

Chairman's Report on 2025 to Herschel Society AGM on 14 March 2026

We had no major conference in 2025, so our AGM was probably our most significant Society event, and beneficial for the range of ideas it produced for further exploration of the Herschels' stories. It is not so much an agenda as a shop window, and we will welcome opportunities that arise to develop them further.

One of these ideas was a conference highlighting the key contribution of John Herschel to the development of photography. We have since been very fortunate to enlist the voluntary services of a photography history professional local to Bath, named Michael Pritchard, who is masterminding preparations for an all-day conference at BRLSI on Saturday 12 September titled "John Herschel, Henry Talbot and Early British Photography 1834-1861" on a format similar to our previous conferences in 2022 and 2024.

One other useful outcome of the AGM was the idea of a group visit to Collingwood to recreate part of the family's story in the very house where much of it took place. This took place in August with the kind permission and hospitality of the owner, and proved a fascinating and moving experience for all concerned. There is a report about it in the current issue of our Journal, and we hope to be able to reproduce a fuller version of the content at next year's AGM.

The Caroline Herschel Prize Lectureship reached its eighth year, accompanied by helpful agreements to strengthen the involvement of both the RAS and University of Bath from the current year onwards.

Our lecture programme managed by Tony Symes provided a varied and stimulating diet of talks – detail at Annex A. The Spring 2026 issue of our Journal is just out, and I'm pleased to say is the first to be edited by Sarah Waltz, while Tony Symes remains responsible for production. I am sure this will be a constructive partnership, and is a welcome further development of our international way of working.

The steady stream of interest in William's music continues - detail at Annex B

I am very grateful for the help and advice of our Committee, and I am pleased that developments this year have broadened the range of support we can call on to manage our affairs.

Charles Draper

Chairman



Lecture report for 2025

In 2025 our programme included 9 lectures, including 2 for the BRLSI Renaissance theme. All these lectures were delivered to a remote audience via Zoom, and given by the lecturer either in-person at the BRLSI or remotely. Note that most lectures are recorded and freely available on the BRLSI YouTube channel one month after the event and are most easily accessed via the Events page of the HS website.

The yearly average attendance figures (excluding the CH Prize lecture and all-day events) are:

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Lectures	10	9	8	7	9	8	6	8	8	8	10	9
Attendance	40	41	56	57	51	50	43	44	57	64	85	55

Looking to the Moon and Stars: Penllergare Equatorial Observatory

Date: Tuesday 11 February 2025

Lecturer: **Stuart Hemsley-Rice**

Attendance: 27

Penllergare Equatorial Observatory was built 4.5 miles North of Swansea as a 16th birthday present from John Dillwyn Llewellyn (JDL) to his daughter Thereza in 1851. JDL was one of a triumvirate of early photography and astrophotography with Henry Fox Talbot and Nevil Story Maskelyne who was the grandson of the Astronomer Royal, Nevil Maskelyne. JDL was a founding member of the Photographic Society of London, now the Royal Photographic Society. JDL and Thereza took some of the earliest photographs of the Moon in 1857/8 without using a clockwork drive.

The Observatory was damaged in WW2 and used for target practice by the U.S. army. The decline continued throughout the 1960s. Restoration works were carried out in 1982/3 with a new cupola being added. It was placed on the local authority's At Risk Register in 2005. Future plans include action to preserve the hollow bricks which are degrading by enclosing the whole structure with outer glass walls, and replacing the cupola with something more like the original. Because of adverse weather and light conditions, it is planned to function primarily as a planetarium rather than an observatory. There is support and interest from a number of groups.

How Life Was Driven by Sunlight

Date: Friday 14 March 2025

Lecturer: **Dr Robert Fosbury, ESO**

Attendance: 81

Light from the Sun's atmosphere at 6,000°C powers life on Earth – the ultimate super-nutrient. Life has evolved over billions of years to harvest and exploit photons from the Sun. We were reminded of the scattering of the blue portion of sunlight in the sky and charts showed how the blue portion of the sky increases relative to the red towards sunset.

There are few pigments in living tissue, other than deoxygenated blood, to absorb Near Infrared (NIR), so this light is scattered with photons accumulating in the body until they can be absorbed. Plants re-emit light as NIR to animals and fungi, e.g. on the forest floor. Photonic structures in such places as butterfly wings and in chloroplasts harvest light at one wavelength and re-emit it at another.

Artificial lighting no longer uses thermal emitters. LED lighting gives off virtually no NIR. Mitochondria are energised by NIR photons. Peak solar emission at 0.75eV corresponds to maximum transparency of the body. Energy in cells is stored by as many as 10^{21} electron transport chains in all the mitochondria in one body. Without NIR, electron transport can only work when quantum tunnelling occurs. It requires NIR to overcome the energy threshold.

The lecturer and his colleagues are in communication with lighting companies and architects. Urgent action is required for critical indoor lighting. People need to spend more time outside. Progress is continuing in the quantum biology of photometabolism.

Robert Hooke FRS – A half-forgotten scientific genius

Date: Friday 11 April 2025

Lecturer: **Professor Alan Bassindale, Open University**

Attendance: 55

Robert Hooke was born in Freshwater, Isle of Wight, in 1635, and found fossils in nearby Compton Bay. After the death of his father, he was apprenticed at Sir Peter Lely's art studio in London and was mentored by Dr Busby, headmaster of Westminster School.

In 1653 Robert Hooke was at Christ Church, Oxford where he met Robert Boyle, Thomas Willis, John Wilkins, Christopher Wren and John Locke. In 1662 he was appointed Curator of Experiments at the RS and the following year he was elected FRS. In 1665 he was appointed Professor of Geometry at Gresham College and in 1667 he was appointed Surveyor for the rebuilding of London after the Great Fire. He died in 1703.

His achievements included building a vacuum pump for Robert Boyle, the book *Micrographia* with drawings of many objects including cork cells (speculating that all plants are made of cells), the fly's compound eye and the flea, the explanation of the formation of fossils by petrification, the importance of experimentation as part of the scientific method, 3 suppositions about the movement of celestial bodies leading to an inverse square law (which he left to Newton to derive properly), the Gregorian telescope design and attempts at parallax measurements.

He had lifelong health problems and was depressive with an unattractive appearance, but he was also friendly, cooperative and sociable. He quarrelled with Sir Isaac Newton in the 1670s over light, colour and gravity.

The Chemistry of the Universe (Davy Lecture)

Date: Friday 2 May 2025

Lecturer: **Professor Mike Edmunds, University of Cardiff**

Attendance: 54

Chemical reactions everywhere depend on composition, density and temperature. For life 9-20 elements are essential and 99% of the elements in biology as we know it are C, H, O, and N.

The Big Bang formed mostly H and He, along with very little Li and Be. Stars convert H to 4He by means of the proton proton chain, and by the CN reaction in larger stars. When a star ends its life in a supernova, elements up to Fe are formed and merging neutron stars can form the heavy elements above Fe by neutron addition. These processes produce well mixed elements that are dispersed through the interstellar medium. The Fe/H ratio increases steadily throughout the life of the Universe.

Interesting chemicals detected in the solar system include alkanes on the surface of Mars, ammonia chemistry on Jupiter and Titan, H_2O on Europa (a subsurface ocean), and phosphine on Venus which is a possible biosignature.

Biosignature chemicals on Earth include O_2 , O_3 , H_2O , CO_2 and CH_4 . There is now a search for these chemicals in the spectra of eclipsing exoplanets. Chemicals can also be detected in the interstellar medium and in protoplanetary discs in which you get both mixing and separation.

Future exploration could include free-floating planets (40-80% of the total), asteroids and comets. The space of possible chemical forms based on a few elements is 1060. It is estimated that there are a total of 1016 – 10200 possible forms (compare to the number of atoms in the observable universe - $\sim 10^{80}$). There could be 1024 exoplanets in the Universe! We should also not forget that Life in the Universe could include chemical systems that we have not yet considered.

Flip it and Reverse it: probing the origins of oblique planetary systems

Date: Friday 5 September 2025

Lecturer: **Dr Claire Davies, University of Exeter**

Attendance: 43

Claire Davies started with familiar coplanar planetary systems like our solar system, formed when gravitational collapse leads to a circumstellar disc where planets form. A coplanar exoplanet orbiting a rotating star will block out equal amounts of red-shifted and blue-shifted light. If not equal, the planet's orbit must be inclined to the star's plane of rotation. Some of these orbits are found to be very inclined.

The reasons for inclined orbits include binary systems where the outer disc may collapse to a different alignment, density changes in the accreting material and a passing star which can disturb the accretion disc. Also a truly massive planet much larger than Jupiter can warp the disc.

Observation of planetary discs may show shadows in an outer ring caused by an inclined inner ring. Multiple star systems with an inner pair and outer pair orbiting in different planes can be cocooned in multiple misaligned shells. We don't know how many misaligned systems there are or how long lasting, but our theories need to account for the diversity observed.

Tycho Brahe and the Restoration of Astronomy

Date: Friday 3 October 2025

Lecturer: **Dr Emma Perkins, University of Cambridge**

Attendance: 85

This lecture was our first contribution to the BRLSI's Renaissance series running from Sept 2025 to June 2026.

Tycho Brahe (1546 - 1601) was a Danish nobleman contributed an essential part of the development of Astronomy between Copernicus and Kepler. He studied Astronomy secretly when supposed to be a law student, and for this reason relied more on his own observations than others did. He found existing astronomical tables disagreed with both the geocentric Ptolemaic system and the solar-centric Copernican system.

He was motivated to restore Astronomy to what he saw as its classical status, with reference to Hipparchus and Ptolemy, however he also introduced some innovations. He favoured a hybrid system of a fixed Earth with the Sun in orbit around the Earth and the planets orbiting the Sun. Observation of a nova in Cassiopeia which had no parallax with the existing stars and comets showed that these must be beyond the Moon which was at odds with the crystalline spheres of the unchanging Aristotelian Universe.

King Frederick II of Denmark gave Tycho the island of Hven where he built Uraniborg (named after the muse of Astronomy) and Størborg with instruments sheltered in crypts. The instruments were based on classical ones as used by the ancients and included quadrants and armillary spheres, but he improved them with diagonal subdivision of scales and slit features for greater accuracy. With 6-12 assistants, he encouraged multiple independent readings with different instruments so that errors could be picked up. The result was an unprecedented improvement in accuracy which produced the data which was used by Kepler. The finance for this came from the Danish royal court which was prepared to pay a lot for Astrology – birth charts and help with political strategy. But Astrology was being reassessed because of its conflict both with free will and the emerging Copernican system. On the accession of the new King, Tycho had to leave Denmark in 1597 and go to Prague where he was assisted by Johannes Kepler.

Creatures of Reason – John Herschel and the Invention of Science

Date: Friday 7 November 2025

Lecturer: **Dr Stephen Case, Olivet Nazarene University**

Attendance: 29

This lecture was delivered remotely from the U.S.A. with an audience in the BRLSI and online.

Steve Case aimed to explain what led up to John Herschel's publication of the Preliminary Discourse on the Study of Natural Philosophy in 1830 through five phases of JH's life up to that time. First as the Astronomer's Nephew (not only the son of William but also the nephew of Caroline), his family name opened doors everywhere in Europe and he was able to use his aunt's star catalogue as a basis for his work. Second as the Reforming Cantabrigian he founded the Analytical Society with Charles Babbage to encourage the teaching of French methods in mathematics rather than the then obsolete Newtonian methods.

Third as the Reforming Astronomer, he, Francis Baily, and Charles Babbage founded the Royal Astronomical Society because of frustration with the Royal Society, and brought in the ideals of the Analytical Society. Fourth as the International Savant, JH travelled to Paris in 1819 and 1820 where he found Science to be more mainstream. Travelling further in Europe

and for example climbing both Vesuvius and Etna, he saw Science as an international endeavour and Earth as a global system.

Fifth, Final Reform and its Failure: frustrated by the quarrels between scientists and the conservative Royal society, JH withdrew from that world and took up the invitation to write the Preliminary Discourse.

The Caroline Herschel Prize Lecture: Unveiling the Secrets of Hidden Supermassive Black Holes

Lecture given at the University of Bath and online

Date: Thursday 20 November 2025

Lecturer: **Dr Victoria Fawcett, University of Newcastle**

Attendance: ~230

Victoria started by describing stellar evolution, familiar to most of us, which for low mass stars ends with a white dwarf, and for large mass stars ends with a black hole (BH). The nearest stellar mass BH is 1,500 light years away, while the nearest supermassive black hole (SMBH) is Sagittarius A at the centre of our galaxy. 27,000 light years distant and with a mass of 4×10^6 solar masses. This has been imaged by the Event Horizon Telescope global network. SMBHs can be up to 10^9 solar masses. The question is do SMBHs form before their host galaxy, afterwards, or do they co-evolve.

An Active Galactic Nucleus (AGN) is an SMBH with an accretion disc that outshines its host galaxy. Recent research reveals that many different kinds of AGN (quasars, blazars, seyfert galaxies etc) may all be the same kind of object viewed from different angles. The second brightest quasar found is at a redshift of 7.642, has a mass of 1.6×10^9 solar masses and a luminosity of 3.6×10^{13} suns. Such a large BH being formed only ~670 million years after the Big Bang challenges current theoretical models.

These distant objects are hard to categorise by eye, so spectra are used to tell us their type, mass and distance and whether winds are being launched. Quasars normally emit blue light predominantly, redder quasars are obscured by dust. These redder quasars are being targeted by the Dark Energy Spectroscopic Instrument (DESI) to find out how they fit into the unified AGN model.

Thomas Harriot, Renaissance Astronomer, Navigator and Mathematician

Date: Friday 5 December 2025

Lecturer: **Anthony Symes, Herschel Society**

Attendance: 63

This lecture was our second contribution to the BRLSI's Renaissance series running from Sept 2025 to June 2026.

Thomas Harriot (1560 - 1621) was born and educated in Oxford and joined the household of Sir Walter Raleigh at Durham House in London in 1583 to train his navigators. He studied the causes of errors in navigation and showed how to remove them. When Raleigh's reconnaissance mission to Roanoke Island returned in 1584 with two native Americans, Harriot taught them English and learned Carolinian Algonquian from them, inventing his own phonetic alphabet to enable it to be written. The following year (1585) Harriot travelled to Roanoke in sir Richard Grenville's fleet of 7 ships and spent time with the native Americans, exploring and living their life. On his return in July 1586, he wrote *A Briefe and True Report*

of the New Found Land of Virginia describing the people and resources of the area to encourage future colonists. However this was the only work that he published which explains why he remains relatively unknown.

In the 1590s Raleigh became friendly with Henry Percy the ninth Earl of Northumberland, and Harriot began working for him too, eventually taking rooms in Syon House, Northumberland's West London property. Harriot pursued his interests in optics (describing Snell's law of refraction 20 years before Snell, and explaining the rainbow), and astronomy using the newly invented telescope to draw the crescent Moon before Galileo did. He went on to draw a full map of the Moon and study sunspots which enabled him to estimate the period of rotation of the Sun. He also took accurate measurements of the position of Halley's Comet which helped with orbit calculations much later.

Harriot was arguably the foremost mathematician of his time and worked in a number of areas including the binomial expansion, binary arithmetic, falling bodies, triangular numbers and their use in interpolation and the solutions of polynomial equations leading to a partial understanding of complex numbers (noetic numbers as he called them). However his most important contribution to posterity might be judged to be modern algebraic notation, using single letters for variables and writing equations in a clear, concise and consistent way. Harriot died in 1621 of a cancer which started on his nose or lip, possibly caused by his heavy use of tobacco. His work was published in 1631 by a pupil as *Artis Analyticae Praxis*, but inadequately represented his work. His manuscripts disappeared until they were found well preserved under a pile of old stable accounts at Petworth House, Sussex in 1784 and are now in the British Library.

Herschel musical activities and plans, 2025-6

Research on the Herschels' musical activities continues to build, if still in piecemeal fashion. Avenues for the future include correcting and expanding the historical record in the most recognized authoritative sources, such as Grove Music Online, Musica Britannica, high-level peer-reviewed journals and other items indexed in music and humanities databases, but also correcting the record in places like Wikipedia. Work that compiles and releases data will help enable that expansion and correction.

Relevant figures for research include not just William Herschel but Caroline, Jacob, Alexander, John Dietrich, William's son John, and the 5 Griesbach nephews, as well as other family members. Even with the best known figure, William, new musical works continue to turn up in recently-digitized archives and no complete scholarly index of the works has been made available, let alone any complete scholarly edition of the works themselves. Therefore editions, translations/publications of music-related letters and sources, contextualizations of William's music and career, and performances are all very welcome routes for expanding research, as is information concerning any musical activities after William's retirement from professional music. Caroline's musical life is overdue for examination by music scholars; Jacob and Alexander seem to have been well known figures in their time whose accomplishments can still be collected, though Dietrich's seem more obscure. John clearly studied music and wrote some treatises involving acoustics, so this should not be overlooked as the Society expands into John's science. The Griesbachs' many accomplishments are known to some musical circles but not generally linked to the Herschels, and the manuscripts they held (now in the British Library) may hold some clues to the Herschel story.

In musical performance, the agenda is to record and perform known William Herschel works as much as possible, familiarizing audiences with Herschel-as-composer, providing premiere recordings of unrecorded works and also new or refined interpretations of previously recorded ones, or editions of music that permit such recordings and performances. This agenda can be expanded to other related figures, so that as works are discovered they can be added to the known catalogue.

The Herschel Society can help by supporting some projects with a subvention, by posting research on its website or directing members and social media contacts to new performances and research, and by helping integrate musicological work into museum displays. Members can also of course help by listening to new performances! As the research and performance agenda progresses it becomes increasingly apparent that music wasn't a dead end for the scientific Herschels but a fundamental expression of many of the same traits that went into their science.

Here are some specific projects that are in progress or recently completed:

Matthew Spring, with the support of the Herschel Society and in collaboration with Matt Dicken at Bath Spa University, has been undertaking a Herschel Music Archive project, to integrate scans of the works held at the University of California, Berkeley, into a digital archive. Incipits of the all the movements for all the pieces (some 100 files) have been prepared. This project has recently moved forward as Matthew has been given access to the existing keyboard files held by BathSpaData and is now able to alter and upload files directly. The keyboard music collection held in Edinburgh and the chamber music collection at Berkeley will soon be made available to the Society's website.

Matthew frequently speaks on Herschel and music, most recently at Oxford in November 2025. One point of interest for the Oxford audience of about 70 was the connection of the Herschel family with Littlemore, a village now within the Oxford area. Sir William James Herschel and Miss Emma D. Herschel (children of John Herschel) had lived in Littlemore at the end of the nineteenth century and the early years of the twentieth and there is a 'Herschel Crescent' and adjoining recreation ground on

land that was then part of Littlemore Parish. Matthew has recently contributed an interview to an educational film on the Bath Assembly Rooms that touched upon the Herschel's musical activities. The film is to be produced by the Sunflower Production company for the National Trust.

Sarah Waltz discovered a new (brief) William Herschel work at Princeton University in 2025 in a musical commonplace book, as well as a recently digitized manuscript of a Jacob Herschel symphony in B-flat that appears to be otherwise unknown. She is also working on the Caroline Herschel Music Notebook held by the Hanover Royal Music Archive at the Beinecke Library at Yale University; its contents add both insight and corrective to Caroline's memoirs concerning her musical training. Sarah has spoken on this at McGill University in Montreal in November 2025 and at the Western Society for Eighteenth-Century Studies conference on "Eighteenth-Century Collaborations" in February 2026; it is planned for journal publication.

Woody Sullivan and Sarah Waltz continue to collaborate on a biography of William Herschel's early (musical) years. The availability of sources such as the William-Jacob correspondence held by the Herschel Family has helped establish much about the Yorkshire years and re-interpret the historical record held in increasingly-digitized newspaper ads about concerts, etc.

Margaret-Mary Sauppè, organist and musicologist, plans to record the bulk of Herschel's organ works on a period-appropriate organ in London in May 2027, and hopes to arrange a relevant 1-day symposium during her visit, which has already received quite a bit of interest.

The Dionysus Ensemble has released its recording of the Violin Concerto in A Minor. Please find the link here:

li.sten.to/ad04cwz5

On the recordings previously produced by the Dionysus Ensemble, Léonie Adams has said "I know that they get a lot of radio play around the world - it seems that something is played somewhere almost every week - which is wonderful, which gives us heart to keep going." This is great news! She also reports that there have been performances of the violin sonatas all over the world after they recorded them. They are working with schoolchildren in the Slough area and teaching them about Herschel's music as well.

Simos Papanas, violinist and concertmaster/artistic director of the Thessaloniki State Symphony Orchestra, has been performing William Herschel's violin music and symphonies, including three capriccios as an encore on a concert in late October 2025: (at 28'22")
https://youtu.be/Tis2nW33Lm4?si=F_y7H_Q0ViG6mLqU&t=1702

Musicologist Alyson McLamore and composer Barnaby Priest are editing Jacob Herschel's Symphony in C Major as part of a project by Musikproduktion Höfflich to replicate the eighteenth-century series of *Periodical Overtures in 8 Parts* in which it originally appeared. It is due out in June 2026.

The American ensemble Les Delices, whose leader Debra Nagy has performed some Herschel oboe music and interviewed the Dionysus ensemble on her podcast, will perform at University of the Pacific and may be prevailed upon to include a Herschel work.