When forty-five degrees thus pass'd, conduct him to the south,	There dazzling Fomalhaut he'll find, in Piscis notius' mouth.[11] When there, south-eastward cast the eye – how glorious! how fine! Achernar with Canopus bright and Fom'lhaut form a line.

827 **Alpha Pegasi** **Markab**	A line athwart this spacious square to north-west, shows the Swan, Transverse to that a north-east ray, points Perseus upon;	And on that way two beauteous stars divide the space between, In equal portions, from Mirak to where Al'mak is seen.
842 **Gamma Cephei** **Errai**	The Pointers of the Greater Bear the Pole-star notify, That barrier cross, and soon the stars of Cepheus meet the eye;	Just twelve degrees prolong that line tow'rds Via Lactea's host, And there bright Gamma will be seen, the Arab shepherd's boast.

About the author

Robert Peeling is a chemical engineer with a life-long interest in astronomy. He is a member of Reading and Abingdon Astronomical Society and a visual deep-sky observer. He wrote about W. H. Smyth's telescopes in Issue 14 of *The Antiquarian Astronomer* (2020 June).

Crossword answers (see p.40)



Quiz answers (see inside back cover)

ANSWERS for AC-6 – SHA *Bulletin* 33 Spring 2020 p. 46 – by Paul Haley [E: pahastro@aol.com]

1) Argelander, Beer, Amici, Arago, Mitchell, Mädler, Bond and Quetelet.
   Observatories are: Madras / Helsingfors / Pulkowa / and Åbo.
2) Arago was twice imprisoned as an enemy spy.
3) The 1827 great fire of Åbo (Turku, Finland today) destroyed ¾ of the city.
4) Mädler coined the word 'photography'.
5) Argelander set up both Åbo & Helsingfors – both in Russia / Finland.
6) Airy purchased a double-image micrometer from Amici in Modena.
7) Quetelet (statistician) / Mädler (calligrapher) / Arago & Beer (politicians) / Beer (railway investor) / Arago (lecturer) / Beer & Mitchell (bankers) / Amici (microscopist) / Bond (horologist).

Top Row:
Madras observatory (1838) – India [B30]
F W A Argelander (1799-1875) – Åbo [C55]
W W Beer (1797-1850) – Berlin [C36]
G B Amici (1786-1863) – Modena [C40]
Middle Row:
Helsingfors observatory – Russia [D17]
D F J Arago (1786-1853) – Paris [B9]
Pulkowa observatory (1845) – Russia [D18]
Bottom Row:
Vartiovuori observatory, Åbo [C55]
W Mitchell (1791-1869) – Nantucket [D23]
J H Mädler (1794-1874) – Berlin [C36]
W C Bond (1789-1859) – Boston [C65]
A Quetelet (1796-1874) – Brussels [C59]

ANSWERS for AC-7 – SHA *Bulletin* 34 Winter 2020 – by Paul Haley [E: pahastro@aol.com]

1) Repsold, Trechsel, Scarpellini, Lamont and Soldner were the 5 pioneers.
   Observatories were in: Munich, Rome, Hamburg, Madrid, Islington and Bern.
2) Soldner predicted that light could be diverted by gravitational forces (1804).
3) Scarpellini saw the 1866 Leonids in Rome and made the first Italian meteor catalogue.
4) Alexander Aubert observed from Highbury House, Islington, London.
5) Trechsel linked his geodesy and cartography work to Bern observatory in Switzerland.
6) Madrid observatory purchased a 24-inch f/12 Herschel reflector for £3150.
7) Schröter began the 'celestial police' (Lilienthal), hunting asteroids with Harding & Bessel.
8) Lamont used 11-inch refractor for 2 dozen stellar spectra but did not develop the work.
9) Lamont was born near Braemar and retained his Scottish accent.
10) Scarpellini discovered a comet in 1854.
11) Repsold (fire-fighter & instrument-maker) / Soldner (mathematician) / Scarpellini (meteorologist & editor) / Trechsel (cartographer)

Top Row:
Bogenhausen observatory, Munich [B18]
Campidiglio observatory, Rome [C43]
Millerntor observatory, Hamburg [C33]
Second Row:
Johann Georg Repsold (1770-1830) [C33]
Johann Friedrich Trechsel (1770-1849) [C56]
Madrid observatory [B27]
Caterina Scarpellini (1808-73) Rome [C43]
Third Row:
Lilienthal observatory [B12]
Highbury House observatory [A9]
Bern observatory [C56]
Bottom Row:
John Lamont (1805-79) – Munich [B18]
Repsold universal instrument (1863) [B18]
Johann Georg von Soldner (1776-1833) [B18]
11.2-inch f/18 Merz equatorial (1835) [B18]

Book Review

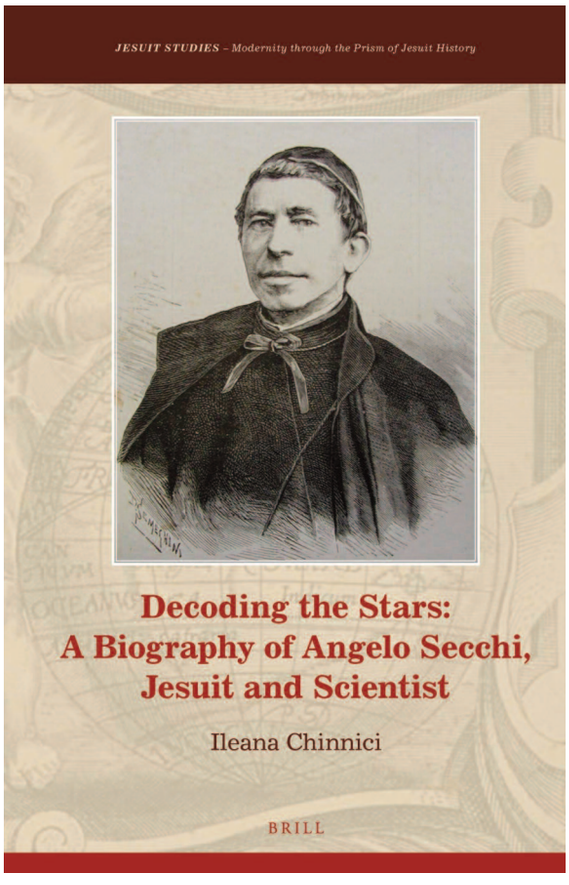
Decoding the Stars: A Biography of Angelo Secchi, Jesuit and Scientist

by Ileana Chinnici

Reviewed by Kevin Johnson

Decoding the Stars: A Biography of Angelo Secchi, Jesuit and Scientist, by Ileana Chinnici (Brill), Jul 2020, pp.412 (hardback, £135.72), ISBN 9789004387294

History can be cruel to the memory of people who enjoyed great fame in their own lifetime, but are now forgotten and neglected. In Britain this fate has befallen John Herschel, while the name of the Jesuit scientist and pioneer of astrophysics Angelo Secchi, is very much overlooked and forgotten in his native Italy.



Accounts of the early years of the New Astronomy, now known as astrophysics, do credit Secchi's contributions, but tend to be overshadowed by the work of contemporaries, such as William Huggins, Norman Lockyer and C.A. Young in America. This is particularly the case for historic narratives, written in English, by contemporaries such Agnes Clerke. Such neglect is now being addressed by a new scholarly biography following the 150th anniversary of his birth. It outlines his career,achievements and the controversy he courted, and highlights his complex and contradictory personality that made him enemies, yet allowed him to rationalise science with his religious faith. The new biography, the first in English, also corrects mistakes that have crept into the current literature, often from sources that are partisan and unreliable.

To understand why Secchi's life and works have been neglected for so long, you have to look at the turbulent times he lived in, a period in which the modern Italian state was created, a process that dispossessed the papacy of its power and lands in Italy. Also, by the end of the 19th century the centre of astrophysics had moved from Europe to America where new mountain-top observatories were been established by new pioneers such as George Ellery Hale. It is ironic that Secchi's name is better known in the English speaking world due to the tribute that Hale and others placed on him. The new biography by Ilena Chinnici tackles the subject using mostly Secchi's own words to explore the ideas and thoughts of this complex individual. The author is careful to avoid it becoming a hagiographic account and autobiography that simply canonises Secchi without critical analysis. It does not claim to be encyclopaedic in its scope or comprehensive regarding his scientific achievements or techniques. These are areas that have been tackled elsewhere and can be followed using the very detailed bibliography provided. The biography aims to give the reader a non-technical, but well-rounded account of Secchi's life, achievements and the milieu around him.

The work is chronological starting with Secchi's early life, education and his entry into the Jesuit brotherhood. It details his childhood in Reggio, initial education at the local Jesuit College and his enrolment into a religious life before studying at

the prestigious Collegio Romano. It corrects much of the inaccurate details of his early life that has persisted in the literature right up to the present. It was during his first time in Rome that Secchi took up scientific studies, this continuing when he became a teacher at Illirico College, Loreto before returning to Rome. Here he started his theological training, being ordained in 1847, just before Europe was shaken by the uprisings of 1848. Italy was convulsed with revolution and war resulting in the establishment of the first Italian republic. The pope left Rome along with the Jesuits who were seen as mendacious and power-hungry by the new government. Secchi and fellow brothers left Italy, first arriving at Stonyhurst College, England before going to Georgetown College, Washington. It was during his two year stay in America that his interest in astronomy first developed having met many of its significant scientists and visited the US Naval Observatory. His America stay was cut short by the collapse of the Italian republic after the French invaded and occupied Rome allowing Jesuits to return to Italy.

The following chapters of this work deal with Secchi appointment as astronomer to the Collegio Romano Observatory after the death of his predecessor Francesco Vico. It outlines his refurbishment of its instrumentation and transfer to the roof of the church of St Ignatius. The source of funding and programme of work undertaken is also explored to focus on how Secchi raised the profile and status of the Italian observatory. Secchi's other activities, such as his interest in telegraphy applied to recording observations, are noted along with work on geodesy. These sections analyse his initial observing projects on the Moon and Mars using the newly installed Merz 20-cm refractor. Later his work on solar observation and the application of the spectroscope to both the Sun and the stellar domain is explored. The biography describes how Secchi's growing profile allowed him to build new networks in the international world. It then shows how his rising reputation led to criticism from both fellow Italian and foreign astronomers. His disagreements with Huggins are noted, and more seriously, his disputes with Norman Lockyer over scientific questions and observations are explored. His clash with the latter was unfortunate as Lockyer edited the prestigious journal Nature and could hinder the circulation of his work and ideas - Secchi only published in French and Italian.

The later chapters of the biography deal with the controversies that accompanied Secchi throughout his career. It examines his disputes with fellow Italian astronomers, who questioned his religious beliefs in relation to rational science and others who accused him of plagiarism or not properly acknowledging the works of others. Secchi clearly had no issues with reconciling his religion with rational science and did his best to steer a neutral path with the ultra-conservatives in his own church and scientific zealots who had no place for God or creation in their world-view. Readers will need to judge for themselves whether the latter criticism is valid, or if he has been ill-judged by history. The final chapter deals with Secchi's last illness and premature death from cancer, which must have been hastened by the turmoil of his final years. These centre on the complete unification of Italy in 1870 and the final demise of the Papal States that left Secchi and his observatory in limbo. Secchi's fame was such that new Italian government was prepared to recognise his status and offered him a new post. However, he could not reconcile his loyalty to the Catholic Church and the new regime in Italy. To accept the new status quo would have invited claims of treachery from his Jesuit bothers. Rather than accept the new position he resigned, a process that started his slide into obscurity. The only memorials to Secchi are to be found in his native Reggio, contemporary attempts to raise monuments to his memory having floundered over time.

Any serious historian of astrophysics should consider acquiring this excellent new biography despite its high price, intended for the academic market. That aside it should find a place in all proper academic or society libraries that cater for history of science or astronomy. It is a much overdue work that will hopefully rediscover a forgotten pioneer of astrophysics that has been ignored for far too long in the county of his birth.

HOROLOGIUM
A timely tale of careless copying

by Ian Ridpath

Richard H. Allen's classic book *Star Names, Their Lore and Meaning*[1] is an entertaining storehouse of information on the history and mythology of the constellations, although historians have long known to treat it with caution. Allen is particularly weak on the more modern constellations, i.e. those invented from the late 16th century onwards, but that is understandable as he did not have the benefit of recent research or the luxury of online access to scans of antique books as we do today.

Neither did I have those benefits when I wrote the first edition of my book *Star Tales* in 1988.[2] That edition was mostly devoted to the mythology of the ancient constellations that have come down to us through classical sources. Since then I have compiled much additional material on the origin and history of the modern constellations which Allen's book lacked.[3]

One such example is Horologium, the pendulum clock. This faint southern constellation was among 14 new figures commemorating the arts and sciences that were invented by the French astronomer Nicolas Louis de Lacaille (1713–62) after his expedition to the Cape of Good Hope in 1751–2 to survey the southern skies.

While researching the history of the southern constellations I have lost count of the number of web pages and books which claim that: (a) Lacaille originally called this constellation Horologium Oscillitorium; and (b) he created it in honour of Christiaan Huygens, inventor of the pendulum clock. No reference for these statements is given, and evidently the authors who quote them have not bothered to check for themselves. Had they done so they would have found that both of the above statements are wrong, which is what has inspired this brief paper.

So where did these misconceptions come from? In this case it is not from R. H. Allen's book but something much more recent. Perhaps unsurprisingly, the actual source is Wikipedia, and we can trace when and how the mis-statements arose.

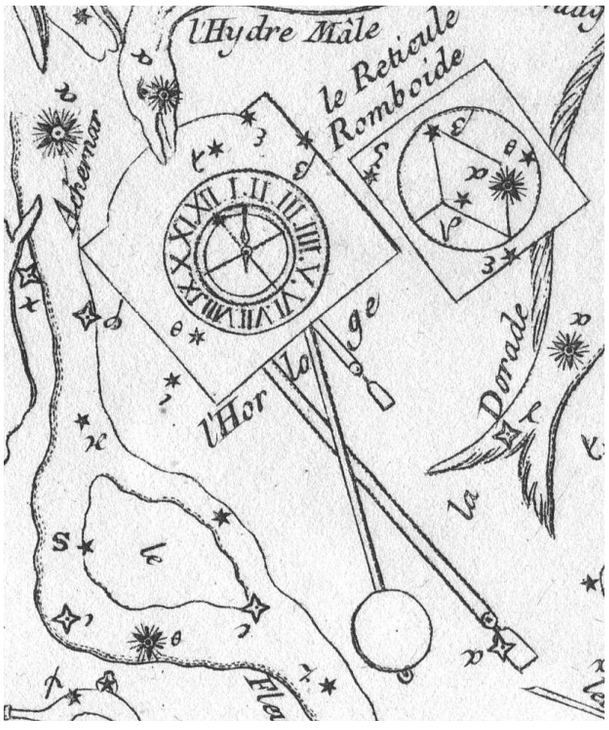


Fig. 1: On Lacaille's first chart of the southern stars, published in 1756, Horologium is labelled l'Horloge and drawn with a fully marked dial as well as a pendulum and driving weights, a remarkable feat of imagination for a sparse scattering of stars of fourth magnitude and fainter. Hydrus (here called l'Hydre Mâle) is to the top, Dorado to the right, and the river Eridanus to the left.

One of Wikipedia's strengths is that every entry has an archive of all changes made, no matter how small, right back to the article's creation. Thus we find that the Horologium entry was created on 2003 April 17 and consisted of only a single unremarkable sentence giving the constellation's IAU designation and its approximate declination.[4] The entry remained unchanged for over six months, until November 4 that year, when an editor inserted the following: "Originally named Horologium Oscillitorium by Abbé Nicolas Louis de Lacaille, the constellation name has since been shortened to be less cumbersome. Horologium Oscillitorium was to honour the inventor of the pendulum clock, Christian Huygens."[5]

Whether these statements are the editor's own, or whether he picked them up unchecked from somewhere else, is not clear because they are unsourced (to its credit, Wikipedia is much more insistent on proper referencing these days). So what did Lacaille himself actually say about Horologium?

In 1756 Lacaille published a preliminary catalogue of 1,935 southern stars taken from his observations at the Cape of Good Hope, with an accompanying chart, in the *Mémoires* of the Académie Royal des Sciences.[6] In his explanatory text, written in French, Lacaille briefly described the 14 new constellations he had invented to fill the gaps in the southern skies. He referred to Horologium by the French name l'Horloge and described it as "à pendule & à secondes". This phrase is somewhat ambiguous. In French the term "à pendule à secondes" refers to a seconds pendulum, so the inclusion of the ampersand is probably a typo.[7] However, on the chart a seconds hand was shown on the clock face, which could also have been what he was referring to.[8] The name l'Horloge was used both in the catalogue and on his chart (Fig. 1).

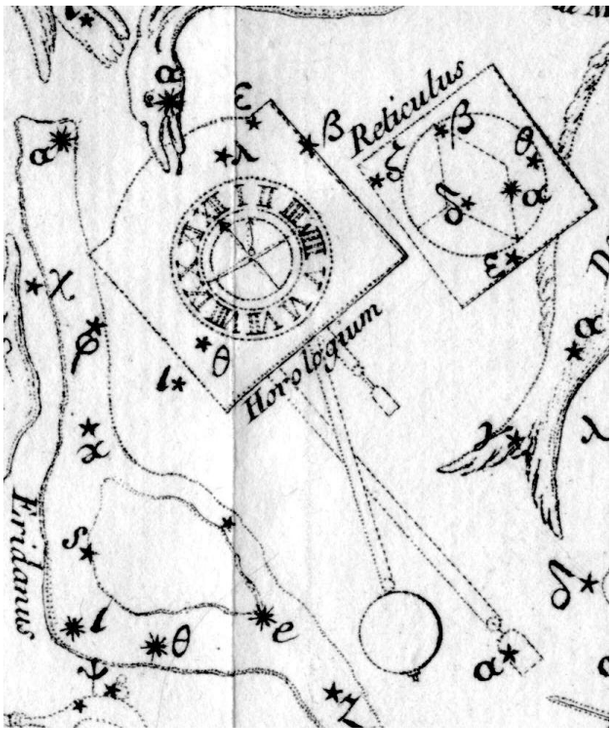


Fig. 2: Horologium on Lacaille's revised chart, published posthumously in 1763. On this version the names have been Latinized but the shapes of the constellation figures remain essentially unaltered. Here, the neighbouring Reticule Romboide has become Reticulus (now known as Reticulum).

Lacaille made no mention of Huygens. In fact, rather than to honour Huygens, Horologium was most likely intended to represent Lacaille's observatory clock beating out seconds. He placed the clock next to another of his new constellations, now known as Reticulum, which represented the diamond-shaped reticle of threads in the eyepiece of his telescope. Both the reticle and the clock were vital components for accurate timing of transits so it was only natural that they should be placed side-by-side in the sky.[9]

A second and expanded version of Lacaille's catalogue, containing 1,942 stars, was published posthumously in 1763.[10] In this version, which also came with a chart, the names of the constellations were Latinized. l'Horloge became Horologium, the name by which we still know it today (Fig. 2).

The suggestion that Lacaille originally called the constellation Horologium Oscillitorium probably comes from a misreading of Allen's *Star Names*, in which he called the constellation Horologium Oscillatorium (sic) without explaining the origin of this name or even who invented it. In fact Allen had very little to say about the constellation at all.[11]

"Oscillitorium" in the Wikipedia entry is clearly a mistype for Allen's Oscillatorium. It is unclear why Allen gave the constellation a double-barrelled name, since the original single-word name was well established by the end of the 19th century when he wrote his book. Lacaille never called the constellation Horologium Oscillatorium, and the clock he used was far more advanced than the one invented by Huygens a century earlier.

These multiple errors were finally corrected by a Wikipedia editor working under the name Casliber on 2016 March 19, thirteen years after they had first appeared.[12] By then the erroneous passage had been so widely copied and recopied that it may take another generation, or longer, to eradicate.

REFERENCES AND NOTES

[1] Allen, R. H., *Star Names, Their Lore and Meaning* (Dover, 1963). Richard Hinckley Allen (1838–1908) was a businessman by profession but an amateur astronomer and historian by inclination with a wide range of interests. The Dover edition of his book was a reprint of the original 1899 edition

titled *Star-Names and their Meanings* (G. E. Stechert, New York, 1899).

[2] Ridpath, Ian, *Star Tales* (Lutterworth, 1988).

[3] Ridpath, Ian, *Star Tales*, 2nd edition (Lutterworth, 2018). The online version is available at http://www.ianridpath.com/startales/contents.htm

[4] https://en.wikipedia.org/w/index.php?title=Horologium_(constellation)&oldid=1519625

[5] https://en.wikipedia.org/w/index.php?title=Horologium_(constellation)&diff=2213483

[6] Lacaille, N. L. de, 'Table des ascensions droites et des déclinaisons apparentes des Etoiles australes… ', *Mémoires* de l'Académie Royale des Sciences, Paris, 1752 (but published 1756), p. 588.

[7] I thank Françoise Launay for linguistic advice.

[8] The dial was illuminated by a faint lamp so Lacaille could read the time and jot down his observations. He described the procedure as follows: "As soon as a star entered or left the plates of the reticle, the observer, closing his right eye, which was only used to look in the telescope, and keeping his left eye open, turned a little to present a little paper to the light of the dark lantern at the clock. He recorded his observation on it and quickly returned to the telescope." Evans, David S., *Lacaille: Astronomer, Traveler* (Pachart Publishing, Tucson, 1992), p.122.

[9] Lacaille's clock was made by the leading Parisian craftsman Julien Le Roy (1686–1759), but this does not seem to have survived.

[10] Lacaille, N. L. de, *Coelum australe stelliferum*, (Guerin & Delatour, Paris, 1763).

[11] Allen's entry for Horologium can be read online at https://penelope.uchicago.edu/Thayer/E/Gazetteer/Topics/astronomy/_Texts/secondary/ALLSTA/Horologium*.html

[12] https://en.wikipedia.org/w/index.php?title=Horologium_(constellation)&diff=710816283

David Osmond Le Conte, FRAS

1940 - 2020

by Jason Hill and Jean Dean

David Le Conte was born in Guernsey on the Spring equinox of 1940 and shortly afterwards was evacuated for the duration of the war as German forces occupied Guernsey. Upon returning, David attended Elizabeth College and then went on to Edinburgh University, from where he graduated with a degree in physics. His scientific career began at the Edinburgh Royal Observatory before moving to Aberystwyth University where he worked on developing astronomical optics. In 1964 his work in Aberystwyth led to his being recruited by the Smithsonian Institution and moving to America where he worked for NASA's space programme tracking satellites with advanced optics and lasers.

The mid-1960s saw activity in space science at fever pitch with the Americans working towards their "end of the decade" task of "putting a man on the Moon and returning him safely to Earth". David's contribution to this significant period of human endeavour saw him working as the manager of the Smithsonian Institution's Astrophysical Observing Station in Maui, Hawaii. It was whilst working in Hawaii that David was able to take the only photographs of the moment on 21 September 1968 when Apollo 8 fired its rocket motors for trans-lunar injection and the astronauts became the first humans to leave the Earth's orbit and head for the Moon.[1] In 1969 his space monitoring work for the Smithsonian Institution took him to Arizona where he was involved in photographing the progress of the Apollo 11 mission that first took men to the Moon. With characteristic modesty David later observed that, "I'm amazed that a little lad from Guernsey could make

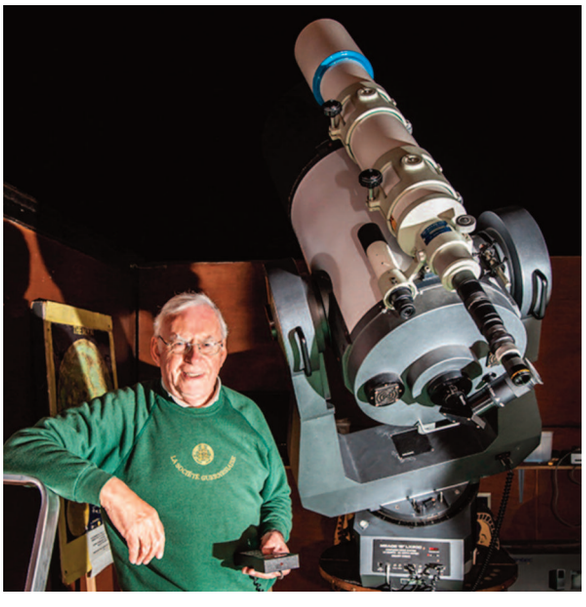


Fig. 1: David Le Conte at La Société Guernesiaise Astronomical Observatory

Fig. 2: Apollo 8 translunar injection (TLI) rocket burn which sent the first humans toward the moon, taken by David Le Conte from the Smithsonian Astrophysical Observing Station in Maui, Hawaii, 21 December 1968

his way to the heart of the space programme in the USA."

After the excitement of Project Apollo, David became Executive Director of the Smithsonian Institution's Research Foundation in Washington and then a department manager at Kitt Peak National Observatory in Arizona. In 1978, he returned to Guernsey where he held several senior posts within the Civil Service and in 2005 was awarded the greatest honour of being elected a Jurat of the Royal Court, a role that required him to be involved with the administration and dispensing of justice in serious criminal and civil cases as well as civic spectacle and tradition.

David's interest in astronomy continued with his research into local historical astronomy and subsequent publications on Guernsey-born astronomer Warren de la Rue who pioneered early astrophotography techniques, and artist Paul Jacob Naftel who contributed to astronomy through his paintings of the total solar eclipse of 1870. David also researched the construction and orientation of megalithic tombs in the Channel Islands and their possible correlation with sunrise. This led David and his wife to develop an interest in sundials and they documented over 25 sundials within Guernsey, dating from as early as 1312 to the most recent Liberation Monument which was designed by local artist Eric Snell to commemorate the 50th anniversary of Guernsey's liberation from occupying German Forces and which was unveiled on 9 May 1995 by HRH The Prince of Wales.

The Liberation Monument hewn out of Guernsey granite, is a sundial with a 5m obelisk gnomon that casts a shadow along a curved 40 metre seat. David used his mathematical and astronomical skills to determine the exact orientation of the monument and inscriptions along the seat so the shadow of the sun on May 9th falls on precisely determined spots marking the surrender of the German Forces at 7.15am, the landing of the British Liberation Forces at 8.00am and the unfurling of the Union Flag at 10.00am. David's love of historical astronomy led him to become a founding member of the Society for the History of Astronomy in 2002.

One of David's most enduring contributions to astronomy upon returning to Guernsey was joining the fledgeling Astronomy Section of La Société Guernesiaise in 1978. He quickly immersed himself within the club's activities, organising a permanent home and the construction of an observatory building equipped with a 16" research grade Meade Schmidt Cassegrain telescope and a 5" Takahashi refracting telescope which was opened by Sir Patrick Moore in 1993 and is still in use today. That same year David was elected a Fellow of the Royal Astronomical Society having being proposed by Patrick.

Under David's unwavering and infectious enthusiasm for astronomy, the club grew in membership and now has a comprehensive educational and public outreach program which David actively participated in until his passing. One of David's greatest legacies has been encouraging and helping to shape the career of future astronomers. For over four decades he has been a mentor to many youngsters on Guernsey who have gone on to pursue Physics and Astronomy as a career. The most recent was accepted as a Fellow of the Royal Astronomical Society in October 2020, having being nominated by David, and is shortly to embark on a year studying Astrophysics at Harvard University.

For those of us who were privileged to know David, we will always remember his genial manner and enthusiasm for Science and Astronomy - and have cause to be thankful we were able to move in his orbit. *(Photos: David Le Conte)*

[1] Le Conte, D., *Apollo Memories*, SHA Bulletin, no.32 (Autumn 2019)

Eddie Carpenter

29 November 1941 - 7 October 2020

by John Chuter

I was very saddened to hear about the death of my friend Eddie when his wife Jackie e-mailed me on the 7 October 2020. It was not unexpected but still a great shock. When Eddie had told me some four weeks earlier that his cancer had returned, I went to see him for what turned out to be the last time. He was frail but his mind was still sharp, being more concerned about my returning home via a busy motorway than for himself, checking on traffic conditions on the TV. He was still keen on talking about his books and some drawings of Mars that he had, the Opposition of which was not far away on the 13th October.

I first met Eddie on an organised coach trip to see the Total Solar Eclipse in Turkey in 2006. We discovered that we had a lot in common and would meet regularly at various Astronomy events. I came to realise that Eddie was a walking encyclopaedia on Astronomy books, dating back to at least the century before last, and has a wonderful collection. I have learnt a great deal from him about antiquarian astronomy books and will sorely miss his wise advice. In the last few years, I have also become interested in Lantern slides, and discovered that Eddie had a collection of hundreds and gave lectures using them with an old self-modified lantern slide projector for the purpose.

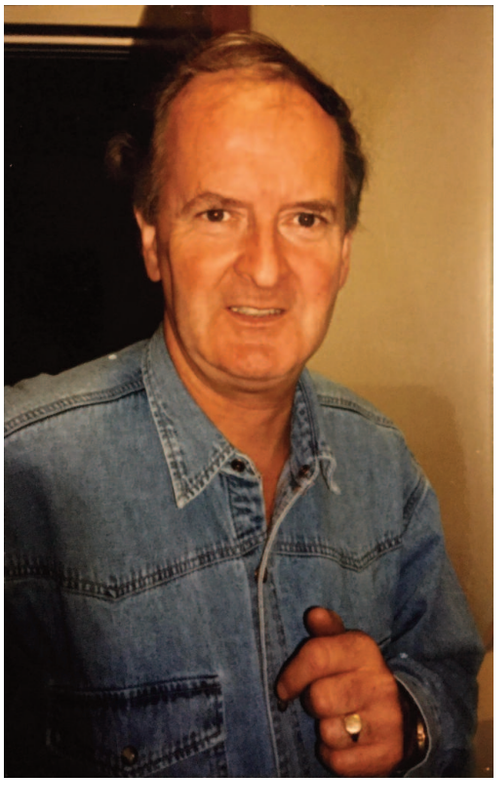


Fig. 1: Eddie Carpenter

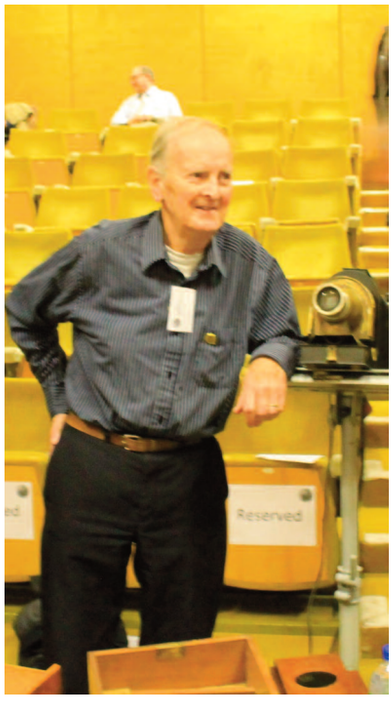


Fig. 2: Eddie with one of his antique lantern slide projectors at the SHA Autumn 2017 Conference

We are both members of the Society for the History of Astronomy and Eddie has given several talks at SHA events. I have taken Eddie to several meetings over the years. He would usually have a bag of books with him. These would be books written by some of the speakers or indeed people he knew might be in the audience. Eddie would ask them to sign their books. He also would ask every speaker to sign his programme. This also included himself if he had spoken! As a speaker he was a natural teacher, treating the audience like a class. More than one person has told me it was the highlight of the day for them. He had a quirky sense of humour and could be cheeky but got away with it because he was…… Eddie.

The following passage and the photograph of Eddie (Figure 1) were sent to me by Jackie:

"Eddie was born in Penzance. He started looking at the stars through the attic window of their house across the black skies of Mounts Bay. He and his dad used a home-made telescope which I believe incorporated parts "liberated" by his grandfather who worked at Land's End Radio at St Just. You can probably see a picture developing here! His most prized possession was a book called "The Splendour of the Heavens" by the Rev T E R Phillips. Eddie attended Humphrey Davy Grammar school in Penzance and then went to the City of Portsmouth Teacher Training College where he met me. He spent his working life in school in Bristol, S. Glos., and Wotton-under-Edge.

Astronomy was his lifelong passion and he was a skilled observer with a thirst for knowledge which he loved to pass on. He taught outreach classes for Bristol University and introduced many people to the joys of Stargazing. He was delighted when his Roller Coaster was officially recognised giving him a place in posterity.[1]

Another life-long passion was the now Cornish Pirates Rugby team which he started watching at the age of 4 with his dad when they were Penzance & Newlyn. In Cornwall, as in Wales, rugby was almost a religion. He had a great love of travel visiting many exotic places. Who but us would manage to be trapped in Lithuania at the time of Gorbachev's fall when visiting an astronomy friend? He also enjoyed listening to music, gardening and above all, his family of whom he was immensely proud. He collected a vast amount of astronomical memorabilia including over 1,000 books and delighted in giving magic lantern shows. He was well known as a speaker with a quirky style of presentation, a slightly strange sense of humour and a degree of dogmatism! He will be remembered for his contributions to the societies he belonged to.

The last 13 years of his life were dogged by cancer and it says much for his determination that he survived pancreatic cancer for an unprecedented six and a half years before finally succumbing to a third attack which he fought to the end. Difficult to sum up such an original, energetic, exhausting and sometimes irritating character—after 56 years of marriage I should know—but someone summed him up nicely this week, using the words from Leigh Hunt's poem About Ben Adhem:

"Write me down as One who loved his fellow men"

and added that Eddie truly loved his fellow men."

Jackie Carpenter

[1] Eddie's Roller Coaster was described by Callum Potter in the June 2020 BAA Journal and on the BAA Website (https://britastro.org/journal_item/22500) The picture of Eddie's roller-coaster is taken from this article.

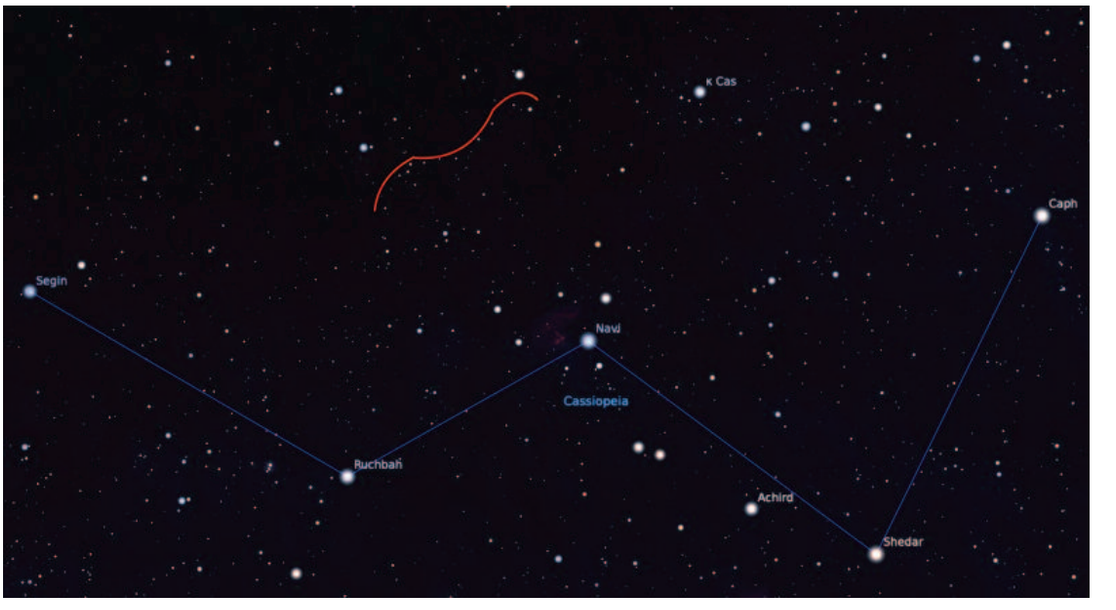


Fig. 3: The asterism known as 'Eddie's Rollercoaster'(BAA Journal)

19th Century Observatories: 1840-49

by Paul Haley

Introduction

This is the sixth paper of a series cataloguing the construction of astronomical observatories during the 19th century. Observatories with a prefix 'A' to 'D' have previously been introduced, in *Bulletins* 29-33. Observatories with a prefix 'E' begin in part 1 of this paper with British and Irish examples and continue in part 2 with examples from across the world. Observatories marked with a * are revisited in future papers. (Readers may be interested in the 'astro-conundrum', introduced later in this issue, which provides a visual challenge.)

A1 - Royal Observatory, Greenwich * [1675-today] George Biddell Airy (1801-92) reduced the planetary and lunar observations for 1750-1830 and commissioned new positional instruments. For lunar work: a 3.7-inch May-Simms alt-azimuth refractor (1847) of 48-inch focus (f/13) in a 10-foot cylindrical dome on a 3-storey tower was used. Geodesy work for longitude arcs Greenwich-Valentia and Greenwich-Altona-Pulkovo enabled Airy to visit Struve (1847). First assistant Robert Main (1808-78) reviewed 875 stars for evidence of proper motion.

A5 - Radcliffe Observatory, Oxford * [1773-1935] Manuel John Johnson (1805-59) succeeded Rigaud (1839) to become the 1st Radcliffe observer. He used the 4-inch Jones meridian circle (1836) to review Groombridge circumpolar stars with assistant John Lucas (1816-83) and computer William Luff. Other instruments: a 4-inch Jones transit; a 4.5-inch achromatic of 120-inch focus (f/27); a 3.2-inch equatorial of 42-inch focus (f/13); and a 7.4-inch Repsold-Merz heliometer of 126-inch focus (f/17) installed (1839) within a 20-foot dome.

A7 - Dunsink Observatory, Dublin * [1785-today] William Rowan Hamilton (1805-65) continued as director with Charles Thompson observer (to 1874). Reductions were not completed and no catalogue was produced.

A11 - Armagh Observatory * [1790-today] Thomas Romney Robinson (1792-1882) continued reviewing Bradley's catalogue using the 3.7-inch Jones mural circle with assistant Edmondson using the Jones transit. An additional Parsons 15-inch mirror (1843) for the East dome was acquired. Robinson developed a self-registering anemometer (1845) and was regularly consulted on instrument design.

A17 - Marischal College, Aberdeen * [1797-1860] John Cruickshank (1787-1875) observed the 1841 July solar eclipse with a 2.7-inch Dollond achromatic of 46-inch focus (f/17). Horologist and editor of the *Nautical Almanac & Astronomical Ephemeris* George Innes (-1842) used a 2-inch Ramsden achromatic of 30-inch focus (f/15).

B7 - Royal Observatory, Edinburgh * [1818-2009] Henderson was succeeded by Charles Piazzi Smyth (1819-1900) who returned from the Cape (1846) to become the 2nd Astronomer Royal for Scotland. Smyth reduced the backlog of 30000 star-positions working with assistant Wallace. In 1847 an extensive renovation of the observatory dome and buildings limited observations to a 2-inch transit of 30-inch focus (f/15). Smyth planned to focus on positional astronomy for the Sun's proper motion and planned more trips abroad.

C4 - Starfield Observatory, Liverpool * [1840-54] William Lassell (1799-1880) mounted his 9-inch equatorial reflector of 112-inch focus (f/12) inside a copper tube and 14-foot dome. Encouraged by Parsons and Nasmyth he built a 24-inch equatorial reflector (1845) of 240-inch focus (f/10) which revealed new satellites of Saturn, Uranus and Neptune (1846-51). Improvements to his polishing machine facilitated specula of 10-inch of 80-inch focus (f/8) and 12-inch of 89-inch focus (f/7) by the end of the decade.

C6 – South Kilworth Observatory, Leicestershire [1821-47] William Pearson (1767-1847) continued observing but a fall from his horse (1844) limited his mobility.

C8 – Cambridge University Observatory * [1823-today] Director James Challis (1803-82) searched for an 8th planet from 1846 July using

the 11.6-inch Northumberland equatorial. He observed stars to the 11th magnitude in the designated region of 30° x 10° using a power of x116 which gave a 9' field of view. Three sweeps required around 300 hours observation and within a month he had recorded Neptune twice without realising. In practice Cambridge lacked the advantages provided by the Berlin star-maps.

C16 – Campden Hill Observatory, Kensington [1826-42] James South (1785-1867) had lost £8000 in his legal dispute with Troughton & Simms (T&S). During this decade he experimented with clocks and pendula and studied the effect of train vibrations on star images. Comets were also observed but South increasingly suffered from failing eyesight and hearing; his instruments would later be auctioned off (1870).

C17 – Makerstoun Observatory, Roxburghshire [1826-55] Thomas Makdougall Brisbane (1773-1860) and observer John Welsh (1824-59) used a 6.4-inch T&S equatorial of 102-inch focus (f/16). Geomagnetic and meteorological observations were made by John Allan Broun (1817-79).

D1 – Hartwell Observatory, Buckinghamshire * [1830-64] John Lee (1783-1866) purchased Smyth's 5.9-inch Tulley-Dollond of 104-inch focus (f/17) in 1839. John Glaisher (1819-46) transferred from Cambridge to become Lee's observer (1844) but suffered the tragic loss of his wife 3 weeks after their marriage.

D3 – Markree Observatory, Sligo, Ireland * [1831-1902] Edward Joshua Cooper (1798-1863) appointed Andrew Graham (1815-1908) observer in 1842. In the same year a 4.2-inch Ertel comet-seeker of 30-inch focus (f/7) was installed in a small dome; in 1848 Graham used this instrument to discover the 9th asteroid – Metis. The Markree Catalogue was started at the end of the decade using the 13.2-inch Cauchoix-Grubb equatorial and a square-bar micrometer to measure ecliptic stars to the 12th magnitude.

D6 – Ashurst Observatory, Kent * [1834-54] Robert Snow (1805-54) continued observing comets and occultations from Ashurst using his 3.9-inch Simms equatorial on a Fraunhofer mount and a 2.7-inch transit; he also used a 3.5-inch achromatic at Dulwich and Saville Row.

D7 – Tretire Rectory, Herefordshire [1834-56] Thomas William Webb (1806-85) worked at Gloucester Cathedral from 1844-49 and then as curate of Ganarew, Monmouthshire from 1849-53. He used his 3.7-inch f/16 Tulley refractor on an alt-azimuth mount.

D9 – South Villa Observatory, Regent's Park * [1836-61] George Bishop (1785-1861) planned (1846) 24 ecliptic star-charts to the 10th magnitude, for minor planet searches within 3° of the ecliptic, using the 7-inch Dollond equatorial. John Russell Hind (1823-95) moved from Greenwich (1844) for a decade prior to his role at the Nautical Almanac. In 1847 he found Iris (7th) and Flora (8th) with 8 more discoveries by 1854; he also found variable star R Leporis (1845) and Nova Ophiuchi (1848).

D11 – Patricroft Observatory, Manchester [1842-56] James Hall Nasmyth (1808-90) resumed casting specula at Bridgwater Foundry (1840) and observed the Moon from 'Fireside' on the east bank of the Bridgwater Canal. Instruments: an 8.2-inch reflector of 108-inch focus (f/13); a 12-inch reflector of 156-inch focus (f/13); and a 20-inch of 180-inch focus (f/9) with a 3rd plane mirror giving a Nasmyth-Cassegrain focus (f/25). The latter innovative design (1848) enabled 37% of the light to form the final image but provided a comfortable observing position on an alt-azimuth mount. Nasmyth collaborated with Lassell and visited observatories in Paris, Pulkovo and Copenhagen.The Vesuvius crater at Naples inspired experiments with illuminated plaster models of the lunar surface.

D12 – Birr, Ireland * [1839-today] William Parsons (1800-67) completed casting of the *Leviathan* specula in 1842 with the 6-foot reflector of 54-foot focus (f/9) completed 3 years later. The 8-ton tube was suspended by chains between 2 parallel 56-foot high stone walls and an elaborate set of stairs and galleries provided observing access. Mirror tarnishing was reduced by a quicklime ventilation system with the 2 specula alternatively used. The project financed by Mary Field Rosse (1813-85), had the initial aim of re-observing Herschel's catalogue. Discovery of the spiral form of 14 nebulae by 1850 including M51, M99 and M33 excited astronomers globally. Observer George Johnstone Storey (1826-1911) began in 1848.

E1 – Greenwich Hospital Nautical School

[1821-62] Edward Riddle (1786-1854) and son John Riddle (1816-62) both installed instruments with 4 equatorials by 1847: a 2.7-inch Dollond of 44-inch focus (f/16); a 3.2-inch Simms of 48-inch focus (f/15); a 6.4-inch Merz of 102-inch focus (f/16); and a 6.7-inch Cauchoix of 98-inch focus (f/15).

E2 – Latimer Rectory Observatory, Chesham [1840-55] Samuel King (?-1857) tested a 7-inch Dollond objective of 144-inch focus (f/19) in 1840. By 1855 he had retired to St. Aubin's, Jersey where he used a 4.2-inch T&S achromatic of 60-inch focus (f/14) and a 1.5-inch T&S transit of 20-inch focus (f/13).

E3 – Durham University Observatory * [1841-1937] Temple Chevallier (1794-1873) founded the observatory by public subscription, and purchased instruments from Hussey: a 3.2-inch Tulley transit of 50-inch focus (f/16); an undriven 6.5-inch Fraunhofer-Utzschneider equatorial (1825) of 99-inch focus (f/15) mounted within a 13-foot copper-sheathed dome; and a set of meteorological apparatus. A 5-inch Ross equatorial of 88-inch focus (f/18) on a portable mount was donated by Hugh Percy (1846). Chevallier also used a 2-inch Dollond achromatic of 30-inch focus (f/15). Observers Arthur Beanlands and Robert Anchor Thompson helped determine the geographical location, time Jupiter satellite events and occultations and observe Neptune. Sunspot records began (1847) with Richard Christopher Carrington (1826-75) appointed observer by the end of the decade.

E4 – Lansdown Observatory, Bath * [1841-55] Henry Lawson (1774-1855) moved from Hereford (1841) and modified the roof-top of No. 7 Lansdown Crescent to accommodate a 3.7-inch Dollond achromatic (1826) of 60-inch focus (f/16) and a 7-inch Dollond equatorial (1834) of 132-inch focus (f/19). Details were published in *The Arrangement of an Observatory for Practical Astronomy & Meteorology* (1846). Lawson's neighbour at No. 6 was John Hippisley (1804-98) who inherited Ston Easton estate in 1843 where he began producing specula.

E5 – Horselethill Observatory, Glasgow * [1841-1938] John Pringle Nichol (1804-59) was the 1st director and a keen populariser of astronomy. Instruments: a 6-inch Ertel transit circle (1843) of 96-inch focus (f/16); the 15-inch Ramage reflector of 300-inch focus (f/20) from Greenwich; a 22-inch Ramage reflector of 600-inch focus (f/27); and the 3-inch Troughton transit (1836) of 45-inch focus (f/15) from Macfarlane. Nichol observed lunar features and nebulae.

E6 – Kew Observatory, Surrey * [1842-2012] Francis Ronalds (1788-1873) was director from 1842-51 with BAAS research focusing on meteorology and atmospheric electricity.

E7 – Wind Street Observatory, Swansea [1842-53] John Jenkins (1802-68) built an observatory at his horologist premises and installed (with Sheepshanks) a 2-inch transit of 32-inch focus (f/16) to supply a chronometer service to ship captains.

E8 – Wrottesley Hall Observatory, Staffordshire * [1842-67] John Wrottesley (1798-1867) moved from Blackheath (1841) and built his 2nd observatory. He used a 7.7-inch Dollond-Guinard equatorial (1843) of 129-inch focus (f/17) purchased with a dome from Edward Blackett Beaumont (1802-78) of Finningley, York. The English mahogany mount was stable but the clockwork drive proved unreliable. Wrottesley, with observers Goddard and Philpott, measured optical doubles at 6-month intervals (1844-49) for evidence of parallax shifts. Hartnup was also involved in a chronometric transfer (1845) to determine longitude.

E9 – Tidenham, Gloucestershire [1843-4] Henry Cooper Key (1819-79) was a curate at Mead House and used a 4-inch Adams Gregorian reflector of 18-inch focus to observe double stars and planets, including an early observation of Jupiter's Great Red Spot. He then moved to Godmersham and Challock on the North Downs (1845) before becoming rector at Stretton Sugwas, Hereford (1846).

E10 – Cessnock Park, Govan, Glasgow [1843-51] John Hart (1783-1851) and brother Robert (1789-1879) retired as pastry-bakers (1831) and used a laboratory-workshop adjoining their Mitchell Street bake-house for scientific and engineering pursuits. They built a 10-inch reflector of 144-inch focus (f/14) to observe the Moon.

E11 – Stone Rectory Observatory, Buckinghamshire [1843-59] Clergyman, microscopist and pioneer photographer Joseph Bancroft Reade

(1801-70) spent 2 decades at Oxford Road, Stone from 1839. His observatory recycled Smyth's Bedford 14-foot conical roof with a 10x11-foot transit room. Instruments: a 4.2-inch Dollond-Barrow transit (£80) of 72-inch focus (f/17); a 7.3-inch Newman-Carter equatorial of 144-inch focus (f/20); and meteorological instruments. Reade observed comets and later used wet collodion to image the Sun with a 2-inch reflector (1854).

E12 – Port of Liverpool Observatory * [1844-66] John Chapman Hartnup (1806-85) was the 1st director, remaining in post for 4 decades. The Waterloo Dock observatory provided a chronometer testing service. Instruments: a 4-inch T&S transit (1845) of 60-inch focus (f/15); and a 8-inch T&S-Merz equatorial (1845) of 144-inch focus (f/18) on an English mount.

E13 – Camden Lodge Observatory, Cranbrook, Kent [1845-50] William Rutter Dawes (1799-1868) left South Villa and built his 2nd observatory. Instruments: a 2.7-inch Dollond achromatic of 43-inch focus (f/16) and 2.7-inch Simms transit circle (1844) of 30-inch focus (f/11) – both from E. B. Beaumont; a 3.7-inch Dollond equatorial (1830) of 60-inch focus (f/16); and a 5-inch Cuthbert Gregorian of 20-inch focus. In 1846 he installed a 6.3-inch Merz & Mahler equatorial of 102-inch focus (f/16) in a 13-foot dome, with a Lawson Reclinia observing chair. The clockwork drive tracking was irregular; Dawes also ordered a second 6-inch objective (1847). Observations of the Mercury transit and edge-on rings of Saturn (1848) were made before illness led to a move to Torquay.

E14 – Aylesbury, Buckinghamshire [1845-1874] Thomas Dell (1817-74) built a 5x6-foot portable observatory for a 2-inch transit of 30-inch focus (f/15). For the Mercury transit of 1845 May he used a 2.7-inch Dollond of 42-inch focus (f/16). Within a decade he had a 4.7-inch Tulley achromatic of 72-inch focus (f/15) mounted in a 10-foot oak observatory with a galvanised iron conical roof .

E15 – Stonyhurst College Observatory * [1845-66] Alfred Weld (1823-90) was director (1846-51 and 56-60) at this Jesuit college which focused on meteorology (1838), astronomy (1845) and geomagnetism (1858). Instruments: a 3-inch Jones meridian circle (1845) of 42-inch focus (f/14) in the east transept; a 4-inch Jones equatorial (1848) of 66-inch focus (f/17) mounted in a 10-foot cupola dome above the 22-foot octagon room; and a transit in the west transept. An early user of the Jones equatorial was Angelo Secchi (1818-78) following the temporary expulsion of Jesuits from Rome (1848).

E16 – Haverhill Observatory, Suffolk [1846-86] William Wakeling Boreham (1804-86) used a 6-inch Kellner equatorial installed beneath a copper dome at The Mount, Hamlet Road to observe comets and asteroids. Boreham was an advocate of education equality for girls and his telescope was later donated to Newnham College, Cambridge.

E17 – Winsor House Observatory, Southampton [1847-57] Retired teacher John Drew (1809-57) built a wooden observatory in Cumberland Place. A 9-foot equatorial housed a 3.7-inch Dollond achromatic of 60-inch focus (f/16) beneath a Bedford-style roof, previously owned by Portsea clergyman Edmund Dewdney (?-1847). A 3.2-inch Jones transit (1835) of 42-inch focus (f/13) in a 6x8-foot transit room provided a time service for ships.

E18 – Bury Hill House Observatory, Dorking, Surrey [1848-1946] Arthur Kett Barclay (1806-69) erected a 14-foot copper-sheathed wooden dome by Charles May which was moved from Norbury. Instruments: a 5.9-inch T&S equatorial of 96-inch focus (f/16); and a 2.7-inch Simms transit of 40-inch focus (f/15). Barclay observed until 1855 when paralysis prevented further work.

E19 – Tarn Bank Observatory, Cockermouth, Cumberland * [1848-79] Isaac Fletcher (1827-79) erected a 14-foot dome on an 18-foot stone tower near Greysouthen. Initially he used a 4.1-inch Cooke equatorial of 72-inch focus (f/18) on a clock-driven Dollond English mount to measure double stars.

E20 – Wyle Cop, Shrewsbury [1849] Chemist and watercolour artist Henry Blunt (1806-53) built a 9-inch reflector of 84-inch focus (f/9) for lunar observation. His plaster model of Eratosthenes was exhibited at the BAAS meeting in Birmingham and at Crystal Palace 2 years later.

E21 – Clapham Grammar School [1849-62] Charles Pritchard (1808-93) was headmaster (1834-62) and so keen an advocate of physical

science that Airy, Darwin and Herschel all sent their sons to CGS. Pritchard purchased a 4.3-inch Merz refractor of 76-inch focus (f/18) which could be used on a portable mount. It was later used for a photometric study of an annular eclipse (1858).

Further suggestions

Additional references to possible small observatories: Joseph Baxendell (1815-87) used a 3.2-inch equatorial of 42-inch focus (f/13) belonging to S. W. Williamson at Cheetham Hill to observe the 1848 Mercury transit; York solicitor William Gray (1751-1845) and his clergyman son William (1785-1863) used a 4.5-inch Cooke equatorial; chemist John George Children (1777-1852) observed from Torrington Square, Bloomsbury and Halstead Place, Sevenoaks from 1847, using a 4-inch T&S equatorial of 66-inch focus (f/16) and 2-inch T&S transit of 30-inch focus (f/15); the Donkin brothers, engineer Bryan (1768-1855) and Thomas (1776-1856) had a 3.5-inch Tulley and smaller Tulley with a transit and a small observatory at 6 The Paragon Bermondsey; clergyman Charles Mayne of Killaloe, Clare used a 2-inch achromatic of 30-inch focus for the 1848 spring lunar eclipse; mariner Basil Hall (1788-1844) observed a comet from Valparaiso, Chile (1821) and timed a Venus occultation at Malta (1841); Hall's alt-az instrument was later used by explorer Phillip Parker King (1791-1856) at Port Stephen, New South Wales to observe the 1848 solar eclipse; John Grover (1796-1847) used a 3-inch Tulley achromatic at Nice for the 1842 July solar eclipse; John Narrien (1782-1860) observed the 1845 May solar eclipse from Sandhurst College whilst at Chatham RE recruits used a 2.7-inch Jones achromatic of 44-inch focus (f/16).

Conclusion

This completes the writer's overview of the British observatories of the first half of the 19th Century. An index will be provided in a later issue of the *Bulletin* (if members would find this useful). The writer has used a chronological approach by examining one decade at a time from 1900. However, the SHA Survey is based on a geographical approach with listings for 120 counties. In a future *Bulletin*, global observatories of the 1840s and 35 observatories of the 1850s will be covered. Global observatories have been included in the catalogue since these were often staffed or visited by British astronomers.

References

The author has cited NASA ADS, Google Books, Hathi Trust and the Biodiversity Library as sources. A complete list of reference material would be too extensive to include but readers are invited to contact the author about specific details (*pahastro@aol.com*).

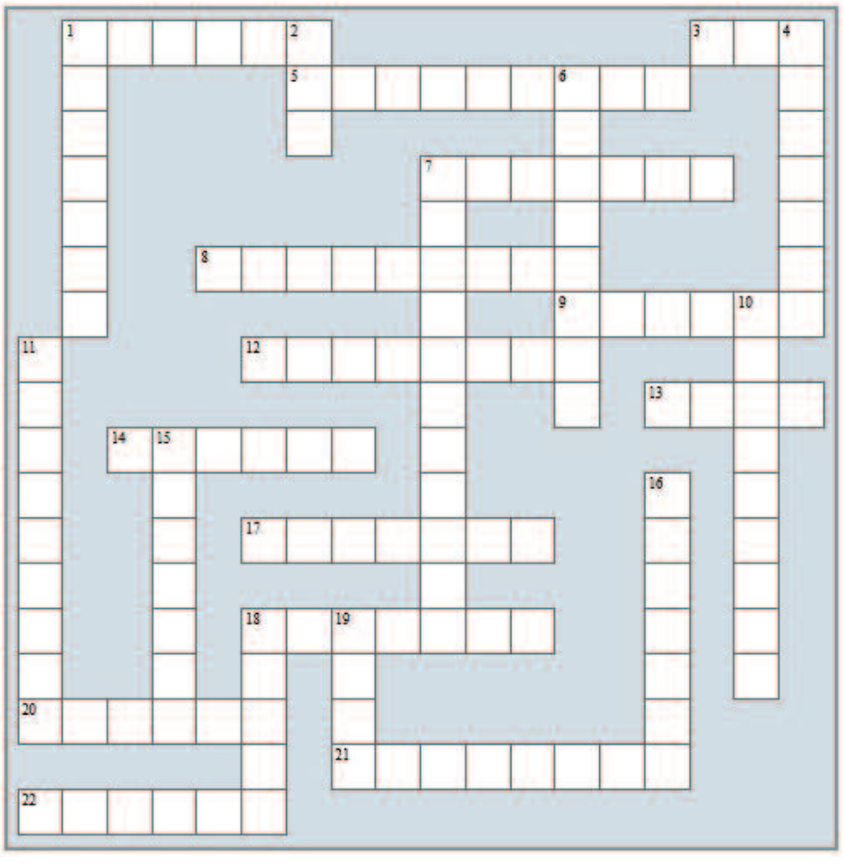
SHA AGM & AUTUMN CONFERENCE REPORT

The Society's AGM for 2020 took place on 24 October and was held virtually (via Zoom ™). The meeting was chaired by Gerard Gilligan and the agenda was addressed with exemplary efficiency. Of particular note from the meeting were announcements of friends and colleagues in our community who have sadly passed away recently and particular mention was made of Heather Couper, Iain Nicolson, Eddie Carpenter and David Le Conte (obituaries to Eddie and David appear in this issue). The Council gave the 2019-20 Peter Hingley Award to Gerard in recognition of his dedication to the society in so many ways, especially during these challenging times of the pandemic. It was decided, meanwhile, that the Roger Jones Bulletin Award be postponed. Further details from the AGM are available in the published minutes.

The meeting was immediately followed by a lecture delivered by Dr Steve Barrett of Liverpool University on the subject of the Hale Telescope on Mount Palomar, USA. This wide-ranging talk addressed an impressive variety of aspects, including the historical context, socio-economic implications, engineering challenges and the cultural impact of the whole project. The presentation included some terrific drawings by Russell Porter, which were not only illuminating from an operational and structural point of view, but were also works of art in their own right. One such image is shown here and Steve's slides are available for viewing via the SHA website. Our thanks to him for such a marvellously informative and entertaining talk.

Cutaway sketch of 200" telescope and dome at Palomar, by Russell W. Porter (image; Palomar Observatory/California Institute of Technology). Inset (above) a selection of the attendees; (below) Dr Steve Barrett

HISTORY OF ASTRONOMY QUICK CROSSWORD



Across

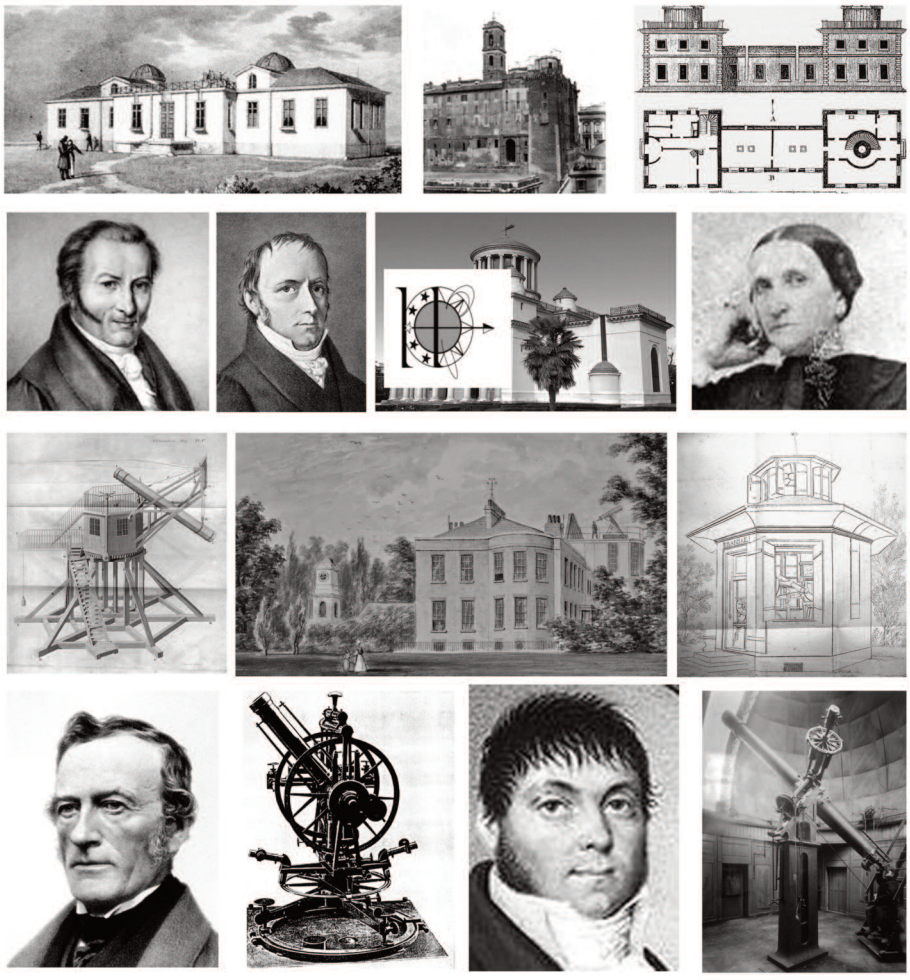
1. Italian pioneer of spectrography (6)
3. Where George III established an observatory to observe the transit of Venus (3)
5. 'New --'. Where Kepler announced the Martian ellipse in 1609 (9)
7. Given name of the astronomer who proposed (1925) that stars were primarily composed of Hydrogen and Helium (7)
8. Scottish reflecting telescope design that predated the appearance of Newton's (9)
9. Historic name of Tartu Observatory, directed by von Struve (6)
12. Cardboard replica of a Ptolemaic planetary model (8)
13. American cosmologist. Proposed the idea of cosmic 'Inflation' (4)
14. Parisian commune - home of the Camille Flammarion Observatory (6)
17. English polymath (d.1621). The first to draw a telescopic map of the Moon (7)
18. 'Realm of the --'. Classic book (1936) by Edwin Hubble (7)
20. Second Astronomer Royal (6)
21. Latinised name of the author of 'The First Account' of the Copernican model (8)
22. 'Winner' of the 'Great Debate' (1920) (6)

Down

1. Cycle discovered by Heinrich Schwabe (1789-1875) (7)
2. Founded in 1919 to promote and protect astronomy worldwide (3)
4. Author of 'The Waste of Daylight' (1907). Campaigner for British Summer Time (7)
6. The author of the misleading Preface of De Revolutionibus (8)
7. Nineteenth century project to map the sky photographically, initiated by Amédée Mouchez (5,2,4)
10. Abode of the rete (9)
11. US historian who made a Copernican Census (9)
15. Connection between a Lancashire brewer and The Rape of the Lock (7)
16. Pseudonym adopted by Christoph Scheiner - Ancient painter (7)
18. English poet who was present at 'first light' of the 100-inch Hooker telescope at Mount Wilson in 1917 (5)
19. Site of Rosse's 'Leviathan' (4)

Astro-conundrum 7 ... Observatories 1800-39

Born between 1770-1806 here are 5 pioneering astronomers and 6 observatories. What were their names and where were they located? Who proposed gravitational deflection of light over 100 years before Einstein? Which person completed magnetic surveys across Europe? Who compiled the first Italian meteor catalogue? Which observatory was used by Alexander Aubert? Who completed geodetic surveys in Switzerland? Which observatory recently restored its 24-inch f/12 Herschel reflector and how much did it originally cost? Which instrument was linked to the 'celestial police' and which astronomers used it before Napoleon's troops arrived? Who missed a significant opportunity to become a spectroscopy pioneer? Which person advised Lord Lindsay (1872) about instruments for Dun Echt observatory in a broad Aberdonian accent? Who discovered a comet in 1854? Who was also a: fire-fighter / mathematician / instrument-maker / meteorologist / cartographer / editor?



Quiz by Paul Haley (answers on page 25)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