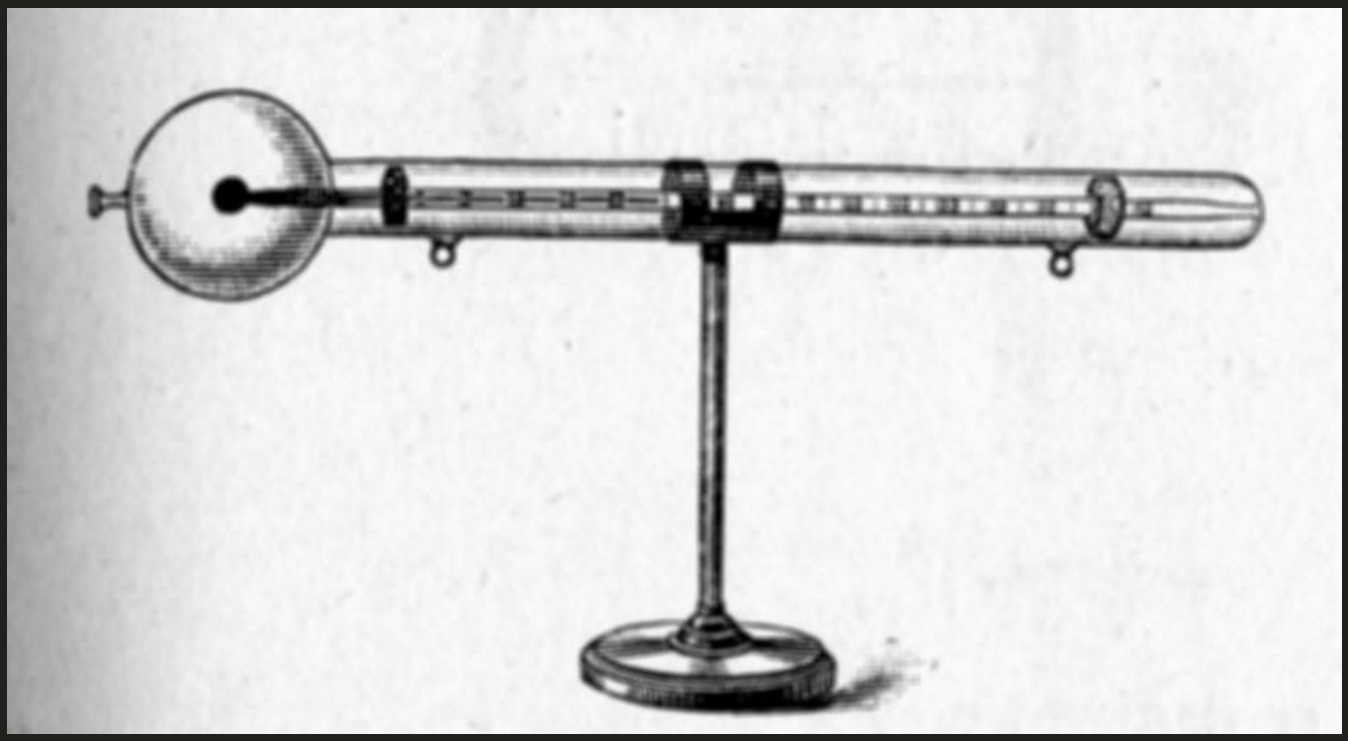
BULLETIN

ISSUE 40 AUTUMN 2023

Thomas Mackereth

William Bulkeley's comet observation

Plancius's Globe



Issue 40 Autumn 2023

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The Bulletin of the Society for the History of Astronomy

Editor: Kevin Walsh

EDITORIAL

We know it is interesting, but why is the History of Astronomy *important*? It is important because it not only contributes to our scientific understanding of the universe but also reflects the cultural, technological, and philosophical aspects of human civilization. It serves as a reminder of our quest to explore and comprehend the cosmos and inspires us to continue exploring the mysteries of the universe.

This neat little description (or justification, if one were needed), is, of course, the answer given by an artificial intelligence (ChatGPT). AI is ubiquitous, and although not an obvious topic for this publication, it is good to see it having even a little bit of relevance.

Earlier in the long text the program produced, there were expansions on things like scientific progress, societal impact, scientific methodology, cosmic perspective and inspiration. The last of these is, I think particularly apposite: the efforts of those figures who have not only helped inch forward the frontiers of knowledge but have done so in ways that serve as examples to all those that come after them—illustrated, indeed, by works and words described in this edition. But we in the SHA have benefitted from skill and dedication, too—that of our outgoing chair, Gerard Gilligan. Our enormous appreciation and gratitude go to him and our good wishes and thanks, too, to Carolyn Kennett who takes on the role.

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Thomas Mackereth, 1823–1897: Astronomer and meteorologist

Alan Gall *explores the life and work of a man dedicated to measurement.*

The possession of a good telescope is a source of unspeakable pleasure of the purest and most intellectual character. (Josiah T. Slugg, 1860) [1]

It is 200 years since the birth of Thomas Mackereth, amateur astronomer and meteorologist. Details of Mackereth's life are available, culled mainly from his obituary in the Manchester Literary and Philosophical Society Notices of the Royal Astronomical Society (MNRAS), papers to the Manchester academics from Owens College (the forerunner of the University of Manchester) and local reports of the industrialists. From the classical "humble beginnings" he progressed to become a prominent member of the New Jerusalem Church in the Manchester area.

Most of Mackereth's published scientific output concerned the observation of terrestrial weather; ozone concentrations, wind speed and direction, rainfall levels, humidity and temperature. Much influenced by Joseph Mackereth's ideas on the connection between the weather and sanitary conditions, he felt that constant monitoring of these patterns provided data for possible correlations. His measurements of rainfall have very recently been incorporated into a large database.

There is little record of Mackereth's various sources that he was well-equipped and took an interest in a wide range of topics. He exercised his aptitude as a teacher by giving lectures on astronomy, no doubt inspiring his audience.

The beginnings

According to the MNRAS obituary [2] Mackereth's date of birth is 28 April 1823 at Helsington, near Kendal (historically in Westmorland). Mackereth's parents died around the time of his twentieth birthday. Certainly, his father had died before 2 January 1843, on which date Mackereth married Maria Turner. The marriage certificate gives his profession as a brass finisher, although the obituary describes this as an apprenticeship to a plumber. By this time he had moved to Manchester, where he is to be found living at 20 and Gregson Street [3]. This stood close to the New Jerusalem Church and New Jerusalem Church School on Peter Street. It is more than likely that Mackereth attended this church given his ardent devotion to scientific pursuits. Meetings of the Manchester Literary and Philosophical Society fostered Mackereth's membership of the Manchester industrialists.

Ill-heath forced his retirement. At the age of sixty-three he moved back to his native Lake District, where he died eleven years later.

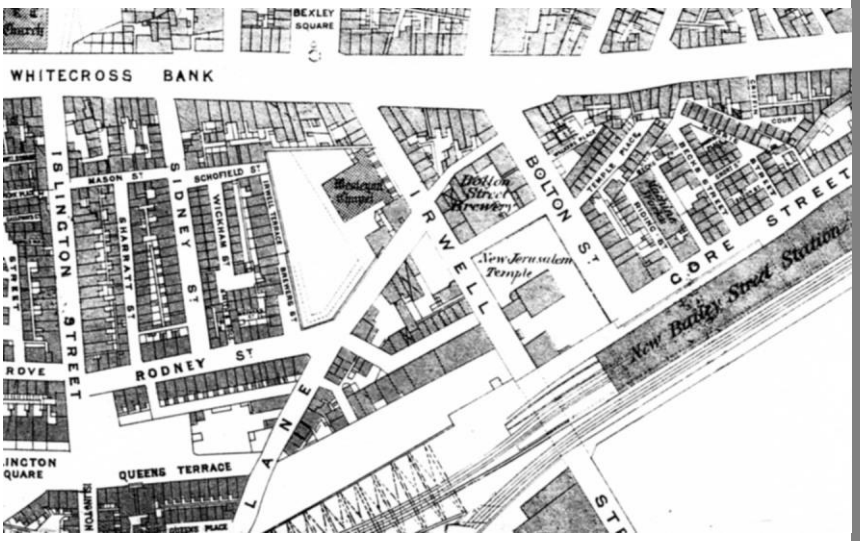


Figure 1: An 1872 map showing The New Jerusalem Temple straddling Irwell Street & Bolton Street, Salford. The building adjacent is the New Jerusalem School where Mackereth became the head master. Above is Whitecross Bank, now known as Chapel Street, the main road into Manchester .

following of Emanuel Swedenborg's theology [4].

Joshua Thomas Slugg, Manchester's maker of budget telescopes, informs us that the Reverend William Cowherd laid the foundation of the church on Peter Street (known as Yates Street at the time) in 1794 [5]. Mackereth would later become associated with the New Jerusalem Church in Salford, opened in 1813 [6] (Figure 1).

The *Catalogue of the Library of the New Church* gives a handy biography of Swedenborg minister of New Jerusalem Church, Higher [7]. Born in 1688 at Stockholm, Swedenborg Bridge Street, Little Bolton. Total seating places wrote prolifically (in Latin) on scientific numbered 370, with no standing room. subjects. Examples are: *Introduction to Algebra* Mackereth reported 306 of the seats as (1717), *A Treatise on the Position of the Earth* occupied, a turnout of over 80% of capacity. He *and Planets* (1719), *A Sketch of a Work on the* felt obliged to explain this unusually large *Principles of Natural Things, or New Attempts at* figure:
Explaining the Phenomena of Chemistry and
Physics on Geometrical Principles (1721), and *The cause of the extra-ordinary attendance on Miscellaneous Observations on Natural Things, Sunday evening March 30th was a lecture which Particularly on Minerals, Fire, and the Strata of was delivered. The* [*situation*?] *of no Sunday Mountains* (1722). A deeply religious man, he *Scholars being in Church in the afternoon was* later reported on visions received from the *because it was closed.*
spirit world. Mackereth would later defend
Swedenborg's conviction that beings lived on Not stated, but very likely, is that Mackereth the Moon and various planets in the solar gave the lecture. His obituary states that he system. often gave popular lectures on astronomy and

encouraged young students.

Manual work did not suit Mackereth so he
endeavoured to better himself by studying for a Having gained a teaching certificate, Mackereth teaching certificate. Exactly when he first moved to Salford where he became headmaster

of the New Jerusalem School on Irwell Street. He moved from Liverpool to Manchester, where he is known to be living in Salford by 1853 as that set up a business in optical instruments with year saw the birth of his daughter Helen. On 9 De- Abraham Abraham as a partner in 1841. Dancer cember 1859 his wife Maria died at the age of 39 could turn his hand to telescopes but his fame from pulmonary tuberculosis. Mackereth was rests mainly on making superior microscopes and quick to re-marry. The following year he moved to the invention of microphotography (Figure 2). He Eccles with his new wife, Margaret (also called even received praise from James Prescott Joule for Mackereth, by birth). Initially they occupied a constructing accurate thermometers [10]. house on Victoria Terrace, off Peel Street, but moved to plusher premises on Half Edge Lane, Joseph Baxendell managed to combine a land christened by Mackereth as "The Observatory". agent's business with spotting variable stars. Over

There had been the birth of three daughters with the years 1848 to 1863 he could lay claim to one Maria. In 1864 Mackereth's only son, another eighth of all the discoveries made worldwide [11]. Thomas, was born. The Mackereth male line of Some observations of variability were conducted descent ended with Thomas junior's son Gilbert, over extremely long periods of time; fifty years in about whom more later. the case of R Leonis [12]. Baxendell held the post of astronomer to the Corporation of Manchester from 1859 until appointed as meteorologist to Southport Corporation. Baxendell's interest in meteorology brought together Mackereth and other amateur meteorologists such as George Venables Vernon (1831–1878) and Rev. Joseph Chadwick Bates (1826–1901). George Venables Vernon, a notable member of the British Meteorological Society [13], observed weather conditions from Trafford Park and used ozone paper that had been prepared for him by Mackereth.


PRIZE MEDAL, 1862,
Awarded for Excellence of Achromatic Microscopes and Originating Microscopic Photography.

J. B. DANCER,
OPTICIAN,
AND
Spectacle Manufacturer,
43 CROSS STREET, KING STREET,
MANCHESTER,
Manufacturer of
PHILOSOPHICAL INSTRUMENTS, ASTRONOMICAL TELESCOPES,
LEVELS AND MINERS' DIALS,
INVENTOR AND MAKER OF THE NEW APPARATUS FOR DISSOLVING VIEWS,
MICROSCOPIC PHOTOGRAPHS SUPPLIED TO THE TRADE.
ARTIFICIAL EYES FITTED.

Figure 2: Advertisement from Slater's Directo- ry of Manchester & Salford 1863 .

From the list in Table 1, there are others who were part of the group of observers living in the Salford and Manchester area, men with sufficient income and leisure time to support their interest. Alfred Brothers (1826–1912), for example, was an expert and prolific photographer who wrote a substantial text on the subject [15]. Brothers also devised an apparatus for comparing the brightness of two stars by the method of limiting apertures [16]. by membership of the Manchester Literary and Philosophical Society (hereafter the "Lit & Phil") membered for the steam hammer but he also [9]. The most notable of these were perhaps John Benjamin Dancer (1812–1887) and Joseph Baxen- such as the Nasmyth-Cassegrain reflecting teledell (1815–1887). If a keen amateur observer scope. Like Nasmyth, Murray Gladstone (1816– could pick a friend, who better than an accom- 1875) owed his wealth to a successful business.

plished maker of telescopes? London-born Dancer

The Manchester scene

Mackereth developed a circle of friends, like- in the love of astronomy and connected by membership of the Manchester Literary and Philosophical Society (hereafter the "Lit & Phil") [9]. The most notable of these were perhaps Benjamin Dancer (1812–1887) and Joseph Baxendell (1815–1887). If a keen amateur observer could pick a friend, who better than an accomplished maker of telescopes? London-born Dancer

Mackereth would also have come into contact with leading scientists through the Lit & Phil, certainly James Prescott Joule. The Owens College group included Henry Enfield Roscoe (1833–1915), the first to isolate the element vanadium, Osborne Reynolds (1842–1812), who gives his name to the dimensionless Reynolds number for fluid flow, and the leading meteorologist Balfour Stewart (1828–1887).

Mackereth's election as FRAS on 10 March 1865 predates his stated membership of the Lit & Phil ten years later. It is curious that the Lit & Phil date of joining is 5 October 1875 as he communicated papers to meetings of the Physical and Mathematical Section from 1866. Prior to that, and starting in 1864, his rainfall measurements at Eccles were submitted via George Vernon. The 2019 film The *Aeronauts* is based on the ballooning exploits of James Glaisher (1809–1903) to collect data on the change in atmospheric conditions with height. Twenty-seven ascents were made during a period lasting from 1862 to 1866, often in the company of aeronaut Henry Tracy Coxwell. One report on the findings appeared under the title "On Scientific Experiments in Balloons" [17]. Glaisher concluded:

From these experiments we may infer that the heat -rays from the sun pass through space without loss, and become effective only where wanted, and in proportion to the density of the atmosphere or the amount of water

Member	Date of Election
Baxendell, Joseph	6 January 1858
Bridson, Joseph Ridgway	4 November 1873
Brothers, Alfred	24 January 1860
Clare, Peter	27 April 1810
Cottam, Samuel	25 January 1853
Cottam, Samuel Elsworth	20 October 1837
Dancer, John Benjamin	19 April 1842
Gladstone, Murray	30 April 1861
Heelis, Thomas	19 April 1859
Jesse, John	24 January 1823
Jones, Rev. Henry Halford	21 April 1846
Jones, Rev. Henry Longueville	15 November 1842
Long, Isaac Waithman	27 Jan 1852
Mackereth, Rev. Thomas	5 October 1875
Nasmyth, James	11 August 1837
Nicholls, John Ashton	21 January 1845
Okell, Samuel	15 April 1884
Rawson, Robert	21 January 1845
Vernon, George Venables	30 April 1861
Winstanley, David	31 October 1871
Worthington, Robert	28 April 1840

Table 1: Members of the Lit & Phil who were also fellows of the Royal Astronomical Society. Election dates are up to the point when Mackereth retired [14]. One measure of the respectability of the Lit & Phil is the number of Fellows of the Royal Society recorded as ordinary members for the period 1781 (the foundation) to 28 April 1896 – a total of 51.

Intelligent life on planets had been proposed by Swedenborg so when Richard Proctor (1837–1888) wrote an article for *Belgravia* magazine

present through which they discrediting Swedenborg, it annoyed Mackereth *pass; and if so, the proportion of heat received at* sufficiently for him to write an eight page *Mercury, Venus, Jupiter, and Saturn may be the* rebuttal [19]. Proctor had suggested that *same as that received at the Earth, if the* Swedenborg's statements about the definite *constituents of their atmosphere be the same as* habitation of various solar system bodies, as

revealed to him by divine visions, were mere frequently, from such periodicals, seen the most imaginings, totally discounted by scientific absurd nonsense set forth as scientific fact" [21].
evidence. One of Proctor's objections to the existence of
Mercurians was the high
temperature expected from its close proximity to the Sun. Mackereth quoted Glaisher's **Meteorological observing** conclusions, above, adding various arguments that appealed to religious belief. Mackereth began his series of meteorological observations in 1861 while at Victoria Terrace A similar defence had been made for the in Salford. The previously mentioned James existence of Selenites. An article appeared in Glaisher had established a network of observers *The Times* newspaper under the title "The Earth around the country and Mackereth became one in its Vigour" and in various forms in other of his many sources of weather data. Rainfall newspapers over the months September and seems to have particularly interested Mackereth October 1883. Mackereth responded with a but he also measured ozone levels using his own piece for *Morning Light*, taking exception to the preparation of ozone papers.
idea that Earth would eventually become a dead world, comparable to "a dead Moon" [20]. He
Mackereth had been supplying Salford's argued against this on religious grounds and sanitary committee with weather data taken at went on to suggest that no firm evidence existed Eccles. In 1866 he wrote to the committee to exclude the likelihood of an atmosphere on suggesting that, although the Eccles readings the Moon, hence the possibility of life. were useful, a monitoring station at the heart of Mackereth also criticised inept science the town might provide better insight into the reporting in the popular press. "I have relationship between weather and disease. It must be remembered that theories on bacterial infection had not become mainstream when Mackereth wrote in 1876, "The origin of disease still lies beyond the ken of scientific research but everyday is showing more certainly what stimulates and provokes it" [22].

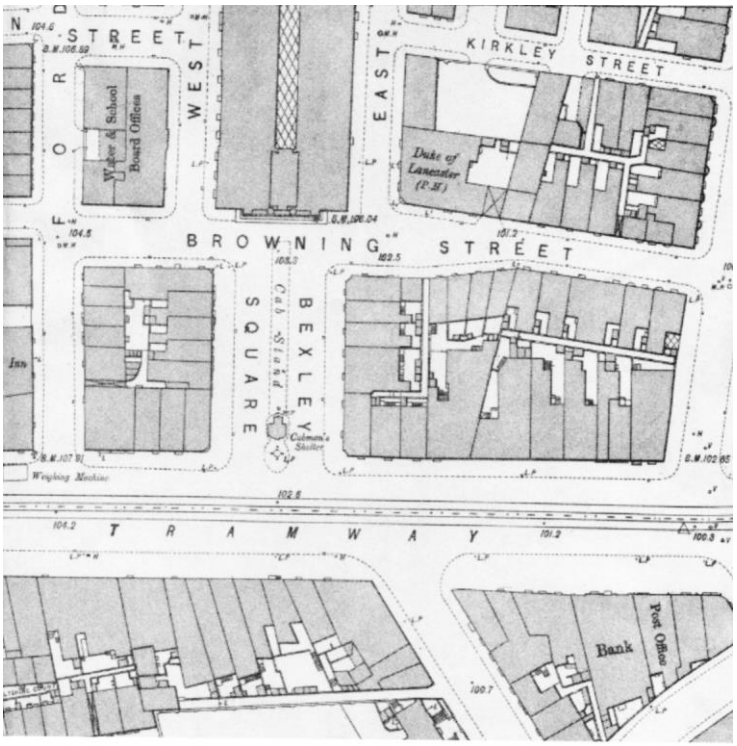


Figure 3: 1889 map of Salford at the enormous scale of 10.56 feet to the mile. The cabman's shelter is marked, in front of Salford Town Hall, Bexley Square

James Glaisher wrote a letter in support of Mackereth's proposal, offering to check the suitability of the meteorological instruments before purchase. A resolution followed in 1867 to erect a structure [24] and this was established under the superintendence of Mackereth in 1868, sited outside Salford Town Hall in Bexley Square. Some early results were discussed with Joseph Baxendell. "Mr Mackereth informs me that these comparisons have already yielded

decisive evidence of a close connection between in meteorological changes and the development of certain diseases which are unfortunately too prevalent in Salford" [25].

Mackereth submitted observations to Salford's Public Health Office. Actual readings were taken for a period by Henry F. Jenkins, a clerk in the employment of the Health Department.

Supervision and processing of results continued for at least twelve years, for which Mackereth received no payment. During that time the original observatory, described as an "unsightly hut", had been replaced by "a new turret" [26].

Figure 4: Undated picture of Salford Town Hall. In the foreground is the cabman's shelter and behind is the meteorology "turret". Photo courtesy of Salford Local History Library.

The observatory was in use until at least 1891. It seems that it shared a location with a cabman's shelter as it is marked as such on a map of 1889 (Figures 3 and 4). The equipment included a rain-gauge, anemometer, barometer, and various thermometers. Of particular interest is the black-bulb thermometer which in its simplest form is an ordinary mercury-in-glass thermometer that features a bulb coated in black. With the bulb now acting as a black body, the temperature recorded is a measure of the Sun's radiation, as distinct from air temperature. The problem with using this instrument is that measurements vary according to the height above ground at the point of placement, differences in manufacture, and the cooling effect of wind. To eliminate the wind factor as far as possible, the bulb needs to be shielded while still having full exposure to the Sun's rays. A more satisfactory option is to encase the bulb in an evacuated outer globe. Mackereth used both types, described as an ordinary black-bulb thermometer and a black-bulb thermometer in a vacuo, respectively (see Figure 5 for an example of evacuated Mackereth used for collecting weather data jacket).

Later life

Mackereth left his teaching job at Salford in 1878, returning to his old calling with the Bolton Society of New Jerusalem Church [27]. He continued with rainfall measurements at various locations around Bolton. In 1886 he retired from his Bolton ministry due to ill-health, moving first to Ambleside, then Ulverston and finally Windermere. He had been submitting his rainfall records to the British Rainfall Organisation from measurements taken at Salford, Eccles and Bolton. His last known submission is from Ulverston (Figure 6) but only covers July, August and September of 1888 [28].

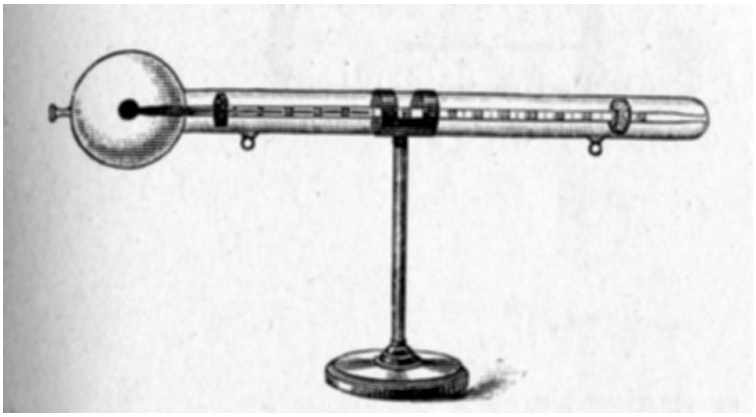
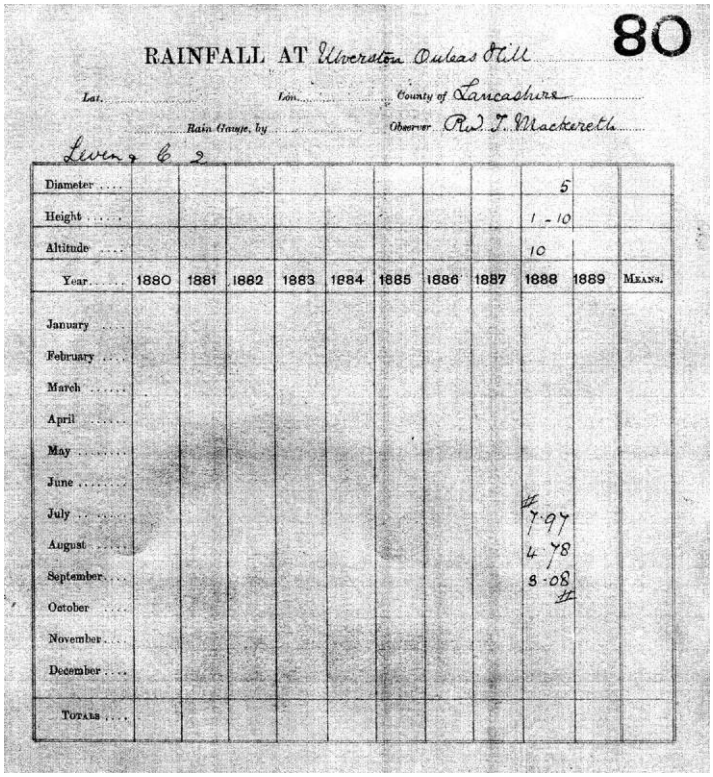


Figure 5: Black bulb thermometer used in Mackereth's time, as pictured in the Townson & Mercer catalogue of 1897.

Mackereth's wide-ranging interests in astronomy are demonstrated by his lecture topics. In 1890 he gave a talk at St John's Church, Windermere, covering stellar, galactic and solar system astronomy.



80

RAINFALL AT Ulverston Outlead Hill

Lat. ..... Lon. ..... County of Lancashire

Rain Gauge, by ..... Observer Rev. T. Mackereth

Liverpool 6 2

Diameter									5		
Height									1-10		
Altitude									10		
Year.....	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	Means.
January											
February ...											
March											
April											
May											
June											
July									7·97		
August									4·78		
September...									8·08		
October											
November...											
December...											
Totals											

Figure 6: The British Rainfall Organisation standard form for rainfall measurements.

He was able to explain the identification of chemical constituents by spectroscopic analysis, systematically developed some thirty years earlier by Robert Bunsen and Gustav Kirchhoff. The following month he delivered a lecture to members of the Kendal Literary and Scientific Mackereth's final years were not kind to him. In the words of his MNRAS obituarist he died "… after a long and weary illness... " His death occurred at home, Woodland Terrace, Windermere on 20 January 1897.

In conclusion

The Revd Mackereth did not achieve distinction as an amateur astronomer, unlike his close friend Joseph Baxendell who gained national and international recognition for his work on variable stars. We now know, of course, that the Mercurians and Selenites do not exist. Mackereth's solid faith in the reality of Swedenborg's visions led him astray in some aspects of scientific theory. But his knowledge of astronomy and training as a teacher ensured that his lectures were well -received. As a public -minded member of the local community, Mackereth collected and processed weather data in the hope of correlating the information with sanitary conditions. This continued for many years without any remuneration. He joined a host of others who offered up their time recording rainfall levels for the British Rainfall Organisation and as a result these records are now digitised and available for analysis and inspection because of the Rainfall Rescue citizen scientists ' project [29].

Figure 7: Sir Gilbert Mackereth, grandson of Thomas Mackereth. (Courtesy of the Fusiliers Museum, Bury, Greater Manchester.)

A footnote

Occasionally it is possible to find one or more relatives of a key person in a historical narrative. Also, occasionally, relatives provide what would otherwise be undiscovered information. The author has not been successful on this occasion. Attempts were made in 2010 by a newspaper to locate living relatives of Thomas Mackereth's grandson Sir Gilbert
Mackereth, finding a first cousin. The reason for the quest was the fate of Sir Gilbert's mortal remains. He had been living in Spain and died there without issue. The Spanish authorities were threatening to evict Gilbert from his grave for non-payment of taxes, until paid by *The Sun* newspaper [30]. His remains now reside in the garden of remembrance at The Fusilier Museum, Bury, Greater Manchester. No images of Thomas Mackereth have been found but perhaps some of his likeness passed down to Gilbert (Figure 7).

References and notes

[1] J. T. Slugg, *The Telescope: Its Construction and Use Explained* (Nabu Press, a reproduction of the original c.1860 text published in 2012) p.81.

[2] Anon, *Monthly Notices of the Royal Astronomical Society*, vol.57, p.215.

[3] 20 Gregson Street was in the centre of Manchester, off Deansgate. Mackereth's wife-tobe lived next door at number 22.

[4] Adoption of Swedenborgianism in the late 1700s had led to the formation of the New Jerusalem Church as a new Christian denomination.

[5] J. T. Slugg, *Reminiscences of Manchester Fifty Years Ago* (Irish University Press, a reproduction of the original 1881 text published in 1971) p.192.

[6] *The Manchester Historical Recorder 1874* (Neil Richardson, reprinted in 1984) p.19.

[7] The Reverend O. Prescott Hiller in Eizak Pitman (ed), *Catalogue of the Library of the New Church Society, Henry Street, Bath* (Isaac Pitman & Sons, 1889).

[8] The Religious Census was conducted for the year 1851 only.

[9] The term Lit & Phil covers both the Literary and Philosophical Society of Manchester (1781– 1875) and the Manchester Literary and Philosophical Society, as it became in 1875.

[10] An account of Dancer's activities in Manchester is given in Robin Marshall, *Three Centuries of Manchester Physics Volume 1: 1641–1870* (Champagne Cat, 2017) pp.97–105.

[11] See Table 1, page 136 of John Toone, "British Variable Star Associations 1848–1908", *Journal of the British Astronomical Association*, vol.120, iss.3 (2010).

[12] H. H. Turner and Miss M. A. Blagg, "Baxendell's Observations of Variable Stars", *Monthly Notices of the Royal Astronomical Society*, vol. 176, iss. 2 (December 1915) pp. 158 –190.

[13] The British Meteorological Society became The Meteorological Society in 1866 and the Royal Meteorological Society in 1883.

[14] *Complete List of the Members & Officers of the Manchester Literary and Philosophical Society from its Institution on February 28th, 1781, to April 28th 1896* (MLPS, 1896).

[15] A. Brothers, *Photography: Its History, Processes, Apparatus and Materials* (Charles Griffin, 1892).

[16] In the method of limiting apertures, the light-gathering area of a telescope is reduced until an observed star (1) of known apparent magnitude is just no longer visible. Performing the same operation for a second star of known apparent magnitude (2) gives the light ratio (R) from the equation: $\Delta m \log R = 2 (\log A_2 - \log A_1)$ where A = aperture in inches, Δm = difference in magnitudes. For a one magnitude difference,

Norman Pogson (1829–1891) set the value of 2/log R^5, giving R = 2.5 (approximately), the value that is still in use today.

[17] James Glaisher, "On Scientific Experiments in Balloons", *Proceedings of the British Meteorological Society*, vol.2, no.19 (1865) pp.424–437.

[18] This is a surprising conclusion to say the least! Taking the Sun's power output as 3.8 x 10^{26} watts and using the inverse square of the average distances away from the Sun, the solar irradiance figures for Mercury and Saturn are, respectively, 9000 W/m^2 and 14 W/m^2 (rounded).

[19] Thomas Mackereth, "On Swendenborg's Visions of Other Worlds", *The Intellectual Repository and New Jerusalem Magazine* (General Conference of the New Church, 1876) pp.478–486.

[20] Thomas Mackereth, "The Moon a Habitable Globe", *Morning Light: A New Church Weekly Journal*, vol. 6, no. 301 (1883) pp.391–394.

[21] Thomas Mackereth, " 'Chambers's Journal' and Ozone", *Proceedings of the Literary and Philosophical Society of Manchester*, vol.16 (1877) p.236.

[22] "The Public Health of Salford", *Manchester Courier* (8 September 1876) p. 6, col. 3.

[23] *Manchester Courier* (8 July 1866) p.6, col.3.

[24] *Salford weekly News* (7 September 1867) p.2, col.3.

[25] Joseph Baxendell, *Proceedings of the Literary and Philosophical Society of Manchester*, vol. 9 (1870) p.168.

[26] John Tatham, *Eleventh Annual Report on the Health of Salford 1879.*

Annals of the New Church 1851–1890.

[28] Information supplied by Jacqui Huntley April 2022.

[29] For details of the Rainfall Rescue Project see https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/gdj3.157 [accessed 10/09/2023].

[30] https://www.bbc.co.uk/news/ukleast-england-manchester-15705770 [accessed 10/09/2023].

Acknowledgements

Thanks to:

Jacqui Huntley, Honorary Research Fellow, Department of Archaeology, University of Durham, for details of the Rainfall Rescue Project and guiding me to Mackereth's rainfall records.

Duncan McCormack, Local History Librarian, and Salford Local History Library, for help with locating maps and records.

Geoffrey Pycroft, Researcher and Archivist, Lancashire Fusiliers website, for the use of Gilbert Mackereth's picture.

The author

Alan Gall is archivist for the Institute of Science and Technology, based in Sheffield, a body representing laboratory staff and managers working in all branches of science and technology. The IST was founded as the Science Technologists Association seventy-five years ago. The current President is ex-astronaut Helen Sharman (an interview with whom featured in Bulletin 35).

A note on the 1831 temporary mounting for E. J. Cooper's large aperture object glass purchased from R. A. Cauchoix.

David Bryden

Astronomer provides histories of the caption, which read: ᵣ *Object Glass by M. Cauchoix* ᵣᵣ recent paper in The Antiquarian As- The second issue has two additional lines to the large aperture objectives made by the *of Paris; mounting & adjustments by M Tulley, on* Parisian optician R. A. Cauchoix. One illustration *the premises of M Comfield, | Clapham, Sept. 23.*ᵈ is that of the temporary mounting constructed *1831.'* [5]. This addition to the caption allows for E. J. Cooper's 1831 purchase for 25,000 the temporary mounting to be put securely in francs of what was at 12½ pouce [13.29 inches context. Edward Joshua Cooper (1798–1863) (334 mm)] then the largest aperture achromatic effectively succeeded to the family estate in Co. objective in the world. It was destined for Sligo in 1830. Having acquired that objective, Cooper's observatory at Markree Castle in Coun- and prior to having it taken to Markree Castle, ty Sligo, where in 1834 Thomas Grubb mounted Cooper tried out the lens in suburban London. it equatorially. It was then used by Cooper in Elected as an MP for County Sligo in 1830, and producing his multi-volume catalogue of stars again in 1831, he was then active at Westminnear the ecliptic [1]. The lithographic print ster—largely speaking and voting against reshowing the temporary alt-azimuth mounting forms that would widen the franchise. The supwas reproduced by H. C. King in his pioneering plementary data added to the foot of the print History of the Telescope, but here too, neither indicates that the temporary mounting was conimprint nor caption are reproduced or cited in structed by the Islington-based instrument- the text [2]. making business founded by Charles Tulley [6]. The alt-azimuth design echoes that made by Two distinct issues of the print are known. That Aberdonian optician John Ramage for his 15which is likely to be the earlier is signed imme- inch aperture Newtonian reflector, erected at diately below and to the left and right of image: the Royal Observatory, Greenwich, in 1825 [7]. 'W. Eldridge lith.ᵍ 'and 'Printed by Inglemann & That the objective was first tried-out in Clapham Co.' The centred caption reads: 'TEMPORARY may explain the choice of Eldridge to record the MOUNTING OF AN ACHROMATIC REFRACTING event—his surviving work includes a lithograph TELESCOPE, | The property of E.J. Cooper Esq.ʳ 'A north view of St. James' Chapel, Park Hill, M.P. | Diameter of the Object Glass 14 Inches, Clapham' [8]. Focal length 25 foot.' The artist and lithogra- pher W. Eldridge is noted in the Gentleman's The 'Mr. Comfield' in whose Clapham garden the Magazine for 1827 for his series of Views in instrument was erected can be securely identiSouth Wales, 'which may fairly be pronounced fied as Richard Comfield (1742–1842), a memsome of the finest specimens yet produced in ber of the Astronomical Society of London from the lithographic department of the arts' [3]. The its foundation in 1820 [9]. Comfield was then same periodical later described his Landscape the proprietor of a dissenting academy in NorthDrawing-Book, Trees, and Rudiments of Trees, ampton, the breadth of whose syllabus included as 'well-executed representations, on stone, of a workshop in which his pupils were taught to fine specimens of forest trees ..... one of the grind lenses and mirrors to make their own telemost attractive books of the kind ever pub- scopes [10]. His own astronomical work was lished.' [4] undertaken using reflectors whose optics he

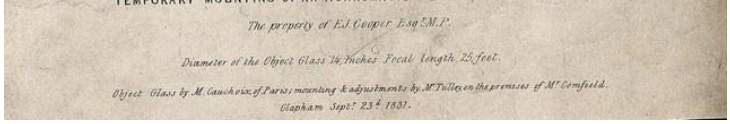


Figure 1: Image from the Wellcome web-site https://wellcomecollection.org/works/v7jdjzvc/images?id=tcz66waf

himself had worked. Charles Tulley, passing on to the telescope collector William Kitchiner FRS a letter from Comfield discussing telescope performance, described him as having 'a great deal of experience in making and using reflecting telescopes' [11]. Following a financial crisis in 1823, which led to the sale of his books and many of his scientific instruments, Comfield left Northampton, settling in Clapham during 1825, opening a school at which he also gave popular scientific lectures [12] and continuing his astronomical activities [13]. 'Rectory Green, Clapham' is Comfield's address as recorded in the list of members of the Astronomical Society of London, and subsequently of the Royal Astronomical Society [14]. Comfield's connection with the Tulley atelier has already been noted, and his Clapham garden would have provided both the space to erect the necessary large mounting, and a clearer atmosphere than Terret's Court, Islington, where the Tulley workshop was situated. The objective and its temporary mounting cannot have remained at Clapham for long. By May 1832 Comfield had moved to Cheltenham, renting space in the Imperial Pump Room, offering 'the Instruction and rational Amusement of young People in the more practical departments of ASTRONOMY, BOTANY, CHEMISTRY, NATURAL PHILOSOPHY, And the SCIENCES in general.' [15]. Astronomy continued to be an interest, and in his subsequent role as Curator of the Cheltenham Literary and Philosophical Institution he fitted-up his telescopes on the roof of their new building to allow Lit. & Phil. members to observe a solar eclipse in 1836, and a lunar eclipse in 1837 [16]. Comfield fell behind paying his annual subscription to the Royal Astronomical Society and being 14 guineas in arrears since February 1835, was expelled (with other defaulters) in early 1836 [17].

References and notes

[1] F. Launay, 'Robert Aglae Cauchoix (1776–1845) and his large achromatic object-glasses', *Antiquarian Astronomer* 12 (2018), 8–9.

[2] H. C. King, *History of the Telescope,* (London 1955), 181.

[3] *Gentleman's Magazine* 97 (1827), 63, 346, 442. No complete set appear to be known; 'Tregarron,/sketched from nature and drawn on stone by W. Eldridge.' London, J. Dickinson, 1827 is in the National Library of Wales, Aberystwyth: TIRLUN CYMRU Cardiganshire Top. B4/6 B115. He was also responsible for engraving the plate for 'Antient Peg-Tankards' illustrating a contribution to the December issue —*ibid* 489.

[4] *Gentleman's Magazine* 103 (1833), 350.

The V&A Art Library has copies of two of Eldridge's drawing books: *The school drawing book of landscapes; being a treasury of art for youth in twenty progressive lessons. (Second series),* (London, n.d.) and *The Boy's Own Drawing Book; being a Treasury of Art for Youth. In Fortyeight Progressive Lessons; commencing with the First Elements, and advancing gradually to Finished Drawings. First and Second Series – Landscapes,* https://discover.libraryhub.jisc.ac.uk/search?q=author: W. Eldridge publisher-place: London&sort=year&rn=4(London, n.d.). His other drawing books are listed in Ackermann's catalogue (addended to the British Library copy of his 1838 issue of *The Tour of Doctor Syntax in search of the Picturesque*), p.15, [BL:1568/4289]), 'Eldridge's Studies of Flowers; in 3 Numbers, Coloured, at 4s. each. Eldridge's Drawing Book of Trees; in 3 Numbers, at 1s.6d. each. Eldridge's Rudiments of Trees; in 3 Numbers,, at 1s.6d. each. Eldridge's Landscapes; in 3 Numbers, at 1s.6d.each. Eldridge's New Landscapes for 1836, in 3 Numbers, at 1s.6d.each, 10s.6d.' no copies are known to survive – though prints of *Weeping willow; Beech; Elm;* printed for him in 1832 by Maguire & Co., London are known – see *Catalogue of lithographic prints, Books &c. in the Art Gallery of The Fuchs & Lang Mfg. Co.,* (New York 1913), 26.

[5] *The Antiquarian Astronomy* reproduced the copy held in the Library of the Institute of Astronomy, University of Cambridge - http://www.dspace.cam.ac.uk/handle/1810/217820. This is the issue with only three lines of caption. A similar copy was sold by James Adams & Son, Dublin, their sale of 24 iv 2018, *The History Sale*, lot 53 – see https://www.adams.ie/83618/***PLEASE-NOTE-THE-TITLE-OF-THIS-LOT-SHOULD-READ-THE-MARKREE-CASTLE-TELESCOPE***-THE-MARKREE-CASTLETELESCOPE-Temporary-Mounting-of-an-Achromatic-Refracting-Telescope-property-of-E-J-Cooper-Esq?view=lot_detail&auction_no=7052. works/v7jdjzvc, and in the Science Museum, London, Inv. No.1998-708 - https://collection.sciencemuseumgroup.org.uk/objects/co461857/lithograph-temporary-mounting-ofan-achromatic-refracting-telescope-print. The Royal Astronomical Society has no record of holding the image credited to them by King (note 2).

[6] King (note 2), 191–196 for Charles Tulley's work on grinding large aperture objectives. G. Clifton, *Directory of British Instrument Makers 1550–1851* (London 1995), 283 outlines the history of the business – Charles Tulley taking his sons William and Henry into partnership c1826, the business trading as William & Thomas Tulley from his death c.1830 to c.1843.

[7] 'Mr John Ramage's Description of his large reflecting telescopes', *Memoirs of the Astronomical Society of London*, 2.1 (1826), 413–418 & plates iv & v. The latter plate re-used in W. Pearson, *An introduction to practical astronomy* (London 1829), vol.2, 79–82. See also http://www.royalobservatorygreenwich.org/articles.php?article=1075

[8] Guildhall Library, *Selected Prints and Drawings from the collection in the library* (London 1965), 79.

[9] *Regulations of the Astronomical Society of London* (London 1820), 29. At 13 ii 1824 Richard Comfield Esq, Northampton listed as a nonresident member of the Astronomical Society of London – having compounded his subscription – see *Memoirs of the Astronomical Society of London* 1 (1822), 524; *Mem Roy Ast Soc* 5 (1833), 430.

[10] D. J. Bryden, 'Richard Comfield (1774–1842), dissenting school proprietor of Northampton: 'an original fellow and probably far from an ideal schoolmaster'. Part I: The Horse Market Academy, 1794 to 1822, *Northamptonshire Past & Present* 75 (2022), 33.

[11] W. Kitchiner, *The Economy of the Eyes, part II, of Telescopes* (London 1825), 76–78.

There are copies of the issue with the two line addition to the caption in Wellcome Library no. 46259i: https://wellcomecollection.org/

[12] *A Key and Companion to the plan of Clapham with its common and environs* (Clapham 1827). The location is given as 50 Clapham Common, East End and 50, Clapham Rise. I am indebted to Sofie Akram of Wandsworth Libraries & Heritage Service for this information.

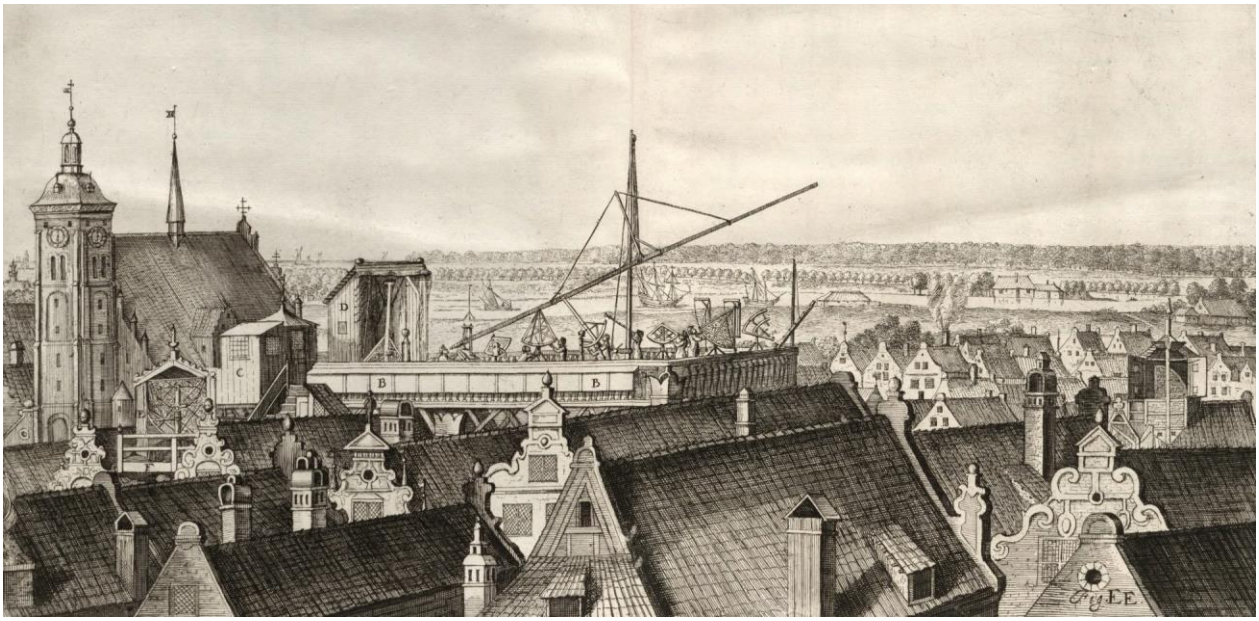
[13] Comfield, R. & Wallis, J., 'Observations of the Occultation of Saturn on the 30th October,1825', *Mem Ast Soc Lond* 2 (1826), 457–8. See also Bryden (note 9), 'Part II: The sale of Comfield's assets and his future career', *Northamptonshire Past & Present* 76 (2023), forthcoming.

[14] See the 1829 and 1833 listing of Fellows of ASL/RAS in *Mem Ast Soc Lond* 3 (1829), 421 and *Mem Roy Ast Soc* 5 (1833), 430.

[15] *Cheltenham Chronicle* 10 May 1832. See also *Bristol Times and Mirror* 8 September 1832.

[16] *Cheltenham Chronicle* 19 May 1836. *Cheltenham Looker-On* 22 April 1837.

[17] *Monthly Notices of the Royal Astronomical Society* 3 (1836), 176.



350 years ago: Publication of Machina Coelestis

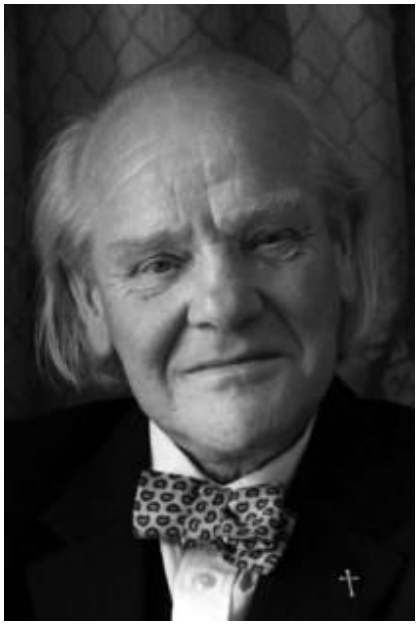
The astronomer **Johannes Hevelius** (1611–1687) is well known to us as a designer and builder of astronomical instruments (though his livelihood was brewing, his family 's business). He was particularly adept at lens grinding and with his apparatus he operated a wonderfully -equipped 17th-century observatory in Danzig, Poland. The first volume of the *Machina Coelestis* describes the equipment and the observatory itself, and the volume is populated with illustrations of exquisite copper engravings.

The figure shown is an image of an engraving that features in the book and depicts the famous rooftop view of the complex (Wikimedia Commons).

Reference: https://library.si.edu/donate/adopt-a-book/machina-coelestis

Interview:
Dr Allan Chapman

President of the SHA



Allan, we are fortunate to have you as president of our society, which you co-founded in 2002 and which you continue to serve whilst still busy at Wadham College. You will be very familiar to many of the readers but I am grateful to you for sharing some more about yourself via these few questions.

And what (if any) music would you have playing in the background?

Beethoven's piano sonata no. 14, the 'Moonlight Sonata'.

How are you presently engaged in the area of astronomy?

What are your current interests in astronomy?

At present, I am preparing a second, expanded and revised edition of my 'Three North Country Astronomical history—my lifelong fascination.
Astronomers' (1982) for the SHA.

If you were only allowed one astronomy book on your bookshelf, what would it be?

What is your earliest astronomical memory?

Sir Robert Ball's 'The Story of the Heavens' c.1886.

I cannot remember a time what I was not interested in astronomy, though when I was aged around 8 or 10, I vividly recall walking around Torquay sea front, as a beautiful half moon was rising above the bay. There were coin-in-the-slot telescopes nearby and I scrounged one coin after another from my dad as I became 'moonstruck'. How I wanted a telescope of my own!!

And if you had the chance to spend a day at any place of astronomical interest, where would you go?

Greenwich, now NMM.

What is your favourite astronomical phrase, motto or quotation?

"The Heavens are telling the Glory of God, and the Firmament Sheweth His handiwork."

(From Psalm 19 and used by Joseph Haydn in his oratorio *The Creation*.)

Which astronomers (past or present) would you choose as companions for an observatory observing session?

Sir John & Sir William Herschel, and Sir Patrick Moore.

First view of the Southern Constellations

Ian Ridpath looks at the influence of Dutchman Petrus Plancius

on revelations during a famous voyage.

I from the island of Texel on the North Sea made, from a latitude of about 23 degrees south n April 1595 four small ships set sail where most of the celestial observations were coast of the Netherlands on a daring [2]. In June 1596 the fleet reached their ultimate voyage that was to last over two years and destination, the port of Banten, an international would take them to the other side of the world trading post on the western tip of Java. Keyser and back. Their aim was to break the died there three months later, but his Portuguese monopoly on trade in spices from observations and those of the other navigators the East Indies, where Dutch ships had never yet were delivered to Plancius when the muchventured. Navigational information for the depleted fleet returned to Texel in August 1597.

voyage was supplied by the Dutch theologian and cartographer Petrus Plancius (1552–1622), much of it obtained surreptitiously from their Portuguese rivals.

Plancius's celestial globe of 1598

Plancius plotted

these previously unrecorded

As well as shipments of valuable spices, Plancius stars, divided into twelve new constellations, on also had other-worldly spoils in mind: a a globe that was published by Jodocus Hondius catalogue of the stars of the southern heavens in (1563–1612) in 1598 or possibly late 1597. the area that was forever hidden beneath the Only one surviving copy of this historic globe is horizon from Europe. To this end, he tutored known, in the Historisches Museum Lucerne. Pieter Dirkszoon Keyser (c.1540–96), chief pilot Despite its importance there are no of the Dutch fleet, in taking positional photographs of it online.

measurements and equipped him with a suitable instrument. This is unlikely to have However, in 1983 the Dutch cartographic been anything as simple as a navigator's cross- historian Peter van der Krogt discovered a set of staff; more likely it was a universal astrolabe 12 globe gores in a volume of cartographic (sometimes known as an *astrolabium* prints held by the Nicolai Collection of the State *catholicum*), one that can be used in any Library of Wu rttemberg, Stuttgart, which latitude, as popularized by their countryman proved to come from the 1598 globe [3,4].

Gemma Frisius [1]. These un-coloured gores, which were intended for a globe of 35 cm diameter, extend from 70

Plancius's motives were twofold: such degrees north to 70 degrees south and include observations would not only be of great ten of the new southern constellations with scientific interest, they would also give a their Dutch and Latin names. The gores are commercial advantage to the celestial globes he centred on the ecliptic poles, not the celestial made by filling in the blank region around the poles, so the new constellations appear on only south pole where no Greek constellations five of them.

existed. These would become the first all-sky globes ever produced.

Unfortunately the south polar cap, or calotte,

On the outward journey, the ships anchored at containing Dorado and Volans is missing. Those Madagascar in 1595 for several months to two figures aside, we can see on these gores ten resupply and recover, since scurvy and of the southern dozen constellations – Apus, malnutrition were rife. This is undoubtedly Chamaeleon, Grus, Hydrus, Indus, Musca, Pavo,.

Phoenix, Triangulum Australe, and Tucana – as they were first visualized by Plancius [Figures 1 and 2]. These figures mostly represent exotic animals that the explorers would have seen on their travels, and all are still recognized today, albeit in modified form. In addition, in Figure 1 we see Crux (here called Cruzero) positioned under the body of the centaur, where we know it today. On previous globes and charts Plancius had shown a much larger cross in the wrong part of the sky before he realized that its stars had been catalogued by Ptolemy as part of Centaurus, but then lost from sight as they were carried below the horizon by precession.

Changing faces of the constellations

Comparison of these new constellations with the modern sky reveals some significant differences. For example, on the 1598 globe Musca, the fly, lies above the head of Chamaeleon, the chameleon, which appears not to be taking any notice of it. However, on a revised globe published by Hondius two years later the fly is positioned in front of the chameleon which is sticking out its tongue to snare it. The Dutch explorers had reported seeing chameleons catching flies with their tongues while in Madagascar, and this tableau was clearly intended to represent such a scene, but it seems that the globe makers initially failed to understand what was meant. For some reason the fly was unnamed on these early globes, which suggests that it and the chameleon might originally have been considered as a joint figure [5].

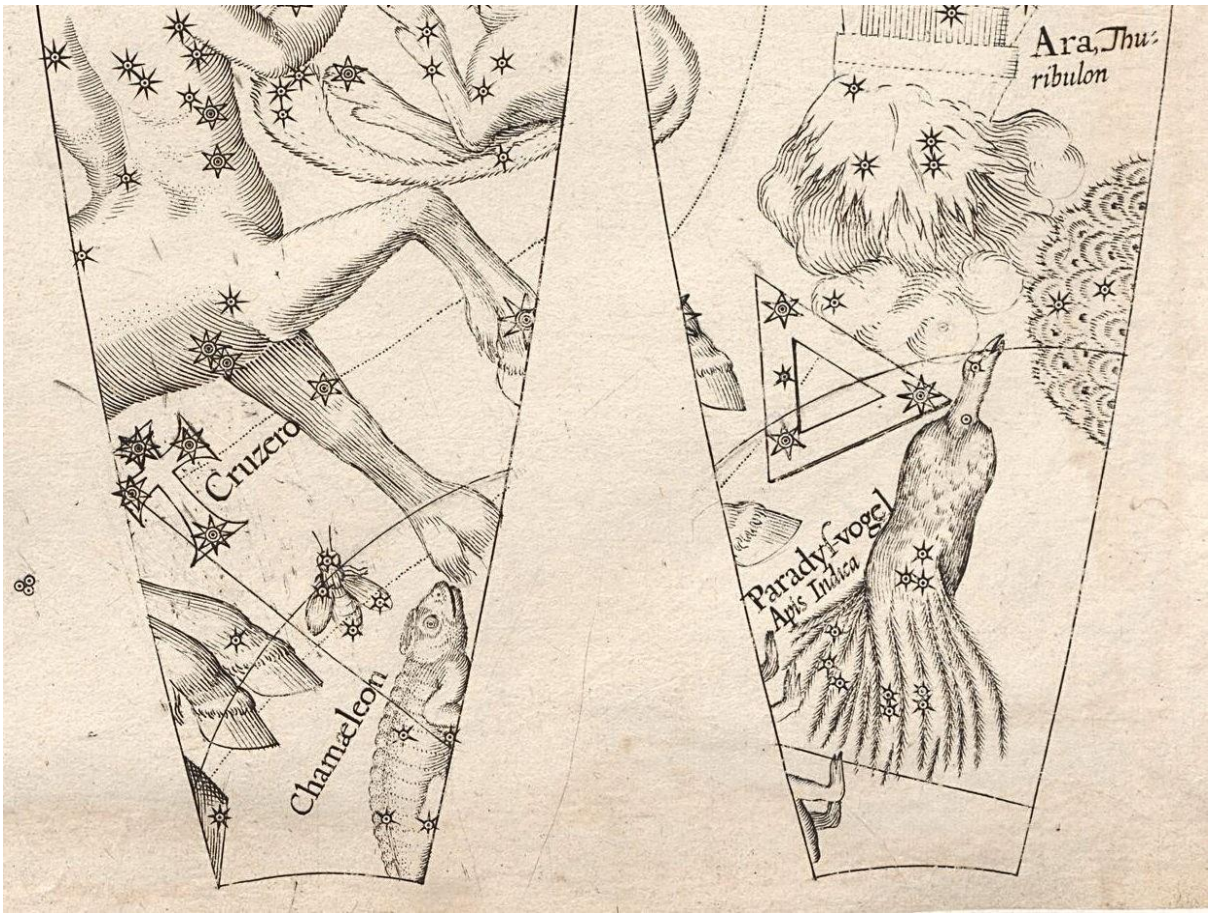


Figure 1: The southern halves of gores 8 and 9 from the Plancius –Hondius globe of 1598 introduced four new constellations: Chamaeleon, Musca (which is unnamed), Triangulum Australe (also unnamed), and Apus, the bird of paradise, here given the Dutch name Paradys -vogel. In addition we see the southern cross, named Cruzero, positioned beneath the body of Centaurus. The figures are drawn in globe view, and so appear back -to-font from the way we see them in the sky. (Nicolai Collection of the State Library of Württemberg, Stuttgart, Vol. 79 'Géographie mathématique', p. 51r)

Figure 2: The southern halves of gores 10, 11, and 12 from the Plancius–Hondius globe of 1598 include Pavo, Indus, Grus, Tucana, Phoenix, and Hydrus. The bright star at lower right, next to the head of Hydrus, is Achernar (here called Alcanar) at the southern end of Eridanus.
(Nicolai Collection of the State Library of Württemberg, Stuttgart, Vol. 79 'Géographie mathématique', p. 53r)

Pavo, representing the Java green peacock, sports a luxuriant tail on Plancius's globe, but in 1756 the French astronomer Nicolas Louis de Lacaille pruned it to make room for Telescopium, one of his own inventions, to the north. Further taildocking affected the magnificent bird of paradise, Apus, which was unceremoniously trimmed by Lacaille to make way for Octans, another of his innovations, in the area around the south celestial pole. Note, incidentally, that on Plancius's globe Apus was labelled as both 'Paradys-vogel' (Dutch) and 'Apis Indica' (Latin). However, the word apis in Latin means bee. It seems likely that 'apis' was a mis-spelling for 'avis', meaning bird. This erroneous name caused confusion for over two centuries, and was still included as an alternative for Apus as late as Johann Bode's *Uranographia* atlas of 1801 [6].

Of all the southern dozen constellations, Hydrus, the little water snake, has undergone the greatest redesign since Plancius's time. On the 1598 globe we see it extending across three gores, with its head by the end of Eridanus, its tail beneath the feet of Pavo, and Tucana sitting on a loop in the middle [Figure 2]. Johann Bayer (1572–1625) added a few coils to the snake as an artistic flourish on his *Uranometria* atlas of 1603, but the first major change came on a globe by the Dutchman Willem Janszoon Blaeu (1571–1638) who moved the snake's body away from the feet of Tucana and turned the end of its tail back upon itself.

More serious changes occurred with Lacaille's reorganization of the southern skies a century and a half later. He completely rerouted Hydrus to pass between the two Magellanic Clouds, transferring some of its stars to Tucana (including the 'star' we now know as the globular cluster 47 Tucanae). In addition, Lacaille chopped off the snake's tail to make way for Octans. It is this more truncated snake that we see in the sky today [7].

Who invented the southern constellations?

The actual inventor of these southern dozen constellations is uncertain, since the original Johann Bayer's chart of the south polar sky, *The* observations were never preserved. Keyser *Antiquarian Astronomer*, 8 (2014), p. 105.

himself died while the ships were still in the East Indies and is unlikely to have made much contribution. The 12 new constellations are often attributed to Plancius, since they first appeared on his globe, but it seems entirely plausible that members of the Eerste Schipvaart would have begun to group the stars they had observed into constellations on their way home. Notable among these crew members was Frederick de Houtman (1571–1627) who is thought to have contributed to the original observations and went on to compile a larger catalogue of the southern stars on a later voyage which was published in 1603. He may therefore have had a major role in shaping the southern constellations [8].

It is worth remembering that the Portuguese were experienced at navigating around the southern tip of Africa from as far back as the end of the 15th century and reached the East Indies almost a century before the Dutch. No doubt they also had their own tables of southern stars for navigation, and had possibly even dabbled with organizing them into groups for easier recognition. But there was no Portuguese equivalent of Petrus Plancius to publish their results, so if the 16th-century Portuguese did invent any southern constellations of their own all knowledge of them has been lost. [8] Ridpath, op. cit. (ref 1.), p. 106.

References

[1] Ridpath, Ian, 'Identifying the stars on constellations of the Nicolai-collection (Stuttgart)', *Der Globusfreund*, March 1985, p. 114.

[2] Ibid.

[3] van der Krogt, Peter, 'The globe-gores in appeared on his globe, but it seems entirely plausible that members of the Eerste Schipvaart would have begun to group the stars they had observed into constellations on their way home.

[4] Nicolai Collection of the State Library of Notable among these crew members was Wu rttemberg, Stuttgart, Vol. 79 'Ge ographie Frederick de Houtman (1571–1627) who is mathe matique' , pp. 51r, 52r, 53r, 54r. thought to have contributed to the original The entire volume can be downloaded from observations and went on to compile a larger http://digital.wlb-stuttgart.de/purl/ catalogue of the southern stars on a later voyage bsz410327069 which was published in 1603. He may therefore have had a major role in shaping the southern

[5] Ridpath, Ian, 'Chamaeleon', *Star Tales* constellations [8]. (online edition) http://www.ianridpath.com/startales/

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[6] Ridpath, Ian, 'Apus', *Star Tales* (online end of the 15th century and reached the East edition)

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[7] Ridpath, Ian, 'Hydrus', *Star Tales* (online easier recognition. But there was no Portuguese edition)

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[8] Ridpath, op. cit. (ref 1.), p. 106.

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The Bright Comet of 1742: a previously unknown observation by William Bulkeley of Wales

Dewi Lewis

Since time immemorial, man has been fascinated, and even scared, by celestial phenomena, namely, eclipses, meteors and comets. There are hundreds of sightings recorded in chronicles or other sources. Needless to say, the value and significance of these records is immeasurable. Here, I present a previously unknown record of the bright comet of 1742 as recorded in the Diaries of William Bulkeley (1691–1760), Brynddu, Anglesey, Wales [1].

Early observations

The Comet was first noted from the Cape of Good Hope on the 5 February 1742 and subsequently widely observed. In Europe, the comet was first seen by William Whiston, Isaac Newton's successor as Lucasian professor of mathematics, in England on 12 March. In a week's time it had developed a tail 8°–9° long with its head at a visual magnitude 2. By 11 March, the comet became circumpolar when it could be seen all through the night [2].

In a letter to *The Observatory* on the Comet of 1742, Lynn [3] stated that,

"It is to be regretted that very few observations were obtained in England. This is to a great extent due to the fact that Bradley had only recently been appointed to succeed Halley at Greenwich who had died on the 14th January and very much of Bradley's time in the early part of 1742 was taken up in getting the instruments

When I first came across the record of a comet in Bulkeley's diaries, I searched for information on this comet. I found this comet discussed in a recent paper by Kapoor [4]. The modern designation of the comet is C/1742 C1. I contacted him with the information as I had initially thought that the date stated by Bulkeley was earlier than the date of its sighting by Grant. The date of the record in William Bulkeley's diaries is 26 February 1742. The record of the sighting by Bulkeley does not appear in the *Cometography* of Kronk [2] or in Kapoor [4]. Kapoor (2023, personal communication) suggested that I contact Dr Gary Kronk himself just in case he now has updates on this comet.

When contacted, Dr Kronk (2023, personal communication) immediately replied. He stated that he had not been aware of William Bulkeley's record of this comet. However, the date of 26 February recorded by Bulkeley would be a Julian calendar date. When converted to the Gregorian date, it would actually be 9 March. The record from Bulkeley's diary states that the comet was already observed "5 or 6 days ago."

in Dr Kronk observed that "Because the comet was *his hands into proper order and adjustments. It* discovered in the southern sky, it would not *appears however from Rigaud's Memoir (p. lxii),* have been visible 5 or 6 days prior to a *prefixed to his 'Miscellaneous Works', that the first* Gregorian February 26". He pointed out that all *account he had of the comet was that it had been* the dates in his *Cometography* were converted to

Gregorian dates after 1582 to make it easier to compare observations from various countries.

Bulkeley's Record of the Comet

I had been undertaking research work on the *Bulkeley Diaries* on behalf of "Lle n Natur" [5] a multi-lingual project which gathers information about the relationship between man and nature. I had previously written a short paper on the records of the Aurora Borealis in the diaries. It was during that piece of research that I came across the reference to "a Comett " in 1742. I undertook further research to ascertain which comet Bulkeley may have referred to. Figure 1 shows how Bulkeley recorded the event in his diary.

It reads:

"Feb 26 1742 At 4 this morning I got up to look at a Comett that had been observed. by some 5 or 6 days ago: it seemed to be but a small star in magnitude & not bright, was very high in the Arch of heaven, & due East; its tail seemed to be 5 or 6 foot long & in breadth 10 or 12 inches; & of a pale, wan colour not much differing from the colour of the firmament, & pointed from the star to S.W. & by S. the Sky at the same time was very serene & clear."

The Bulkeley Diaries are kept at the University of Bangor, North Wales. These are an important piece of documentary evidence available to the historian on life in eighteenth century Anglesey. There are two volumes that have survived; the first covers the period 1734 –1743 and the second from 1747 –1760. A third volume for the period 1743 –1747 has not survived. The two surviving volumes run into over a thousand pages of small but neat handwriting detailing the life of a minor squire in Brynddu, Llanfechell, Anglesey.

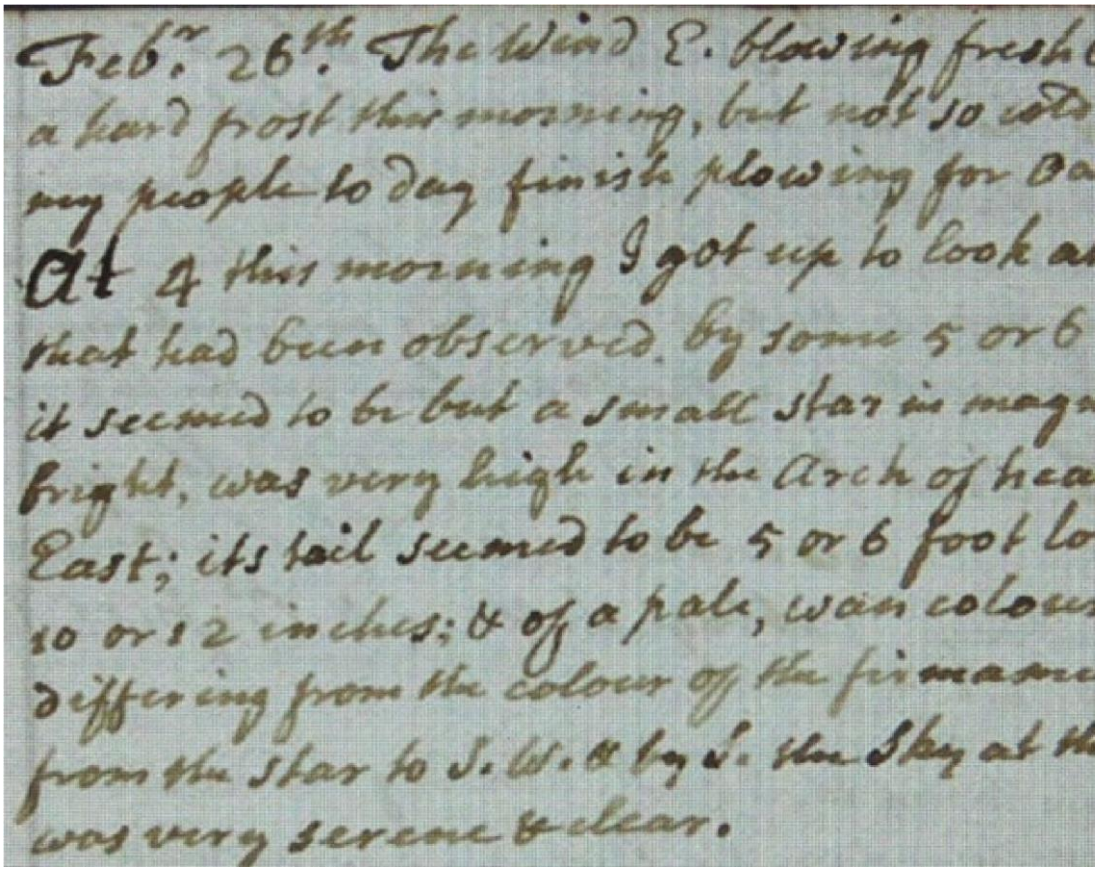

Feb.r 26th. The Wind E. blowing fresh
a hard frost this morning, but not so cold
my people to day finish plowing for Oa
at 4 this morning I got up to look a
that had been observed. by some 5 or 6
it seemed to be but a small star in mag
bright, was very high in the Arch of hea
East; its tail seemed to be 5 or 6 foot lo
10 or 12 inches; & of a pale, wan colou
differing from the colour of the firmame
from the Star to S. W. & by S. the Sky at th
was very serene & clear.

Figure 1: Bulkeley's diary entry for 26 February 1742 which includes the mention of the comet [1].

The bulk of the diaries record farming matters, such as when he started sowing, ploughing or haymaking. Rates of wages for servants and labourers are also noted as well as prices for goods at market. Every day he carefully notes the weather and the direction of the wind. Bulkeley was an astute observer of nature and several such observations are recorded in the diaries. He also records an acquaintance with a local astronomer, which may reflect a general interest in astronomy:

"17 March 1749 gave Rhys ab Richd. Rowland the Astronomer of Llanfaethly 1s. a cheese & 2 Cibbins of Corn."

Anglesey produced a number of astronomers during the eighteenth century. To name a few, the mathematician William Jones (1675–1749) from Llanfihangel-Tre'r-Beirdd, FRS, who produced some work on astronavigation, John Robert Lewis (1731–1806), also known as Sion Robert Lewis and as John Roberts, Holyhead, who ran a nautical academy, published books and produced almanacs with astrological as well as astronomical content, and Robert Roberts (1777–1836), Holyhead, who ran a nautical academy, built an observatory, published books and produced almanacs, with astrological as well as astronomical content. He was the son of John Robert Lewis.

To sum up, the record in the diaries of William Bulkeley represents an important observation of a comet vie[illegible]om Wales and is possibly the only record[illegible]e fro[illegible] Wales of the bright comet of 17[illegible]

Acknowledgements

It gives me pleasure to thank to Drs R. C. Kapoor and Gary W. Kronk for correspondence and useful suggestions.

References

[1] Bulkeley, William, *The Bulkeley Diaries*, Archive of Bangor University; http://bulkeleydiaries.bangor.ac.uk/

[2] Kronk, G.W., 1999. *Cometography*, *A Catalogue of Comets*, Volume 1, Ancient –1799, Cambridge University Press, 403–405.

[3] Lynn, W.T., 1907. The First Comet of 1742, *The Observatory,* **30**, 284–285.

[4] Kapoor, R.C., 2015. Was the bright comet of 1742 discovered from India? *Current Science*, **108**, 2279–2281.

[5] Lle n Natur; llennatur.cymru

Bob Mizon (1946—2023)

Readers will be saddened by the death of Bob Mizon earlier this year, a tireless campaigner for the Dark Skies movement and great populariser of astronomy. Picture credit: Pam Mizon

Quotations Quiz

Who is credited with each of the following quotations and to what do they refer?

1. Not only does God play dice, but he sometimes throws them where they cannot be seen.

2. And yet it moves.

3. Space isn't remote at all. It's only an hour's drive away, if your car could go straight upwards.

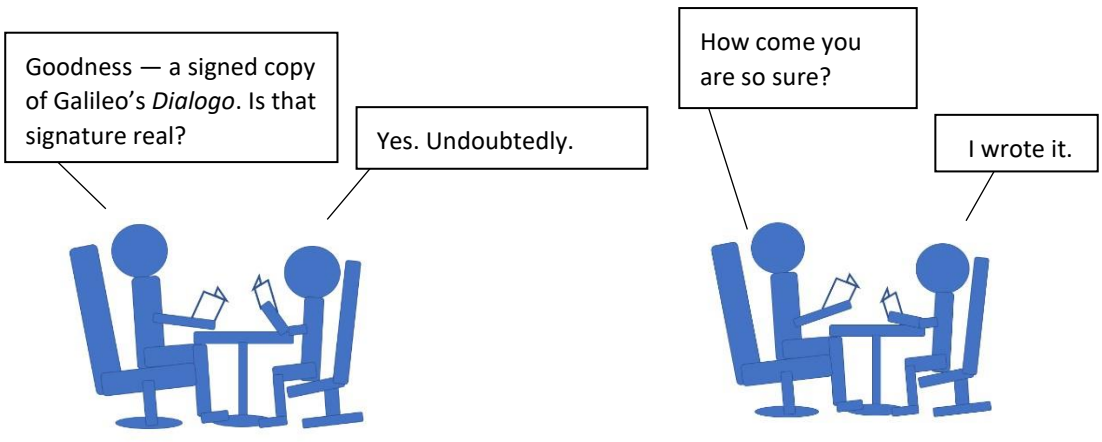
4. Besides learning to see, there is another art to be learned: not to see what is not.

5. If I have seen further it is by standing on the shoulders of Giants

6. There is no problem in science that can be solved by a man that cannot be solved by a woman..

(Answers inside back cover.)

Catching up with the past

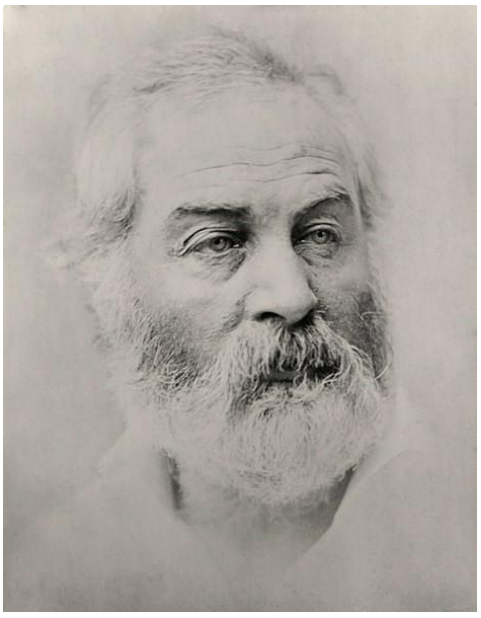


When I heard the learn'd astronomer

Walt Whitman (1819-1892)

When I heard the learn'd astronomer,
When the proofs, the figures, were ranged in columns before me,
When I was shown the charts and diagrams, to add, divide, and measure them,
When I sitting heard the astronomer where he lectured with much applause in the lecture-room,
How soon unaccountable I became tired and sick,
Till rising and gliding out I wander'd off by myself, In the mystical moist night-air, and from time to time,
Look'd up in perfect silence at the stars.

This famous verse by American poet Walt Whitman (himself once a teacher) was published in 1865 and compares the inspiration of a lecturer with that of the intimate experience of the real world. He was deeply affected by the civil war and moved by the natural universe. There is a crater on Mercury named after him.



Whitman, photographed in 1863. (Image: Wikimedia Commons)

Quotations Quiz answers

(Questions on page 23)

1. Not only does God play dice, but he sometimes throws them where they cannot be seen.

These words of **Stephen Hawking** refer to the unpredictability and uncertainty underpinning quantum physics. The statement also directly respondsto Einstein's famous comment, "God does not play dice with the universe," which reflected his reluctance to embrace the indeterminacy of quantum mechanics.

2. And yet it moves. (*Eppur si muove.)*

This is one of the most famous lines associated with **Galileo**, yet he probably did not say or write it at all. It refers to the movement of the Earth, considered static in the Ptolemaic system, Galileo being a great supporter of the Copernican model with which the Catholic Church was in disagreement. More about the controversy of the attribution may be found at https:// blogs.scientificamerican.com/observations/did-galileo-truly-say-and-yet-it-moves-a-moderndetective-story/

3. Space isn't remote at all. It's only an hour's drive away, if your car could go straight upwards.

English astrophysicist **Sir Fred Hoyle** uses a powerful analogy to describe the proximity of space. Famously, Hoyle rejected the 'Big Bang' idea of how space and time originated, though it was a phrase he himself used to ridicule the theory.

4. Besides learning to see, there is another art to be learned: not to see what is not.

Maria Mitchell is drawing attention to the dangers of delusion when searching for truth, a characteristic that lies alongside our natural curiosity and yearning for comprehension.

5. If I have seen further it is by standing on the shoulders of Giants.

Sir Isaac Newton wrote this famous line in a 1675 letter to Robert Hooke, his great rival. Whilst acknowledging the work of others it is also regarded as an unkind dig at Hooke, who had a hunched back.

6. There is no problem in science that can be solved by a man that cannot be solved by a woman.

The American astronomer **Vera Rubin** provided the first unequivocal evidence for the existence of dark matter, the still-mysterious "invisible" material that is believed to account for about a quarter of the universe. Despite her discovery being acknowledged as among the most important breakthroughs in astronomy, Rubin was never awarded a Nobel prize.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