Some Nottinghamshire Astronomers

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This paper summarises research into the lives of some of the astronomers who were born or worked in the English county of Nottinghamshire. Twelve individuals are mentioned, including the professional astronomers Norman Robert Pogson (1829–1891) and John Russell Hind (1823–1895); and the amateurs Robert White (1694–1773), Edward Gregory (1744–1824) and Joseph Whitehead (1784–1811). Collectively, these observers represent more than 300 years of local astronomical history, most of which is poorly documented. The rural south and east of the county was particularly rich in its clusters of observers, who were active within a few miles of each other. The interaction of these individuals would reward closer study.

Like many other members of the Society for the History of Astronomy (S.H.A.), I started my research initially in the 1990s to help Dr Allan Chapman locate material for his book, *The Victorian Amateur Astronomer*.[1] The purpose of Chapman's book was "…to examine the contributions made to astronomy by those persons who were not paid professionally to do so." [2] Having spent many hours browsing the collections of local libraries with some success, I became fascinated by what I found, and wondered how many other Nottinghamshire astronomers were waiting to be re-discovered. The founding of the S.H.A. gave me the perfect vehicle with which to further my research, and I volunteered my services as the Nottinghamshire representative for the S.H.A. Survey of Astronomical History.[3] This paper is my tribute to astronomers either born or working in the county – observers and theorists, amateurs and professionals. It also mentions a library that played an important rôle in the dissemination of astronomical and scientific knowledge in 19th century Nottingham.

Nottinghamshire (Figure 1) is a county in the East Midlands of England.[4] Its western area is industrial, while the eastern area is mainly rural. Nottingham, in the south of the county, is the only city; with the towns of Mansfield in the west, Retford and Worksop in the north, and Newark in the east. The county is perhaps best known for its association with Robin Hood and Sherwood Forest, and the manufacture of bicycles. It was also a major producer of coal until the 1980s.

Although Nottinghamshire has never produced astronomers in the league of Sir Isaac Newton, from Lincolnshire to the east, or John Flamsteed from Derbyshire to the west, there are nevertheless one or two major figures, as well as several minor ones, whose stories are worth telling.

Figure 1

The English county of Nottinghamshire showing the places mentioned in this paper

Robert White (1694–1773) was a resident of Bingham, a village in south-east Nottinghamshire. According to his biographer, he was of humble parentage and a cripple from birth.[5] His family and friends provided him with a liberal education so he would be able to earn his living as a schoolmaster. He was taught only the classics until he was nineteen years old, but then "… launched out into the wider and intricate maze of figures, wherein by close application and a natural bent of inclination,

he made a very rapid progress, particularly in the sublime art of astronomy." [6]

We do not know how White came into contact with the astronomical establishment, but he began compiling for the Worshipful Company of Stationers almanacs, which contained ephemerides for the Sun, Moon and planets, and were very popular. White's almanacs sold very well, until he omitted the "weather prophecies", of which he did not approve; to raise sales he had to reintroduce them. He also wrote *A Celestial Atlas* in 1750[7], which went through several editions - the last published in 1840 - clearly it was well received. His reputation was such that in 1767 Nevil Maskelyne (1732-1811), the Astronomer Royal, asked him if he would like to become the compiler of the *Nautical Almanac*. He declined due to old age (he was then 73 years old). Figure 2 shows the memorial to White in Bingham Church.

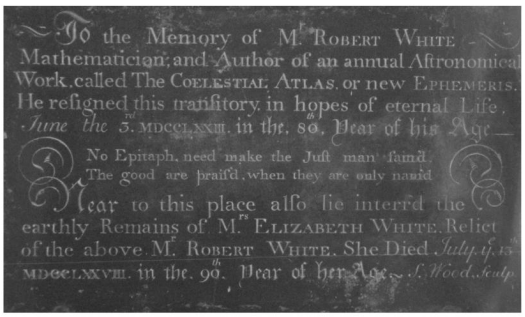


Figure 2

Memorial to Robert White in the parish church of St Mary and All Saints, Bingham

Photograph by the author September 2006.

Many great British astronomers of the past were clergymen. This was because they were graduates of the universities of Oxford or Cambridge, a pre-requisite for which was that they had to be ordained as Church of England ministers. Such a person was the Reverend John Michell (1724–1793),[8] who is one of the best known of the Nottinghamshire-born astronomers. He was born in the village of Eakring on Christmas Day in 1724 (only recently has his place of birth been discovered by astronomers). He was the son of the Rector of Eakring, who was well-known to the local gentry. Little is known about John's early life and education, but we do know that he studied at Queen's College, Cambridge, where in due course he taught arithmetic, geometry, theology, Greek, Hebrew, philosophy and geology. He is probably best known as the 'Father of Seismology', for his pioneering work on the study of earthquakes. However, he was interested in all aspects of science, including astronomy. In a paper written for the *Philosophical Transactions* in 1784,[9] he argued that stars 400 to 500 times more massive than the Sun ("dark stars" as he called them) would not allow light to escape, but would be detectable by their gravitational effect on other, nearby stars. He was thus the first person to suggest the idea of black holes in space, two hundred years before their existence was indirectly confirmed.

Michell also invented and built an elegant apparatus, the torsion balance, with which to measure the density of the Earth. Unfortunately, he died before he could use it. Eventually it came into the hands of Henry Cavendish (1731–1810), the English natural philosopher, who was the first person to carry out the experiment, in 1798 at Cambridge University. Using Michell's apparatus, Cavendish obtained a value of 5.45 $g{\cdot}cm^{-3}$, which is close to the value accepted today.[10]

In a paper entitled, *An enquiry into the probable parallax, and magnitude of the fixed stars,*[11] Michell argued that stars must be extremely far away because their parallax was undetectable with the telescopes of the time. The German astronomer Friedrich Wilhelm Bessel (1784–1846) confirmed this 70 years later when he measured the parallax of 61 Cygni as 0.3 arcseconds, the first star thus to be accurately measured.

Michell was the first person to use statistics in astronomy, arguing that many double stars must be real binaries, not just optical doubles. He likewise recognised that stars in clusters such as the Pleiades must be really associated, not just the result of chance alignments.[12] His ideas influenced his contemporary William Herschel (1738–1822), who also used statistical techniques, for example in measuring the spatial density of stars in the Milky Way.[13,14] Michell also made a 10-foot reflector, which eventually came into Herschel's possession. Much of Mitchell's scientific work was carried out while he was the Rector of Thornhill in Yorkshire, from 1767 until his death in 1793.

Another clergyman with a passion for figures was Charles Wildbore (1737-1802). He was born in Nottingham and for 34 years was the curate of St Luke's church, Broughton Sulney (now named Upper Broughton) in the south of the county. Like White, he had been a schoolmaster at Bingham. As their dates overlap, it is probable that they knew each other. There is evidence that he was the son of Cornelius Wildbore (born 1713) a master dyer, who was a friend of Thomas Peat (1708–1780), an eminent Nottingham mathematician. Charles was left an orphan when very young, and those in charge of the local workhouse took him in and provided him with a good education at Nottingham's Blue Coat School.

Wildbore was said to be a child of "extreme dullness" and "absence of thought",[15] except when given figures to work with. He was given the nickname "Silly Charley" because he would walk round and round his garden for hours, doing calculations in his head.[16] When 14 years old he was apprenticed to the local apothecary, but later gave it up to become a schoolmaster. On his marriage in 1760 he inherited an estate at Kirton in Lincolnshire, and seven years later took holy orders. From thence on, he devoted much of his time to the study and application of mathematics. A genius at mental arithmetic, he wrote a paper in Martin's *Miscellaneous Correspondence* to prove that the Moon's orbit was always concave with respect to the Sun, showing that its orbit was more akin to that of a planet than a satellite.[17] He was perfectly correct in this. He became a reviewer for *Philosophical Transactions* and "led a goodly band of mathematicians in Nottinghamshire" (including the above-mentioned Thomas Peat). He was offered membership of the Royal Society but turned it down, being something of a recluse and not wanting to travel to London for meetings. However, he did correspond with many eminent scientists of his day, including Charles Hutton (1737–1823), a Fellow of the Royal Society, Professor of Mathematics at the Royal Academy in Woolwich, and editor of the *Ladies' Diary,* famous for its mathematical puzzles.

Another clergyman with a passion for astronomy was the Reverend Edward Gregory (1744–1824), who lived for many years in the village of Langar, in the south of the county. He was the third son of George Gregory, Esquire of nearby Rempstone Hall. Thoroton's *Antiquities of Nottinghamshire* (1795) states that Gregory:

> "…was a gentleman whose astronomical pursuits are spoken of with much respect. He has lately erected an observatory near his house, which has order and embellishments without, as well as usefulness within." [18]

The old Rectory still stands, but so far I have been unable to find any trace of the observatory.

On 8 January 1793, whilst observing Venus and measuring its distance from the star ι Aquarii, Gregory discovered a comet. It was independently discovered by the French astronomer Pierre Méchain on 10 January. Its official designation now is c/1792II, c/1793A1. It is also known as Comet Gregory-Méchain. Gregory's description of the comet was recorded in letters he sent to the Astronomer Royal, Nevil Maskelyne, and which later appeared in the *Philosophical Transactions*.[19] He died at Langar on 25 October 1824. In St Andrew's Church, there is a memorial to his charitable work and as a large tomb in the cemetery (Figure 3).[20]

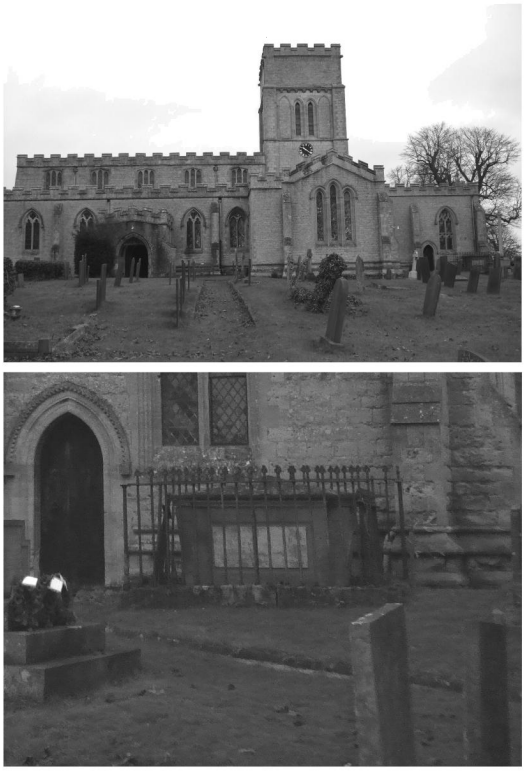


Figure 3

St Andrew's church, Langar, Nottinghamshire, burial place of Edward Gregory

The upper panel shows the church from the south. The lower panel shows Edward Gregory's chest tomb on the south side of the chancel. Photographs by Mr Robin Coles, November 2007. By courtesy of Mr Robin Coles.

In the early 19th century, science lectures for the general public became popular, and Nottinghamshire produced one lecturer of international renown, Robert Goodacre (1771–1835) (Figure 4). He was born in the village of Long Clawson, just

Figure 4

Robert Goodacre (1771–1835)

This silhouette is from Reference 21.

Figure 5

Robert Goodacre's school, Nottingham

This image is taken from Reference 22.

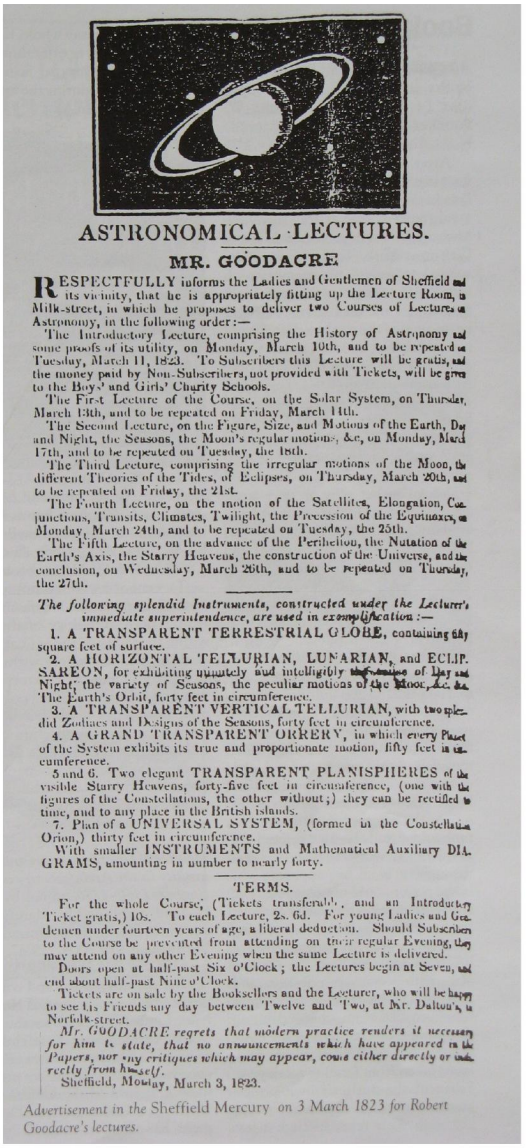
By courtesy of the Thoroton Society of Nottinghamshire.

over the county border, in Leicestershire. A tailor turned schoolmaster, he built an observatory on the roof at his school near Nottingham Castle, where astronomy was part of the curriculum (Figure 5). His 1808 publication, *An Essay on the Education of Youth*[23] contained a list of books and scientific instruments used at the school, including an orrery, a microscope, a barometer, a thermometer, a pair of twelve-inch globes and a quadrant. In 1809, telescopes and other astronomical instruments were added. Goodacre was enlightened and liberal, and was very keen to promote science, the teaching of which was at this time very poor.

In 1817 Goodacre began to construct an "extensive and original apparatus for the purpose of illustrating a series of lectures on astronomical science",[24] and in 1821 he gave up his teaching career to become an itinerant astronomy lecturer (Figure 6). From then until his death in 1835, he lectured in more than 200 towns in Great Britain, including Bradford, Derby, Sheffield, Nottingham, London and Edinburgh. He also lectured in Canada, and in 24 towns in the United States of America, where the President and Vice-President attended one of his lectures, and 10 members of Congress signed a public testimonial to his abilities.

His series of talks included the solar system; the Earth's surface and climate; the astronomical basis of time; the Moon (its phases; eclipses and tides); comets, parallax and transits of Venus; and "The Belief of Man in Divine Revelation". This last talk was aimed at widening his audience to those interested in theological and moral issues, in keeping with the ethos of the times.

His lectures were always well attended. The lecture aids he constructed contributed greatly to their success. There were about forty of these, including a large transparent terrestrial globe, a large transparent orrery, a horizontal tellurian, lunarian and eclipsareon, transparent planispheres; and a "universal system of solar systems", of 30-foot circumference, and smaller instruments.[25]



ASTRONOMICAL LECTURES.

MR. GOODACRE

RESPECTFULLY informs the Ladies and Gentlemen of Sheffield and its vicinity, that he is appropriately fitting up the Lecture Room, in Milk-street, in which he proposes to deliver two Courses of Lectures on Astronomy, in the following order:—

The Introductory Lecture, comprising the History of Astronomy and some proofs of its utility, on Monday, March 10th, and to be repeated on Tuesday, March 11, 1823. To Subscribers this Lecture will be gratis, and the money paid by Non-Subscribers, not provided with Tickets, will be given to the Boys' and Girls' Charity Schools.

The First Lecture of the Course, on the Solar System, on Thursday, March 13th, and to be repeated on Friday, March 14th.

The Second Lecture, on the Figure, Size, and Motions of the Earth, Day and Night, the Seasons, the Moon's regular motions, &c, on Monday, March 17th, and to be repeated on Tuesday, the 18th.

The Third Lecture, comprising the irregular motions of the Moon, the different Theories of the Tides, of Eclipses, on Thursday, March 20th, and to be repeated on Friday, the 21st.

The Fourth Lecture, on the motion of the Satellites, Elongation, Conjunctions, Transits, Climates, Twilight, the Precession of the Equinoxes, on Monday, March 24th, and to be repeated on Tuesday, the 25th.

The Fifth Lecture, on the advance of the Perihelion, the Nutation of the Earth's Axis, the Starry Heavens, the construction of the Universe, and the conclusion, on Wednesday, March 26th, and to be repeated on Thursday, the 27th.

The following splendid Instruments, constructed under the Lecturer's immediate superintendence, are used in exemplification:—

1. A TRANSPARENT TERRESTRIAL GLOBE, containing fifty square feet of surface.

2. A HORIZONTAL TELLURIAN, LUNARIAN, and ECLIPSAREON, for exhibiting minutely and intelligibly the cause of Day and Night, the variety of Seasons, the peculiar motions of the Moon, &c. &c. The Earth's Orbit, forty feet in circumference.

3. A TRANSPARENT VERTICAL TELLURIAN, with two splendid Zodiacs and Designs of the Seasons, forty feet in circumference.

4. A GRAND TRANSPARENT ORRERY, in which every Planet of the System exhibits its true and proportionate motion, fifty feet in circumference.

5 and 6. Two elegant TRANSPARENT PLANISPHERES of the visible Starry Heavens, forty-five feet in circumference, (one with the figures of the Constellations, the other without;) they can be rectified to time, and to any place in the British islands.

7. Plan of a UNIVERSAL SYSTEM, (formed in the Constellation Orion,) thirty feet in circumference.

With smaller INSTRUMENTS and Mathematical Auxiliary DIAGRAMS, amounting in number to nearly forty.

TERMS.

For the whole Course, (Tickets transferable,) and an Introductory Ticket gratis,) 10s. To each Lecture, 2s. 6d. For young Ladies and Gentlemen under fourteen years of age, a liberal deduction. Should Subscribers to the Course be prevented from attending on their regular Evening, they may attend on any other Evening when the same Lecture is delivered.

Doors open at half-past Six o'Clock; the Lectures begin at Seven, and end about half-past Nine o'Clock.

Tickets are on sale by the Booksellers and the Lecturer, who will be happy to see his Friends any day between Twelve and Two, at Mr. Dalton's, in Norfolk-street.

Mr. GOODACRE regrets that modern practice renders it necessary for him to state, that no announcements which have appeared in the Papers, nor any critiques which may appear, come either directly or indirectly from himself.

Sheffield, Monday, March 3, 1823.

Advertisement in the Sheffield Mercury on 3 March 1823 for Robert Goodacre's lectures.

Figure 6

An advertisement in the *Sheffield Mercury* of 3 March 1823 for Robert Goodacre's lectures

By courtesy of the publisher.

Goodacre made no astronomical discoveries and owned no large telescopes, but he did bring the wonder and excitement of the night sky to a generation of schoolchildren in Nottingham, as well as to countless hundreds of adults in the United Kingdom and in North America. He died, while on tour, in 1835 in Edinburgh, and is buried there.[26]

Another schoolmaster turned astronomy lecturer was a Mr Potchett (dates unknown), from Sneinton in Nottingham. Like Goodacre and Edward J. Lowe (1825–1900), another Nottinghamshire astronomer, he lectured at the Mechanics' Institute in Nottingham, which had been established

in 1837. His lectures at Newark, a town in the east of the county, was the stimulus for the establishment there of a Mechanics' Institute. The *Quarterly Journal of Education* for 1831 reported:

> "At Newark, Mr Potchett, a schoolmaster from Snenton [*sic*], has given a series of lectures on astronomy. the whole of the mechanical apparatus, as well as the geometrical figures, used in illustrations, being of his own construction. Mr Potchett having, in the course of his lectures, expressed a hope to witness the establishment of a Mechanics' Institute, a schoolmaster in the town was immediately offered the use of a room, and a small society was formed, the first meeting taking place on New Year's Day." [27]

Unfortunately, no records seem to have survived of the lectures, or of the subsequent history of the Newark Mechanics' Institute.

The Victorian Age in astronomy was characterised by the rise of the professional assistant, and this is no better illustrated than in the life of John Russell Hind (1823–1895)[28] (Figure 7). Hind was the son of a Nottingham lace manufacturer and was interested in astronomy from an early age. On the recommendation of Professor Charles Wheatstone (1802–1875), of King's College, London, he was engaged in 1840 as one of the assistants in the Magnetical and Meteorological Department at the Royal Observatory, Greenwich. His job was that of Supernumerary Computer, a lowly post which was the first rung on the professional ladder, but poorly paid, with few prospects. However, it gave Hind the grounding to aspire to better jobs, and in 1844 he was appointed to the observatory at South Villa, in Regent's Park (London), and home of George Bishop (1785–1861) a wealthy wine merchant.

Hind brought enormous renown to South Villa, which came to the forefront of the observation of, and research into, double stars, planetary motion, proper motion and deep-sky work. It was also successful in cometary and asteroid astronomy - Hind discovered both. He also published the first confirmed sighting of Neptune in Britain, which took place on 30 September 1846. He won many medals for his discoveries; Sir John Herschel reckoned him among the best observers and computers of his age. He led in the growing professionalisation of astronomy in England, eventually becoming Foreign Secretary of the Royal Astronomical Society. In 1853 he was preferred over John Couch Adams (1819–1892), the joint discoverer of Neptune, to the post of Superintendent of The Nautical Almanac Office, which he held until 1891. He died at Twickenham, Middlesex in 1895.

Hind's discoveries included the star R Leporis (Figure 8), known as Hind's Crimson Star, which he identified as a Mira-type, long-term variable. He described it as "… like a drop of blood on a black field".[29] He also discovered T Tauri, which we now know is a prototype of a class of newly formed stars that has not yet settled down on the Main Sequence.[30] Not far from T Tauri is Hind's

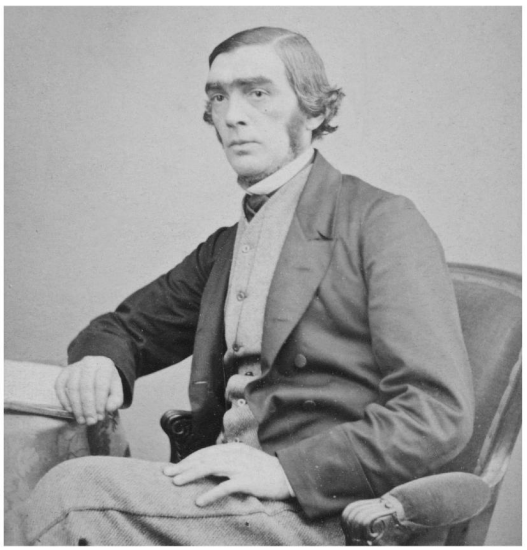


Figure 7

John Russell Hind (1823–1895)

From Hind's Carte de Visite.

By courtesy of the Science Museum, London.

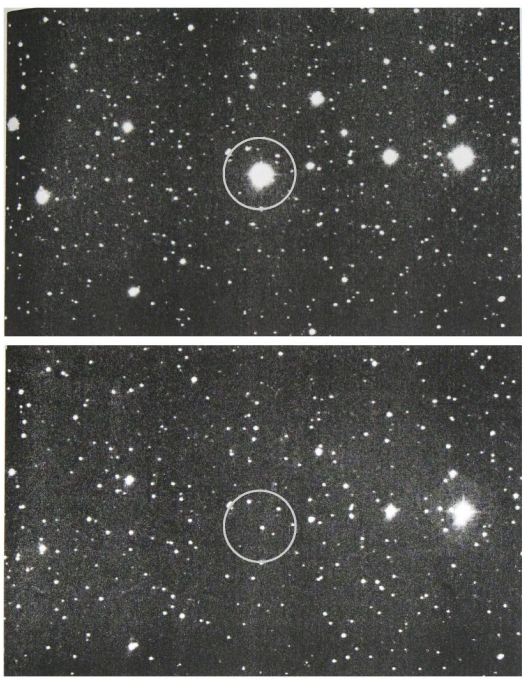


Figure 8

Hind's crimson star, R Leporis (circled)

R Leporis (circled) is shown photographed in red light (upper panel) and in blue light (lower panel). From Reference 31.

By courtesy of Dover Publications.

Nebula (NGC 1555), a reflection nebula that is illuminated by its neighbouring variable star.[32] It was visible between 1852 and 1861, but then began to fade from sight. By 1868 it had disappeared completely from telescopic view, and was not seen again until 1890, when it was observed by E.E. Barnard and S.W. Burnham in the United States of America. It again vanished, but traces were seen by photographic means, in 1899. In 1920, the phantom nebula began to brighten again, but it still remains a challenge for observers today.

Norman Robert Pogson (1829–1891) was a contemporary of Hind and also hailed from Nottingham. He, too, became a professional astronomer. By the age of 16 years he was sending astronomical reports to the local press, and by the age of 18 years he had calculated the orbits of several comets. One of his best-known discoveries was the minor planet Isis, for which he was awarded the Lalande Medal of the Académie Française in 1861.

In 1847 Pogson went to work with Hind at South Villa (see above) where he stayed until 1851. He then moved to the Radcliffe Observatory in Oxford, where most of his work was devoted to variable stars. He also helped George Biddell Airy (1801-1892), the Astronomer Royal, with his experiment to try to determine the mean density of the Earth. This experiment took place at Harton Colliery in County Durham in 1854.[33]

For nearly two years, from January 1859, Pogson was observer at the Hartwell observatory of Dr John Lee (1783–1866) in Buckinghamshire (Figure 9). In October 1860 he was appointed Government Astronomer at Madras, India (Figure 10). There he produced the first major Indian star catalogue, based on more than 51,000 observations. Unfortunately, not all of it was published.[34] His reputation was as an outstanding observer, who laid the foundations for independent Indian astronomy, and was instrumental in setting up its first dedicated solar physics observatory. Pogson stayed in Madras for 30 years, until his death in 1891. He used his wife and daughter as helpers, as funds to hire help were not available. His obiturist in the *Monthly Notices* records his indefatigable devotion to duty, exemplified by the fact that that during his whole time in India he took no holidays.[35]

Pogson is best remembered today as the originator of the first precise definition of visual star brightness, which he devised in 1854. He expressed the relationship between stars of different brightness by the formula $m_1 - m_2 = -2.5 \log (l_1/l_2)$, where m_1 and m_2 are magnitudes and l_1 and l_2 are intrinsic luminosities. Each magnitude interval equals a brightness difference of 2.512 times, or 100 times for a range of five magnitudes.

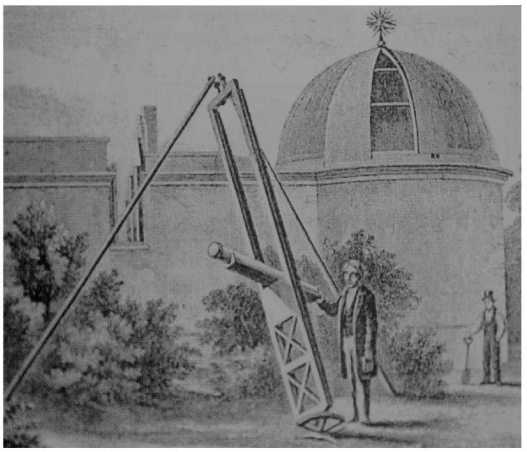


Figure 9

The observatory of Dr John Lee at Hartwell, Buckinghamshire [36]

The figure shown at the parallactic ladder mounting has been identified as "probably" being Norman Pogson,[37] but considerable uncertainty remains. Work is in progress to try to remove this uncertainty.

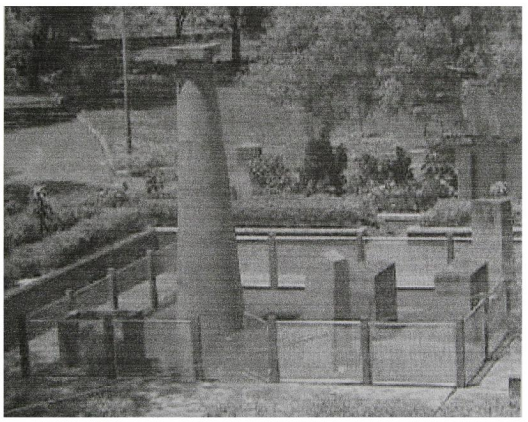


Figure 10

Madras Old Observatory

For the origin of this image, see Note 38.

Whereas Hind and Pogson were professional astronomers, Edward Joseph Lowe (1825–1900) (Figure 11) was a wealthy amateur whose family owned a large area of land in Nottingham.[39] Lowe inherited a love of astronomy from his father Alfred Lowe (died 1856).[40] Between them they erected no fewer than three observatories in the Lenton and Beeston areas – at Highfield House, Broadgate House and the Pepperbox.[41] Edward was elected a Fellow of the Royal Astronomical Society in 1848 and published some useful work, including several books on astronomy and meteorology,[42] and some papers on meteors[43] and the zodiacal light.[44] He was secretary of the committee set up in Nottingham in 1851 to try to get funding for a public observatory in the Midlands, which un-

Figure 11

Edward Joseph Lowe (1825–1900)

By courtesy of Mr Frank Barnes.

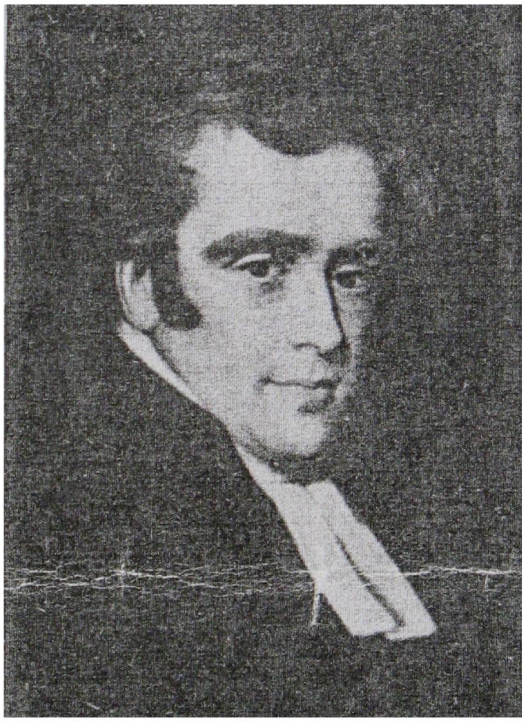


Figure 12

Rev. Robert White Almond (1786–1853)

By courtesy of Bromley House Subscription Library, Nottingham.

fortunately never materialised.[45] Lowe was one of the last of what Allan Chapman has given the name "the Grand Amateurs" – those individuals wealthy enough to be able to pursue their interests full-time without a regular job. He died in Shirenewton, Monmouthshire, in 1900.[46]

The Reverend Robert White Almond (1786-1853) (Figure 12) was Rector of Saint Peter's church in Nottingham for many years, and was a keen amateur astronomer. He was a friend of the famous Nottingham mathematician, George Green, and became President of the Bromley House Subscription Library, which played a leading rôle in the dissemination of scientific ideas in 19th century Nottingham. For example, the Nottingham Literary and Scientific Society met there from 1824 onwards. R. Goodacre and Mr Potchett lectured there. Subscribers included J.R. Hind and E.J. Lowe, who was also a trustee in 1874. Famous visitors included Michael Faraday (1791–1867), whose signature can be seen in the old visitor's book.

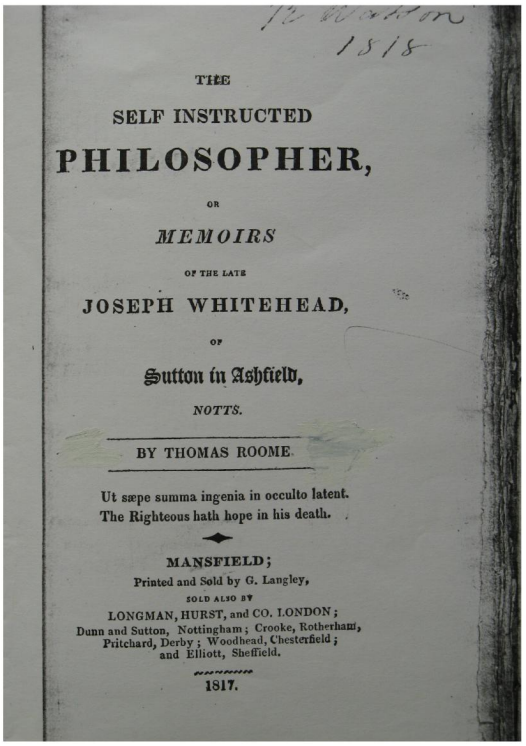
This library is still in use today. As well as containing an excellent collection of 19th century astronomy books and journals, it also houses some astronomical instruments, a meridian marker and a beautiful sundial in the garden. An article about this most-interesting library is planned to appear in a future issue of the S.H.A. *Newsletter*.

Some of the most interesting astronomers of the past were those having a working-class background. Their stories rarely survive, so it was with satisfaction that I learned from members of Mansfield and Sutton Astronomical Society of the existence of Joseph Whitehead (1784–1811). Whitehead was a frame stocking-knitter in the town of Sutton-in-Ashfield. In his whole life he had only three weeks schooling – he thought his teachers useless – and taught himself to read and write. We are told that he became an expert in astronomy, and at 20 years of age he:

> "… could measure the diameters and distances of the heavenly bodies, satisfactorily account for their respective motions … and possessed an accurate and extensive acquaintance with the solar system." [47]

He also became an expert in predicting and dating eclipses. His work colleagues said his stockings would frequently fly off their frames as his mind was occupied elsewhere!

With the help of James Ferguson's *Astronomy Explained* ... – an inspiration also to the young William Herschel – Whitehead managed to construct a magnificent orrery four feet in diameter, made with his own tools and engraved by him. He was only 21 years old at the time, and it was declared by one manufacturer to be the best he had



THE

SELF INSTRUCTED

PHILOSOPHER,

OR

MEMOIRS

OF THE LATE

JOSEPH WHITEHEAD,

OF

Sutton in Ashfield,

NOTTS.

BY THOMAS ROOME.

Ut sæpe summa ingenia in occulto latent.
The Righteous hath hope in his death.

MANSFIELD;
Printed and Sold by G. Langley,
SOLD ALSO BY
LONGMAN, HURST, and CO. LONDON;
Dunn and Sutton, Nottingham; Crooke, Rotherham,
Pritchard, Derby; Woodhead, Chesterfield;
and Elliott, Sheffield.

1817.

Figure 13

Title page of Thomas Roome's life of Joseph Whitehead

By courtesy of Pearson Publications.

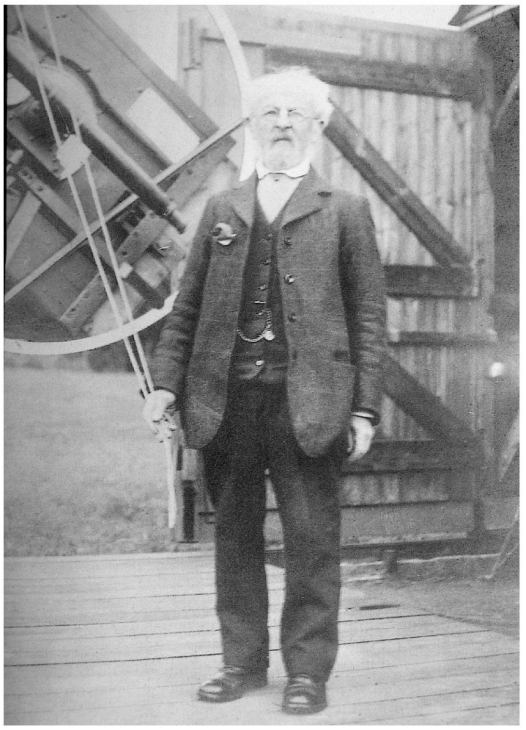


Figure 14

Thomas William Bush (1839–1928)

The person shown in this photograph has been identified as T.W.Bush by Mr Patrick Fleckney of Nottingham. It was reproduced in Reference 52. The telescope shown in the photograph is the 24-inch reflector depicted in Figure 15.

By courtesy of Sir Patrick Moore.

ever seen. It was sold to a Dr Williams of Rotherham College in south Yorkshire. So far I have been unable to find its present whereabouts.

Whitehead died at the tragically early age of 27 years, after contracting a lung disease from sleeping in a damp room. A copy of the book about his life (Figure 13) is in Sutton-in-Ashfield library.[48] Reading it is a salutary lesson in what some of our predecessors had to endure. It is also a tribute to the book's author that he was prescient enough to record Whitehead's life for posterity.

Another working-class astronomer was Thomas William Bush (1839–1928)[49] (Figure 14), and his story is an intriguing one.[50] Bush was born at number 2, Canal Street, Nottingham, where he learned the baking trade from his stepfather, who ran his own business there. We know that Bush was observing quite early in life. He lived in a crowded and smoky part of Nottingham, which considerably hindered his observations.[51] He seems to have had only basic schooling, but taught himself Latin, Greek and Hebrew. His astronomy he learnt from Sir John Herschel's *A Treatise on Astronomy*, which was first published in 1833.

Bush came to national attention in 1870, when he 'stole the show' at the Working Men's Exhibition in London with his homemade, 13-inch, equatorially-mounted, reflecting telescope. It is said to have weighed 15 hundredweight (about 760 kg), gave excellent definition at magnifications of up to 1400x, and could 'split' several double stars that were difficult to separate. It came to the attention of Queen Victoria, the Prime Minister and the Astronomer Royal (Airy), who sent him a solar eyepiece, a spectroscope and a filar micrometer.

Bush seems to have made a success of the family baking business, and in 1876 moved from Canal Street in the centre of Nottingham to the new, leafy suburb of Mapperley. There he had a house built with its own observatory, and both are shown on an Ordnance Survey map of 1880. It was this discovery that led Patrick Fleckney, a Nottingham amateur astronomer, to piece together Bush's story in the 1990s.[52]

At Mapperley, Bush observed the 'Great Comet of 1881' (otherwise known as Comet Tebutt and C/1881 K1and 1881 III) with the spectroscope given to him by Airy, and he detected carbon and other elements in its tail. In 1889 he moved to Shropshire and became Lord Forester's astronomer in his private observatory at Willey Park. In 1909

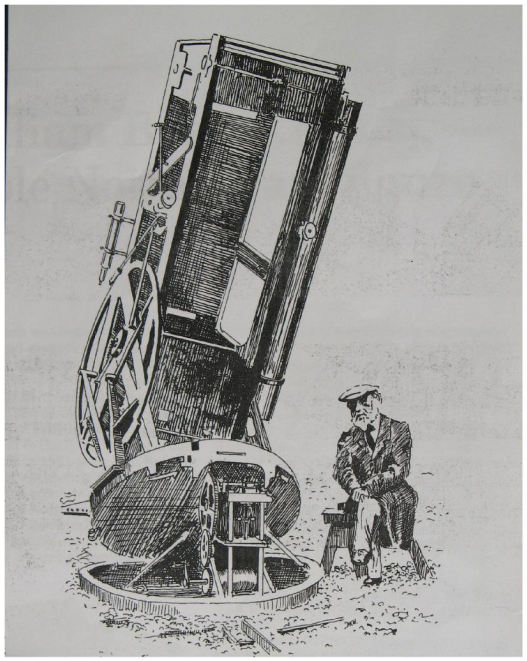


Figure 15

T. H. Bush with his self-made 24-inch reflector

Compare this view of the telescope with the telescope shown in Figure 14. This sketch is thought to be by David Northrop, whose book Reference 53, contains water-colour depictions of many observatories, and is an attractive and valuable source of information about amateur astronomy in the first part of the 20th century in England.

By courtesy of Mr Patrick Fleckney.

he retired to Cornwall, where he designed and made a 24-inch, f4 reflector on a simple, clock-driven equatorial mount (Figure 15). In 1909 he moved again, to East Grinstead in Sussex, where this instrument was used at the Brockhurst Observatory of F. J. Hanbury. He died there in 1928, having made some considerable headway on the professional ladder, including Fellowship of the Royal Astronomical Society.

Interestingly, another Nottinghamshire-born astronomer, William Sadler Franks, (1851–1935) also worked at the Brockhurst Observatory.[54,55] Born at Newark in 1851, Franks developed an early interest in astronomy, his speciality being the colour of the stars. From 1892 to 1904 he worked as photographer to Isaac Roberts (1829–1904) at his observatory at Crowborough, Sussex, and in 1910 he was hired by Hanbury to work as an observer at Brockhurst, where he continued his studies of the colours of stars. He also made micrometer measurements of double stars.

Franks's first major publication was a *Catalogue of the Colours of 3890 stars*,[56] communicated to the Royal Astronomical Society by the Rev. T. W. Webb (1806–1885) in 1878. Franks

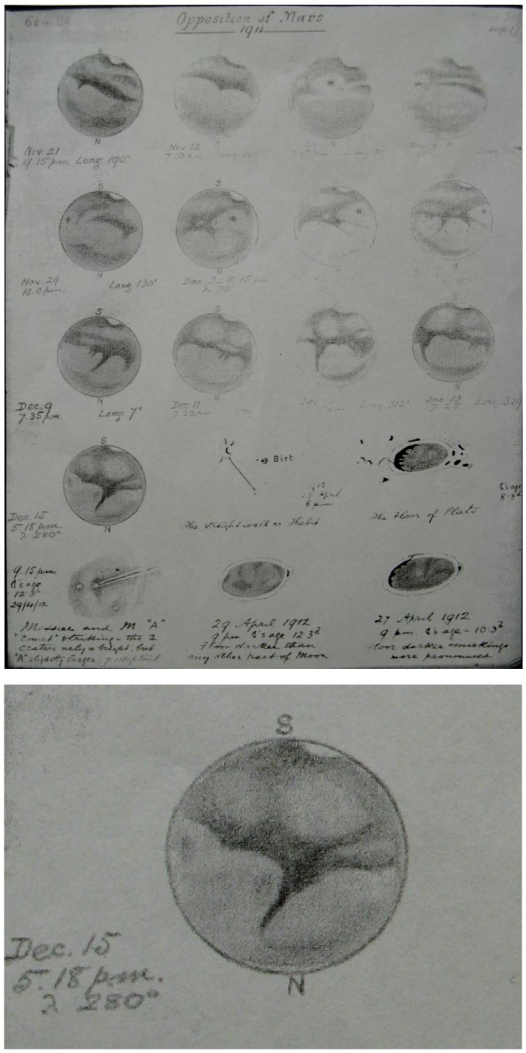


Figure 16

Drawings of Mars made during the 1911 – 1912 opposition by W. S. Franks

The upper panel shows a page from one of Franks's observing books, which are preserved at the home of Sir Patrick Moore. The lower panel shows the drawing of Mars in the fourth row (from top). Notice that drawings of lunar craters appear to the right of this drawing.

By courtesy of Sir Patrick Moore.

was Director of the Star Colour Section of the British Astronomical Association for several years, and in 1921, at the request of the Vatican Observatory, he undertook a revision of the colour estimates of 6000 stars.[57] He published 43 papers in the *Monthly Notices of the Royal Astronomical Society* and also produced some beautiful drawings of the planets, which are preserved in his observing books[58] (Figure 16). In 1923 he was awarded the Jackson-Gilt medal of the Royal Astronomical Society He died in 1935, mourned, amongst others, by the young Patrick Moore, who knew him well.

The magazine *Sky and Telescope* ran an interesting article in July 1980[59] about the early days of Nottingham Astronomical Society, founded in 1946.[60] The article featured members Dr Whitaker, Richard Grainger and a Mr W. Hunt, and was accompanied by watercolour illustrations of some of their observatories and telescopes. These were beautifully painted from memory by the author, David Northrop, who was a member of the Society. He tells the strange story of how Dr Whitaker, when building the foundations for an observatory in his garden, came across the foundations of an earlier one in exactly the same spot. Unfortunately, we do not know who this previous owner was.

Northrop's article shows how important it is for astronomical societies to preserve their records, especially information about members' equipment and observatories. Without these details, the contribution of amateurs to science will be lost to future historians. My experience was that the records of professionals such as Pogson and Hind were easy to find; those of Whitehead and others were not. I would therefore urge all members of the S.H.A. to go without delay to seek out the history of their local astronomical communities and to record it for the benefit of future generations.

It was clear from my searching, that the more affluent south of the county has produced more astronomers than the north, with Goodacre, Gregory, White and Wildbore all being born, or working, within a radius of just a few miles. Their over-lapping dates suggest that they may well have known each other, and that the younger generations were directly influenced by their predecessors. The sociology of these relationships would reward closer study. I conclude that Nottinghamshire is probably typical of other counties in its past astronomers. It has produced its share of professional, working-class, and wealthy amateur astronomers, all of whom have contributed in some way to our knowledge of the heavens.

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I thank the staff of the following libraries for their help in my research: The Hallward Library, University of Nottingham; Beeston Public Library; Angel Row Local Studies Library, Nottingham; Newark Public Library; Bromley House Library, Nottingham; Sutton-in-Ashfield Public Library; Mark Hurn, Institute of Astronomy Library, University of Cambridge; Peter Hingley, Librarian of the Royal Astronomical Library. I wish to thank Sir Patrick Moore for support during this research, and for permission to use the drawings in Figure 16. For responding swiftly and fully to my last-minute questions, I would like to give special thanks to Mr Robin Coles, a Churchwarden of St Andrew's Church, Langar, Nottinghamshire. I thank Les Jepson for his usual support; Kevin Johnson and Reg Withey for their help during the editorial process; and all members of Nottinghamshire astronomical societies who have given freely of their time and local knowledge in answer to my many enquiries.

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