

James Glaisher FRS (1809–1903) Astronomer, Meteorologist and Pioneer of Weather Forecasting: ‘A Venturesome Victorian’

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SUMMARY

The life of James Glaisher (Fig. 1) was long and eventful. At the age of 20 years he was engaged on an Ordnance Survey in Ireland. This tour of duty was followed by 3 years as First Assistant to Professor George Airy at the University Observatory, Cambridge (1833–1835). He was then appointed to the Royal Observatory at Greenwich and became the first Superintendent of the Magnetical and Meteorological Department. This new post was a challenge for Glaisher but he exercised his characteristic energy and ensured the survival of the new Department. He remained as Superintendent until his resignation in 1874 by which time he had effectively organized meteorological observations and climatology statistics throughout the UK.

Glaisher also achieved fame for a series of 28 balloon ascents for scientific purposes, many of them in company with the aeronaut, Henry Coxwell. These particular flights were under the auspices of the British Association for the Advancement of Science, of which Glaisher was a member until he was 90 years of age. They were free, high altitude flights designed to observe temperature, atmospheric pressure, the hygrometric state of the atmosphere and other phenomena. Glaisher was not altogether satisfied with the observations he had made at low elevations in the free balloon and, in 1869, organized a further series of 27 experiments from a captive balloon.

Glaisher wrote a series of reports dealing with the aeronautical findings made during the flights sponsored by the British Association. He was also the co-author of a book describing his ballooning exploits. His co-authors were French aeronauts and the book, known as *Travels in the Air*, was published in French, English and German editions between 1869 and 1884.

Glaisher wrote well and he wrote often. His scientific publications are listed in the Archives of the Royal Society. He also wrote for various periodicals and furnished Quarterly Reports on the weather to the Registrar General with amazing energy and perseverance until March 1902.

Glaisher was associated with learned societies for many years. He was elected a Fellow of the Royal Society in 1849 and took a leading part in forming the British (later Royal) Meteorological Society. He became a Fellow of the Royal Astronomical Society in 1841 and at the time of his death was its oldest Fellow. He was also the first President of the (Royal) Microscopical Society (1865–69), President of the Royal Photographic Society for more than 20 years and a member of the Council of the Royal Aeronautical Society from its foundation in 1866 until his death.

1 INTRODUCTION

A figure like James Glaisher FRS (1809–1903) could only have arisen when not only science, but also the society in which science was practised, was going through rapid change. His original career lay in geodesy, and then astronomy, but it was as a meteorologist, who tried to connect the business of data collection with the broader physical laws of nature that made

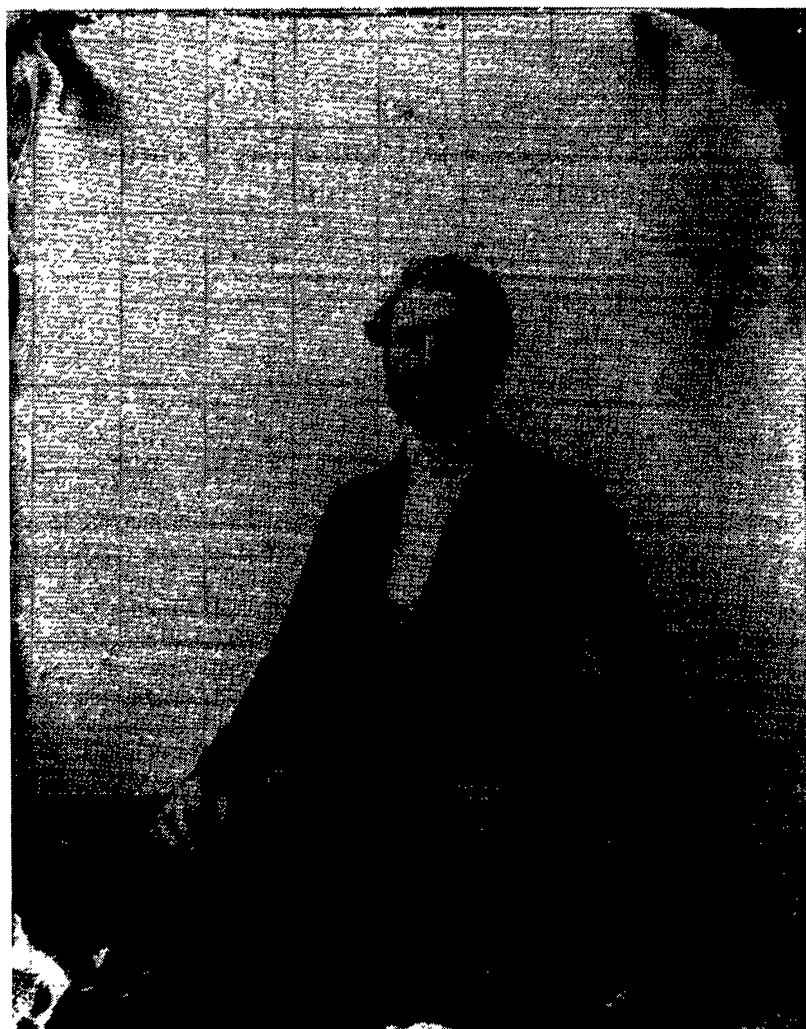


FIG. 1. James Glaisher: probably mid-1840s. Original photograph described as 'silver positive on glass with backing' has been presented to the Royal Astronomical Society by the writer. It has become Item 14 in the Glaisher collection.

prediction possible, that his reputation was made. He was also a pioneer in the application of self-recording instrumentation in science, as well as microscopy, aeronautics and the scientific applications of photography.

James Glaisher did not receive much formal education, but he was fortunate in that his family were friendly with William Richardson, an Assistant at the Royal Observatory (1). Richardson was the first person to notice that James was an enthusiastic student and invited him to visit the Observatory. In 1829 he then instructed Glaisher in the use of astronomical instruments, especially the mural circle, which had been in use since 1812 (2). He introduced the young man to John Pond who was Astronomer Royal at that time. In later life colleagues remarked that Glaisher often spoke of his earlier experiences at Greenwich and in glowing terms of his recollection of Pond's delicate manipulation of instruments (3).

At this time Glaisher may have attracted the attention of Professor George Airy. Certainly, when Glaisher returned from his first official job in Ireland, where he had suffered from respiratory problems brought on by exposure on

the mountains, it was Airy who appointed him as his First Assistant at the University Observatory, Cambridge, where he began work with the mural circle in 1833 January. This appointment opened the way for a long and eventful working life in the fields of astronomy, meteorology and aeronautics.

Glaisher left Cambridge for Greenwich following the appointment of Professor Airy as Astronomer Royal in 1835. One of Airy's first acts was to set up a Magnetical and Meteorological Department to deal with matters distinct from astronomical work being carried out at Greenwich. Airy appointed Glaisher to be its first Superintendent in 1840.

Although Glaisher's enthusiasms had been for astronomical pursuits, he worked hard to make a success of the new Department and contributed much to its establishment. Magnetism was introduced in pursuance of Royal Warrants issued to Airy to find out the 'so much desired longitude at sea (4)'. The interest in meteorology largely arose from promptings resulting from the belief in the pre-bacterial era that temperature and pressure might be capable of triggering epidemics, as we shall see when we discuss the cholera epidemic in London in 1854.

Any paper dealing with the life of James Glaisher must also describe the balloon ascents which he undertook in the 1860s. He had been asked by the Committee of the British Association for the Advancement of Science, of which Professor Airy was a member, to make scientific readings during the ascents. Glaisher showed uncharacteristic diffidence before accepting this invitation (5).

Other aspects of his life to be mentioned will include his close association with many scientific societies and his work as an author and editor.

It should also be appreciated that I have been stimulated to produce this paper because, as a grandson of Glaisher's only daughter, I have received from other members of my family details of Glaisher's personal life which have never been published. I have also obtained access to copies of relevant documents, which tended to confirm personal communications, and which were placed in the archives of the Royal Observatory in 1992. Some of these documents were memoirs of Ruth Belville, the half-sister of Glaisher's wife, who died in 1943 (6).

2 THE GLAISHER FAMILY

A family tree for the Glaishers was lodged with the Royal Meteorological Society in 1980 and I have now placed an adaptation of this in the Library of the Royal Astronomical Society. I have checked James Glaisher's direct forebears through the Family History Centre Parish Records System and have visited the Parish Churches of All Hallows in Woolbeding and St John the Baptist in Kirdford to confirm the findings. As a result, I have concluded that one can trace the Glaisher family back to John Glacier (*sic*), who was born in Woolbeding, near Midhurst, in West Sussex in about 1600. His son George (known as Geordy) was born in 1635 and christened in the Church of All Hallows in Woolbeding on 1635 September 6. He moved to Kirdford, $4\frac{1}{2}$ miles from Petworth and also in West Sussex, after his marriage to Jane Lee of Cobham in Surrey in 1661. George Glaisher (Glacier) died in 1730 at the ripe old age of 95 years.

Kirdford was a centre for glass making. Eight glasshouse sites are known to have existed in the area from the 14th to the 16th century. P.H.Reaney states that the names of Glaisher, Glazier and Glaysher (all still fairly common in the Midhurst area) signify that the families had been associated with glass making, at least from the time when the names are first recorded in the late 13th century. Variations in the way the same family name is spelt are often found in the records of earlier centuries (7).

The Parish Church of St John the Baptist in Kirdford was built in the 11th century as part of the Priory of Arundel, as were many buildings where glass making would have been needed. However, George Glaisher was described as a 'yeoman of Kirdford' and we can assume this to be true. Between 1500 and 1700 there were 73 farms of over 40 acres in the Kirdford district, most of them owned by a few families. The families with small holdings seldom farmed for more than one generation. Farming possibilities in Kirdford appear to have been limited (8).

Certainly, it seems to be apparent that the Kirdford Glaishers left for London in the 18th century before the massive influx of people who arrived in the early 19th century. They settled in the area of St Giles' Fields where James's father (also called James) was born in 1786. He was the third son of John and Elizabeth Glaisher. The parents moved to Rotherhithe soon after the birth. The three youngest of their eight children were christened in the Church of St Mary in Rotherhithe in 1791, 1794, and 1796 (9). Glaisher, himself, was born in Rotherhithe in 1809, the year in which Gladstone, Tennyson and Darwin were also born. William Richardson, who became an associate at Greenwich, was living nearby in Princes Street, South Bermondsey. Both families moved down river to Greenwich, the Glaishers to Roan Street, the Richardsons to Park Row. Glaisher's connections with the Royal Observatory began, fostered by Richardson's interest in him.

James Glaisher had five brothers and three sisters. All of his brothers were studious and got their education 'without aid from the rates being shoved under their noses (10)'. John (1819–46) was the brother most closely associated with James. He showed great interest in astronomy and, like his brother, James, was a regular visitor to the Royal Observatory as a youth. He seems to have worked as a supernumerary computer at Greenwich before he took James's post at the University Observatory, Cambridge. He then moved to work at Hartwell House in Buckinghamshire. In 1846 he died at the early age of 27 years from kidney disease (11). His wife, Jenny, whom he married in 1844, died shortly before her husband.

3 GLAISHER'S WORKING LIFE AND ASSOCIATED EVENTS (1829–51)

James Glaisher began to receive instruction in the use of astronomical instruments from John Pond and William Richardson at the Royal Observatory and was then sent in the first instance for a period of about 2 years to Ireland as an assistant on the trigonometrical Ordnance Survey of that country (1829 January to 1830 November). In Ireland he was working in the Bencorr Mountains, County Galway and the Keeper Mountains near Limerick. Observations of cloud formations from the summit of Irish mountains quickened his interest in meteorology.

When he made his first speech before members of the Aeronautical Society at the home of the Duke of Argyll on 1866 January 12, he explained his feelings thus:

In the performance of my duty I was often compelled to remain, sometimes for long periods, above or enveloped in clouds. I was thus left to study the colour of the sky, the delicate tints of the clouds, the motion of opaque masses, the form of the crystals of snow. On leaving the Survey and on entering the Observatory at Cambridge, and afterwards at Greenwich, my taste did not change (12).

In 1833 Glaisher was appointed as an assistant to Professor Airy working with astronomical instruments in the University Observatory at Cambridge. The Library of the Institute of Astronomy in the University of Cambridge contains letters from the assistants to Airy in respect of the annual cost of candles for their quarters at Madingley Road. A Mr Baldrey wrote in an apologetic manner hoping 'that £2.10 will not be deemed too much for the consumption of candles'. He stated that rather than occasion the slightest unpleasant feeling he would pay for the candles himself. On the other hand, Glaisher wrote bluntly:

Sir, the annual expense of candles from attending to the work of the Observatory is about £2.10 (13).

Glaisher began his astronomical observations on a large mural circle provided by the Cambridge Observatory in 1833 January and continued with astronomical studies for 3 years. George Airy was then appointed Astronomer Royal and he made arrangements for Glaisher, then his First Assistant, to transfer from Cambridge back to the Royal Observatory at Greenwich. However, Glaisher wanted to clear up the work he was doing on equatorial observations of Halley's Comet and he remained at Cambridge until 1836 February. When he went to Greenwich Glaisher's salary was £100 per annum with £20 per annum rent allowance. He also had an agreed 5 weeks leave per year (14).

Airy was not impressed by the staff at Greenwich. He replaced the First Assistant with the Rev. Mr Robert Main of Queens' College, Cambridge. He wished to dismiss William Richardson also, but the Admiralty held the view that Richardson should remain in post. Finally, in a letter to the Admiralty dated 1835 August 30, Airy accepted their rejection of his attempt to sack Richardson and resolved to try 'to secure the advantages of his abilities and guard against his imperfect perception of honesty (15)'. It should be noted that in 1830 Richardson had actually received the Gold Medal of the Astronomical Society, and it was he who had introduced Glaisher to Airy (16).

In 1840 Airy appointed Glaisher Superintendent of the Magnetical and Meteorological Department on its formation, a post he was to retain for 34 years. He has therefore been described as 'the Nestor of Meteorology (17)'.

The new Magnet House was built in 1838 at a cost of £500.00 (without instruments). Land in Greenwich Park on the South Ground was enclosed for this purpose and the new building, cruciform in shape, was built of non-magnetic materials (18).

In making his appointment Airy passed over some of the older assistants from the years when John Pond was Astronomer Royal. Glaisher worked hard and by 1843 had ensured the permanence of the meteorological portion

of the work at the Observatory about which there was originally no certainty. Glaisher had been loath to give up his astronomical interests entirely and unofficially continued after his workday was finished to search for small planets with one of the idle equatorials at the Observatory. Airy would have no such unauthorized activities and forbade him to carry his research forward. From that time Glaisher ceased his astronomical observations at the Observatory (19).

In 1841 Glaisher was made a Fellow of the Royal Astronomical Society which had been founded in 1820 when it was known simply as the Astronomical Society. The first President was Sir William Herschel, the father of Sir John Herschel whose association with Glaisher will be discussed on later pages.

On 1844 March 16 Glaisher contributed an article on his Department to the *Illustrated London News*. Airy actually asked Glaisher to write the article but he said that he wanted to see it before it was published. There is no evidence that it was shown to him. The *Illustrated London News* said that the article had been published with the 'express and implied permission' of the Head of the Establishment and they understood it should bear Glaisher's name as the person solely responsible for its accuracy. Airy took the matter up with Glaisher and with the periodical on the grounds that no statement relating to the affairs of the Observatory could be published without the authority of the Astronomer Royal. Glaisher also wrote to the *Illustrated London News*. Airy requested that they should publish the following correction:

We are requested to state that the account of the Magnetical and Meteorological Observatory attached to the Royal Observatory at Greenwich in our number of 16 March was inserted with the approval of the Astronomer Royal. The signature of James Glaisher was attached by mistake.

What actually appeared in the issue of 23 March under the heading of *Royal Magnetical and Meteorological Observatory at Greenwich* was:

In the account of this establishment it should have been stated that the details were published with the approval of the Astronomer Royal to whose courtesy we are therefore indebted for this valuable contribution to our columns (20).

On 1845 October 27 the Royal Observatory was shocked when William Richardson left suddenly in what were officially described as 'disgraceful circumstances which cannot be hinted at' (21). Airy's papers and correspondence with the Admiralty reveal that Richardson was arrested on 1846 January 25 in Yorkshire. On 1846 February 24 he was charged with the murder of his daughter's male child.

At the time of his trial (1846 May 13) Richardson's daughter was again pregnant to her father. Airy noted that Mr Main, his First Assistant, was absent from the Royal Observatory on that day to attend the Old Bailey where Mr Richardson was on trial 'for the wilful murder of his incest child (22)'. Father and daughter were found 'Not guilty' of murder.

On 1846 May 16 a local newspaper devoted a whole page to a discussion of the event and described the verdict as 'so unexpected'. Richardson had been discharged on May 14 and the next afternoon had been seen walking down Greenwich High Street chatting with passers by. His daughter, Anne, was sent to a refuge to remain until she had given birth, as the newspaper

commented, ‘to another child of which she is again pregnant to her filthy incestuous parent (23)’.

It was at about this time that Glaisher formulated his dew point tables to determine the true hygrometric conditions of the air. Nine editions of these hygrometrical tables adapted to the use of wet and dry bulb thermometers had appeared by his death in 1903 (24). He read his paper ‘on the amount of radiation of heat from the earth and from the various bodies on or near the surface of the earth’ before the Royal Society of London on 1847 February 4 (25), following this with an elaborate reduction of the thermometric observations made at the Royal Society from 1771 to 1781 and 1787 to 1842 (26). Glaisher also found, as he began to collect statistics, that various observations taken with different instruments and made at different times of the day were not comparable. He produced papers showing corrections to be applied for diurnal ranges of temperature based upon observations made at Greenwich in the years 1841–45 (27). The diurnal ranges of temperature at Greenwich might not necessarily have been reliably applicable to all areas of the country but were of value nonetheless. He communicated these results in papers presented to the Royal Society in 1849 and was elected to membership of the Society. He paid a membership fee of £40 in the same year.

On 1849 June 14 the first account of synchronous meteorological reports in various parts of the country was published in the *Daily News*. Three years later the Registrar General invited Glaisher to produce *Quarterly Returns on Meteorology for England* (28). He described how the first connection with the Registrar General came about in evidence he presented before the Royal Committee on Scientific Instruction and the Advancement of Science in 1874. In this evidence Glaisher stated that he set up the system on his own initiative after pointing out to the Registrar General that his published remarks on the weather were patently wrong (29).

It was in 1863 that the first European weather map was produced using data obtained from Glaisher’s British daily weather reports. These data were sent to Paris and collated with other reports from elsewhere.

Glaisher needed good statistical sources of information for his *Quarterly Returns*. His account of how he recruited staff in order to achieve this purpose was described as follows:

Knowing a good number of Cambridge men, I thought that clergymen would unite with me and would help with establishing the system of truthful observations. Thereupon, I travelled all over the country and induced some fifty or sixty gentlemen of education and position to engage in the toilsome task of daily observations.

This explanation was also part of Glaisher’s evidence to the Royal Commission on Scientific Instruction and the Advancement of Science and by this time Glaisher’s recruits had been making daily observations for more than 25 years.

In 1851 Glaisher became a member of one of the Juries of the Great Exhibition and contributed to the official description and catalogue. The profit of £200000 from the Exhibition enabled the purchase of the South Kensington Estate to provide sites for museums and Imperial College. Negretti and Zambra exhibited a new maximum thermometer at the Exhibition. This was tested and recommended by Glaisher. He was a friend

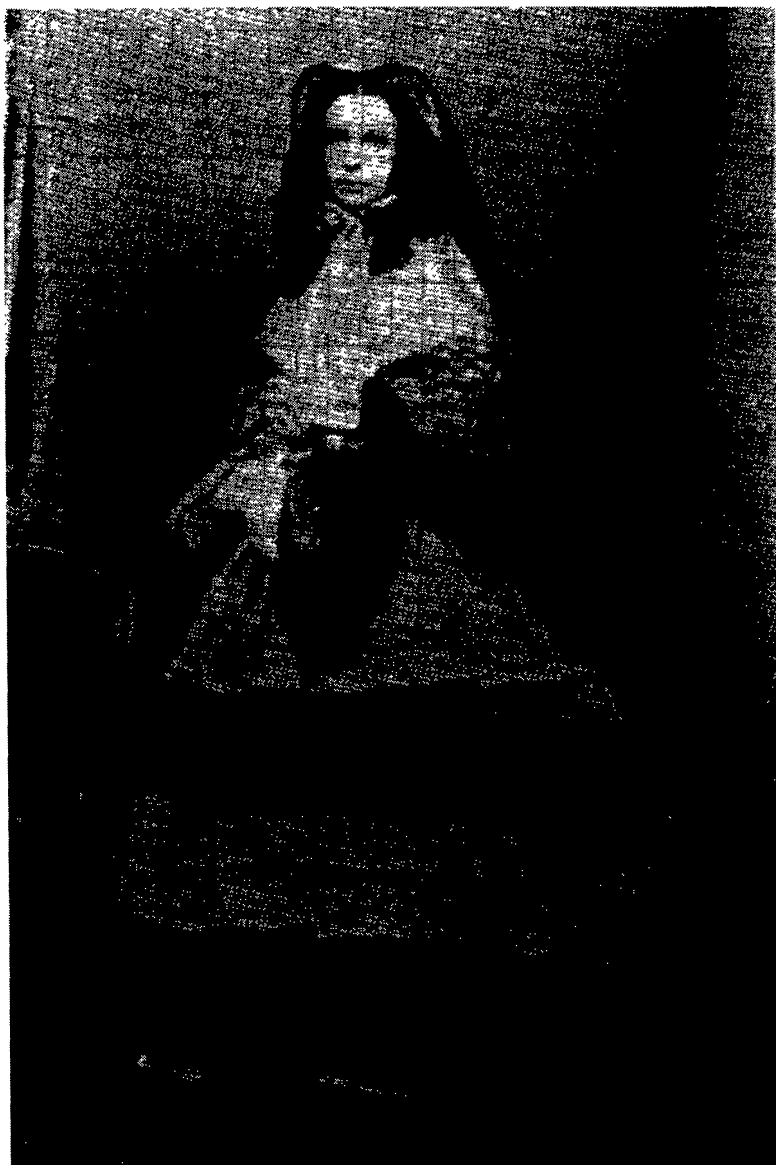


FIG. 2. Cecilia Louisa Glaisher (Photograph by Negretti) c. 1864. The original is in the possession of the writer's cousin, Mrs Muriel Fisher QSM of Auckland, New Zealand.

of Negretti who took photographs of him and his family (Fig. 2). Negretti also accompanied Glaisher on a flight in 1863 and took photographs from a height of 4000 feet. Glaisher was himself an enthusiastic photographer and was responsible for other photographs taken during flights from about 2000 feet. Among the Glaisher manuscripts in the Library of the Royal Astronomical Society there is a Negretti photograph of Glaisher and his co-aerialist, Henry Coxwell, sitting in the balloon car before lift off (30).

4 THE FOUNDATION OF THE BRITISH (LATER ROYAL) METEOROLOGICAL SOCIETY AND THE FRIENDSHIP WITH THE LEE FAMILY OF HARTWELL HOUSE

Soon after James Glaisher returned from Ireland in 1830 November he met Dr John Lee of Hartwell House near Aylesbury in Buckinghamshire and

a life-long friendship between the Lee family and the Glaishers began. This is confirmed by a letter Glaisher wrote to Sir John Herschel on 1866 March 5, following Dr Lee's death. He stated:

I was deeply grieved at Dr Lee's death. He was an earnest good man and I had known him for 35 years (31).

Dr Lee, a lawyer and a former Fellow of St John's College, Cambridge, was the son of John and Harriett Fiott of Doctor's Commons, London. His mother was a Lee and in 1812 he obtained a Royal Warrant to bear the Arms of the ancient family of Lee (32). When he moved to Hartwell House he built a private observatory on the premises in which, as we have noted above, James Glaisher's younger brother John worked for several years in the early 1840s.

Dr Lee played a key role in the establishment of the British meteorological Society in 1850. On 1850 April 3 he convened a meeting at Hartwell House to consider how meteorological observations might be conducted, recorded and published so that they would become available for study and research. This meeting, which was attended by three Fellows of the Royal Society and seven Fellows of the Royal Astronomical Society decided to set up a scientific Society to be called the British Meteorological Society. It would meet regularly to review progress in the field and to discuss papers contributed by its members. Samuel Charles Whitbread FRS was elected to its first President and James Glaisher FRS its Secretary (33).

We have seen that Dr Lee and the Glaishers had been on friendly terms since 1831. Dr Lee presented a Bible to Mrs Glaisher with Mrs Cecilia Lee's regards in 1854 July. It seems that Samuel Whitbread had also been closely associated with the Lees and Glaishers because when Glaisher's elder son had been born in 1848 he had been christened James Whitbread Lee. In later life the infant became J.W.L. Glaisher, a well-known mathematician with a strong interest in astronomy.

James Glaisher was Secretary of the British Meteorological Society from 1850 to 1873, except in 1867–8 when he was elected President. The Society was granted a Royal Charter of Incorporation by Queen Victoria in 1866 and re-named the Royal Meteorological Society in 1883.

5 GLAISHER, HERSCHEL AND SNOW CRYSTALS

In his report on the section of the Great Exhibition devoted to Philosophical Instruments and processes depending upon their use, published in 1851 November, Glaisher proposed the use of photographic methods to preserve books and documents by providing microfilm copies of them (34). Turner has pointed out that Sir John Herschel, who wrote a letter on the subject to *The Athenaeum* in 1853 July, has, on occasion, been credited with the idea which should more properly have been ascribed to James Glaisher (35).

Glaisher was on friendly terms with Herschel and letters which passed between them from 1857 April to 1866 March have been preserved in the Library of the Royal Society. Glaisher contacted Herschel about his quarterly returns on the weather, his articles on radiation and on rain (36) and, in 1862 November, on his early balloon ascents. In the last named

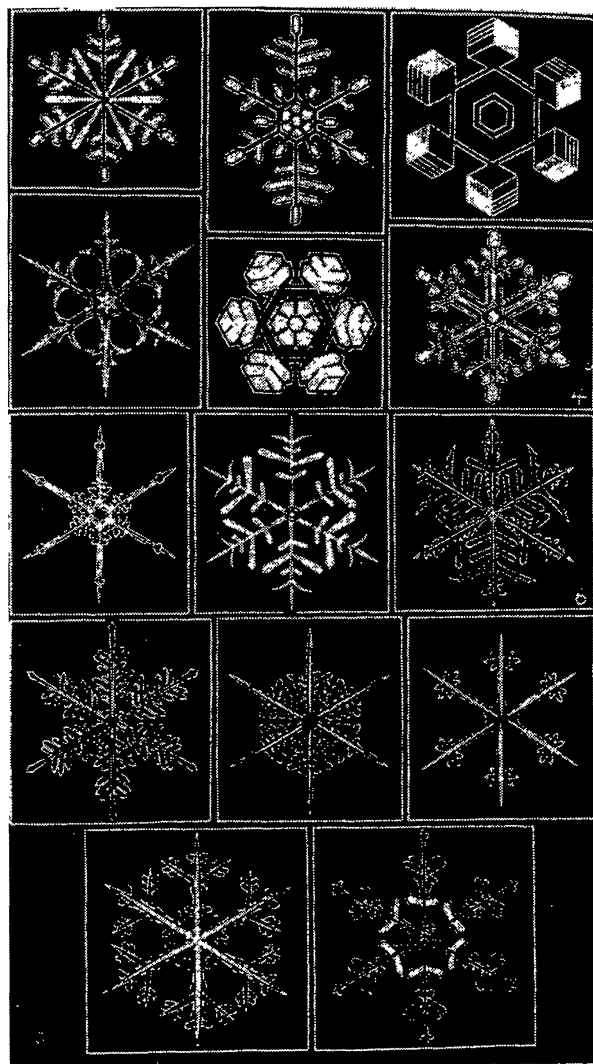


FIG. 3. Various forms of snow crystal. Sketched by James Glaisher and drawn by Cecilia Louisa Glaisher in the winter of 1855. (Taken from the *Proceedings of the Royal Microscopical Society*, 1979 (May), p. 176.)

correspondence he displayed a willingness to write to and to meet Sir John's son, Alexander (37). In 1866 March Glaisher invited Sir John to contribute an article on the Correlation of Physical Forces to *Leisure Hour*. The two men also corresponded with each other about Glaisher's observations relating to snow crystals in the winter of 1855. We shall now discuss these observations.

The 151 varieties of crystal roughly sketched by Glaisher had been redrawn by his wife (Fig. 3). Glaisher's 'snowflake paper' was published in 1855 (38). A Report of the Council of the British Meteorological Society on the severe winter of 1855 and on snowflakes appeared in 1858 (39). In 1857 April Glaisher sent Herschel photographs of some of the drawings with permission to publish them 'as he should wish' and a copy of an article he had published in the *Art Journal* of 1857 July 4 about the application of snow crystals for the purposes of design.

To the Editor of the *Art Journal* Glaisher wrote:

The primary figure or base of each crystal I determined to be of six radii, or a hexagon of laminae, and the compound varieties to include combinations of spiculae, prisms, cubes and rhomboids aggregated upon and around the central figure according to the degree of complexity. The originals of the subjoined illustrations were executed by Mrs Glaisher, from rough sketches of my own figures, selected rather as varieties illustrative of a class rather than for any special symmetry of form (40).

It was on 1856 May 28 that Glaisher was elected a Fellow of the Microscopical Society of London. The Society was granted a Royal Charter in 1866 when Glaisher was President. *Transactions of the Microscopical Society of London* published two plates of engravings of crystal forms, one of which became the emblem of the Society and the basis not only of one of the snowflakes of the seal of the Society but also of the snowflake on the first volume of the *Journal of the Microscopical Society*.

6 GLAISHER'S ACTIVITIES 1852–67

In 1852 Glaisher delivered a series of lectures to the Society of Arts, Manufactures and Commerce on the results of the 1851 Exhibition. He also gave evidence to Parliamentary Committees. One occasion, on 1852 June 16, was on the subject of rainfall and evaporation in connection with the water supply to the London (Watford) Spring Water Company's Bill. He was asked:

Are you aware of the nature of this Enquiry sufficiently to know that the great point of the Enquiry is how much of the fall of water gets through to the stratum below?

Glaisher replied:

That may be the nature of the Enquiry, but it is not the nature of the information I came here to give (41).

In 1853 Glaisher personally tested 300 thermometers and supplied 23 sets of meteorological instruments to the Spanish Government.

These were intended to be used by observers whom Glaisher (in association with Captain Maury, the head of the US Naval Observatory) had assembled as part of a global network of people who would provide data for use in the compilation of daily weather reports which, as we have seen, were first produced for Europe in 1863.

The acquisition of healthy sanitation was a major preoccupation of the mid-19th century. London's population has risen from 860000 in 1800 to nearly 3 million in 1860 and the area covered by the city trebled to 121 square miles. In 1839 the Poor Law Commission produced its report on the conditions of the labouring classes and showed that agricultural labourers, vagrants and Irish immigrants were pouring into the city. So far as the working classes were concerned, London's housing and health were appalling. Water-borne disease (as we know it to be now) was rampant. Cholera was rife in the areas South of the Thames and in 1854, at the request of the General Board of Health, Glaisher did some work investigating the hypothesis that disease might be caused by the evaporation taking place from the putrid waters of the Thames. During the epidemic of 1866 Glaisher continued to make a number of observations about the 'miasmatic blue mist', as he described it, in areas along the South Bank of the Thames (42), particularly Rotherhithe and Greenwich. The supporters of the miasma

theory attributed cholera to the formation of a 'dense torpid, poisonous mist'. These observations were never published but a *Report to the General Board of Health* on the meteorology of London and its relation to the cholera epidemic in 1855 was presented to both Houses of Parliament by Command of Her Majesty (43).

The attempt to link meteorology and cholera in this way was bound to fail but it is now accepted that in some conditions weather has a profound influence on medical statistics. Airy's attitude that few meteorological observations could ever possess the 'slightest utility' has not proved defensible. An interesting comment was made on the final series of observations which Glaisher undertook in 1866. H.E. Westcar, one of his fellow aeronauts, wrote to him from Baden-Baden on 1866 September 6 exhorting him 'to think more of the pure air of the upper regions rather than forsaking it for the choleric mists down below (44)'. Glaisher did not accede to Westcar's request because the flight they made together from Windsor on 1866 May 26, which will be described later, proved to be the last of Glaisher's aerial expeditions, apart from those undertaken in a captive balloon.

In 1856 John Henry Belville who was Glaisher's father-in-law died. At that time Belville's salary as Second Assistant at the Observatory was £290 per year inclusive of £40 per year rent allowance. The Astronomer Royal received £1000 per year, and his First Assistant, the Rev. Mr Main, £400 per year. Main was a mathematician who had, as we noted above, been brought by Airy to Greenwich from Cambridge.

Dr David Dewhirst has traced the close connection between Cambridge men, especially mathematicians at Trinity College, and the Royal Observatory at Greenwich. The mid-19th century was a time of relatively stable prices and wages. Junior computers at Greenwich got about £35 per year rising to about £70 at the age of 23 years. The incentive to transfer to Cambridge where they would receive £80 per year with a candle allowance of £2.10 was real. The work at Cambridge was also more interesting. At Cambridge Airy, who held the Plumian Chair in Astronomy and was *ex-officio* Observatory Director had received £500 per year. On the other hand, at Greenwich he was originally paid £800 (later £1000). The overall position, therefore, was that junior staff were better paid at Cambridge but the movement was back again to Greenwich at higher academic levels (45).

In 1863, at the request of the Commission of Enquiry into the Sanitary State of the Army in India, Glaisher prepared a *Report on the Meteorology of India in relation to the health of the troops stationed there*. He included the results of all the meteorological observations made in India on which he could get results. In the Report he expressed a hope that future observations in India might be carried out under some unified plan both with respect to instruments, their position, and general instructions given. He arranged for £800 worth of instruments to be sent to India to start the Army Medical Department (46).

As Glaisher's observations at Greenwich accumulated he published numbers of papers with a meteorological interest, particularly studies of mean temperatures (47), mean pressure (48), wind directions (49) and rainfall at Greenwich over a number of years (50–53).

In 1860 Glaisher established the Northumberland coastal weather stations.

The project was under the auspices of the Duke of Northumberland. The Royal National Lifeboat Institution then took up the provision of barometers and other instruments to their lifeboat institutions. Glaisher provided directions for their installation and maintenance. He also published several papers in *Life Boat*, a Royal National Lifeboat Institution periodical (54, 55).

7 GLAISHER'S ASCENTS IN A BALLOON

This is chronologically where any account of Glaisher's exploits in the balloon should fit in. Balloon ascents between 1862 July 17 and 1866 May 26 were arranged by a Committee of the British Association for the Advancement of Science of which Glaisher was a member and all were strictly scientific in character. Airy was a member of this Committee. There were 28 ascents in all, the last three of which were night flights, in which observations at night were made at moderate distances from the earth. It is well to remember that these flights took place in the sixth decade of Glaisher's life. Glaisher's reports to the British Association for the Advancement of Science are to be found in the libraries of the Royal Meteorological Society and the Royal Aeronautical Society (56). Glaisher helped to found the latter in 1866 and became its first Treasurer. There are also a number of private papers relating to these activities in the library of the Royal Astronomical Society. They cover the years 1862–70 (57). In these papers one is made aware of the fact that, among members of the British Association for the Advancement of Science, it was Dr Lee who seemed to show the most enthusiasm for the aerial programme. He also displayed, along with his wife, feelings of friendship for Mrs Glaisher. It is also apparent that Mr Coxwell, a dentist and a fellow traveller of Glaisher, admired the balloonist's courage greatly, whatever vicissitudes befell them (58). Coxwell lived until 1900 when he was 80 years of age. A memorial to him is to be found in the Parish Church in Seaford in Sussex. There are about 60 letters from Coxwell to Glaisher in the archives of the Library at the Royal Astronomical Society.

Originally, relations between Coxwell and Glaisher were good but they deteriorated in the summer of 1864. This seems to have occurred following the destruction of Coxwell's balloon by a mob at a public exhibition in Leicester in 1864 (59). From that time Glaisher employed the services of other balloonists.

Robert Orton made five ascents with Glaisher from 1864 December. A less than friendly relationship between the two men is revealed in a letter from Mr Orton to Glaisher dated 1866 July 6 (60), which reads as follows:

Supposing it must have slipped your memory, I beg to remind you that I lent you a knife...you would oblige me if you would leave it with your servant so that I could have it at any time I sent for it should you be out.

Orton had accompanied Glaisher on the occasion of a night ascent from Woolwich Arsenal in 1865 October, for the purpose of recording variations in air temperature and humidity over London. A breeze carried the balloon out over Oxfordshire (61), Orton panicked and insisted on making a hurried descent for fear of being blown out to sea in spite of the fact that Glaisher

knew that they were being blown inland. Nearly all Glaisher's instruments were broken on landing. Of the conversation that followed, history is silent (62)!

There are a number of letters to and from the Director of Ordnance at the War Office in 1863–64 over permission to use the facilities at the Royal Arsenal in Woolwich. Glaisher found the charge for gas of £4.3.1 and the itemized labour costs of £10.7.8½ excessive and refused to pay them for a number of months in spite of several demands. However, he did commend the quality of gas from this source (63, 64).

Airy was undoubtedly annoyed by Glaisher's activities which attracted much publicity. On 1864 May 18 he wrote to him as follows:

If you shall have any more balloon ascents I much wish that you would give all your energies to magnetic determination. The things wanted are vibration of the horizontal needle and vertical observation. These observations are far more important than any addition to the meteorological determination (65).

It was at this time that Airy designated W.C.Nash Magnetic Assistant at Greenwich. The Magnetic Instruments were put in his charge, though Glaisher remained overall Superintendent. Nash eventually became Superintendent of the Department on 1893 December 31. He accompanied Glaisher on some of his balloon ascents (66).

Not only did the accounts of Glaisher's flights catch the imagination of the popular Press but the man himself was becoming a celebrity. These facts would have been distasteful to Airy who set great store by order, method and decorum. However, Airy's lack of enthusiasm for Glaisher's meteorological observations could also have been occasioned by the fact that they had no proper theoretical basis and that meteorology defied precise laws of reduction. Magnetic observations were better in this respect, but Airy seems to have regarded them as less worthwhile than astronomical observations. These attitudes placed Glaisher in the difficult position of having to develop activities to which Airy accorded a low priority. The same problem was also to affect the introduction of solar physics to Greenwich in the 1870s since this stemmed mainly from the discovery of solar effects on terrestrial magnetism (67).

None of these considerations deflected Glaisher from pursuing his programme. On two of his flights he was accompanied by his elder son, Lee (known to the scientific community as J.W.L.Glaisher). One flight was from Mill Hill on 1862 August 21. The second was from Derby on 1864 June 20 and occurred 1 month after he had received the admonitory letter from Airy. At the time of the first flight Lee, who was born on 1848 November 5, was not yet 14 years of age. They reached a height of 14355 feet, the balloon finally coming to earth at Biggleswade. On both occasions Lee, described in his father's report as Master Glaisher, was taken with his father so that a selection of physical observations (pulse rate, respiratory rate, colour changes) could be recorded. Other passengers in the balloon were also examined. A Mr Ingelow became distressed at 14000 feet, but Lee Glaisher was unaffected by the height. Nevertheless, Glaisher noted that some changes were always present at great heights 'even in men of hearty and temperate constitution (68)'.

On one occasion in Wolverhampton on 1863 September 29 Glaisher

admitted that he had received slight injuries when his balloon was destroyed when he was descending in the teeth of a gale (69). Nevertheless, he appeared to be unruffled. This is remarkable because on June 26 of the same year Glaisher and Coxwell had been subjected to an equally unpleasant experience. The aeronauts had set out from Wolverton in Berkshire in reasonable weather but conditions deteriorated appallingly and the balloon was driven eastward by sudden storms. Vision was almost nil and the balloon narrowly missed colliding with the spire of Ely Cathedral during its descent (70). For this flight the London and Northwestern Railway had organized special trains to take spectators from Northampton and from Bedford to Wolverton and back (71).

The big ascent which encouraged more people to watch the flights had been from Wolverhampton on 1862 September 5. The balloon got to a height of about 6 miles from the earth. Glaisher (then aged 53 years) was unconscious for about 30 min during the flight but, following the descent to earth, had to walk about seven miles to the nearest railway station for help. Coxwell stayed to look after the balloon because the country crowd had been hostile to the aeronauts after they had descended from a previous flight in the area. During the big flight Coxwell had become worried about Glaisher's loss of consciousness and wrote:

Never shall I forget those painful moments of doubt and suspense as to Mr Glaisher's state when no response came to my questions. I began to fear that he would never take any more readings (72).

It is appropriate to note at this point that it was Glaisher's high altitude temperature measurements which gave the first direct indication of the existence of the stratosphere. In addition, we can now appreciate that what happened during the Wolverhampton flight was one of the first practical examples of the effect of lack of oxygen on the human body.

A leading article was published in *The Times* of 1862 September 11 to celebrate the occasion (73). At the same time *Punch* published a poem entitled *Coxwell and Glaisher – a song by a school boy*. The poem has also been published by Coxwell (74) and Marriott (75). Relevant papers are held in the Royal Aeronautical Society Library. The last verse reads as follows:

Tis true that these two men did go
Six miles towards the sky;
But as for Icarus, we know
That story's all my eye.
Then what's the use to hear about
Old heroes fabled acts
When now they're beaten out and out
By wonders that are facts.

Another ascent was made on 1866 May 26 from Windsor in company with Mr Westcar of the Royal Horse Guards. The path of the balloon was over Woking, a little to the west of Guildford and on to Pulborough where they came down to earth after sunset. No one was there to meet them and they were preparing to pass the night in the car of the balloon when a shepherd passed by near midnight and took them to spend the night in his cottage half a mile away.

On this flight Glaisher made most of the readings while Westcar managed

the balloon but their roles were reversed on occasion and Glaisher stated that he believed that it was the first occasion on which a scientific experimentalist had managed a balloon since Biot and Bay-Lussac in 1804. However, in his correspondence with the Abbé Moigno in Paris he was told that Bixio and Barral, the French aeronauts, had taken the entire management of a balloon into their own hands during a flight in 1850 (76).

Glaisher also made 27 flights at moderate elevation with M. Giffard in a captive balloon (77). Giffard was doubtful about making these experimental flights but Glaisher reassured him in a series of letters pointing out that in all the ascents in free balloons it had been necessary to leave the ground quickly in order to avoid striking adjacent buildings. This had precluded satisfactorily determining temperature and humidity at lower elevations and was the reason why Glaisher wanted to make the series of observations in a captive balloon (78). Flights in the captive balloon also had the backing of Tissandier and de Fonvielle (79, 80).

The captive balloon was kept at Ashburnham Park in Chelsea. It was filled with 420 000 cubic feet of hydrogen gas and on a clear day it could ascend to 2000 feet. Its rate of climbing could be regulated and the balloon could be kept all but stationary for any length of time. The ascents were usually even and the balloon climbed slowly. As many as 30 people often went on a flight as passengers.

In the autumn of 1867 Glaisher and his elder son spent a weekend with Robert Fox at his home near Falmouth. Fox was a man eminent for his research into terrestrial magnetism. His daughter, Caroline, recorded in her journal that her father ‘talked at length with the Glaishers of balloons and meteors (81)’.

When his aeronautical exploits ended Glaisher gave a number of lectures on balloon ascents and various astronomical and meteorological matters. For example, at Brighton Town Hall on 1868 April 20 he delivered a lecture entitled ‘Meteors and shooting stars’. (The charge for entry to the Hall was sixpence.) An advertisement for this lecture is kept with the Glaisher manuscripts in the Library of the Royal Astronomical Society (82).

8 TRAVELS IN THE AIR

In 1869 the first edition of a book entitled *Voyages Aériens* was published in Paris (83). This book was in three parts and Glaisher wrote Part I. Second and third French editions followed in 1870 and 1880. The first English edition was published with 118 illustrations as *Travels in the Air* in 1871 and the second and third revised editions later in the same year (84). As was the case in the French edition, Glaisher’s contribution consisted of a description of 10 of the flights made under the auspices of the British Association, and included chapters dealing with his scientific observations. His accounts of the free flights differed somewhat from those presented to the British Association for the Advancement of Science. The second English edition sported a coloured frontispiece, a Preface and included a list of the balloons, pigeons and despatches which left Paris during the siege of that city in the Franco-Prussian War. The list described the fate of these pigeons and of the despatches.



FIG. 4. Ernest Glaisher, aged 10 years. Laser copy in the Royal Astronomical Society Archives. The original is in the possession of Mrs Muriel Fisher.

Luftreisen, the German editions of *Voyages Aériens*, were published in Leipzig in 1872 and 1884 (85).

Glaisher's personal copy of *Travels in the Air* contains about 160 marginal notes which reveal a lot about the man himself and what he thought of his co-authors. Unfortunately, he (or someone else) cut some of these notes away with scissors. The writer has presented Glaisher's copy of *Travels in the Air* to the Library of the Royal Astronomical Society. It will be classified as Item 15 in the collection of Glaisher manuscripts.

Shortly before *Voyages Aériens* was published Glaisher took his younger son on one of his flights in a captive balloon (1868 May 5). Ernest, who was born on 1858 July 7, was not quite 10 years old at the time (Fig. 4). A French aeronaut, de Fonvielle, the co-author with M. Tissandier of Part III of *Travels in the Air* described this flight in a chapter in Part III entitled 'The

great captive balloon at London'. He wrote that on this occasion the balloon was blown 600 feet beyond the boundary of the enclosure. He maintained that Glaisher was intent on watching his instruments all the time and did not notice the force of the wind or the way the balloon was oscillating (86).

One of Glaisher's comments in his personal copy of *Travels in the Air* seems to confirm de Fonvielle's claim. Initially, he wrote in the margin 'My dear boy Ernest'. He then crossed this comment out and wrote – 'Poor Ernest – who thought of him?'

On 1869 November 20 de Fonvielle sent Glaisher 10 copies of *Voyages Aériens* and asked him to 'read accurately your part and mark the alterations you require for the second edition which, according to every probability, will not be delayed long' (87).

Glaisher's marginal comments refer to the first English edition of *Travels in the Air*. As we have seen the book was initially published in French. In Part I, which he wrote himself, Glaisher complains several times that the translation from the French has been too literal, and suggests ways in which these paragraphs could be improved. On the other hand, he approves, on occasion, of the translation. He congratulates himself on the way that he wrote the description of his ascent from Crystal Palace on 1863 July 11, stating that 'everything is well described – the mention of clouds is exceedingly good (88)'.

On one revealing occasion Glaisher remarks that one passage of his writing, when it has been translated from the French, sounds as though it had been written by de Fonvielle and 'must be changed (89)'. Glaisher did not like de Fonvielle whom he referred to as being 'too excited'. His co-author, Tissandier, who was Director of the Laboratoire de Chimie at the Union National de Paris, is described as an agreeable, active and intelligent man. De Fonvielle was one of his assistants at the Laboratory. Tissandier had a very distressing experience in a disastrous balloon accident in 1875 when two of his companions died in the balloon car (90, 91).

One of the real problems affecting the relationship between Glaisher and de Fonvielle was that Glaisher was a vociferous supporter of Imperial France whereas de Fonvielle had Republican sympathies. There are many letters from de Fonvielle to Glaisher in the Library of The Royal Astronomical Society. In some of these de Fonvielle chastises Glaisher for failing to reply to his letters. There is also a copy of de Fonvielle's article about his aeronautical exploits which was published in *La Liberté* on 1868 November 5. Glaisher did not approve of this newspaper but he agreed to translate the article (92).

Glaisher's marginal notes refer to de Fonvielle's account of his balloon ascents in Part III of *Travels in the Air* in a variety of derogatory ways:

Unpleasant feeling, unpleasantly expressed; Flippant and in bad taste; How sour a disposition! (93).

At one point he muses whether Republican aeronauts are different from others and adds a comment that science and discovery should know neither country nor Government (94). Glaisher complains that de Fonvielle 'espouses the character of a Red Republican and this explains the difficulties he has with the French authorities (95)'. What his difficulties were with the

authorities is not made clear. One of his most pungent comments is that ‘de Fonvielle does not impress me as a man of education, a gentleman or a thinker. He never shows the education of a scholar and to read him is to fancy him without friends (96)’.

Glaisher viewed Flammarion, the author of Part II of *Travels in the Air* with approval. He later edited Flammarion’s book on *The Atmosphere* and wrote the Preface to the English edition (97). Glaisher made marginal notes throughout Flammarion’s section of *Travels in the Air*. He identified those areas of France seen during Flammarion’s ascents which had been captured or destroyed during the Franco-Prussian War. These flights were described in an article in the *Daily News* of 1868 August 25, before the publication of *Voyages Aériens*. He lamented that ‘as Columbus conquered the Indians, so the Prussians conquered France, leaving Versailles sadly scourged by Prussian occupation (98)’. He concluded:

It is hard to forgive all the agitators who, by their writers, have helped to dethrone the best of Emperors and to bring France to her present terrible condition. Vive l’Empereur! (99)

This is one of the occasions when one could conclude that Glaisher had allowed personal prejudices about the political situation in France to run riot. By the time that France declared war on Prussia the Emperor was unpopular and enfeebled and the Empress had become insanely patriotic threatening to ride through the streets of Paris dressed as Joan of Arc (100). This is, therefore, a good example of how one can easily conclude that Glaisher was a man of uncompromising and fixed opinions which were not always based on a calm assessment of the state of affairs. He was obsessive both at work and in his personal relationships. One is forced to admit that Glaisher seems to have been a snob of the first order as far as his social and family life was concerned; as a man of humble origins himself and (at least in theory) an assistant to Airy, he was far too concerned about the gentlemanly behaviour of those with whom he deigned to associate. At work when he wrote notes about applicants for jobs at the Observatory he was openly concerned about and influenced by their social background. In this way he was in agreement with Airy, who was always willing to condemn Richardson, in part it seems because his father was a North Country blacksmith and he had himself begun life in the same trade (101). When he agreed to keep Richardson on at the Royal Observatory as an Assistant he wrote that he ‘expected to have some trouble (102)’.

However, when Glaisher was engaged on his scientific experiments he thought calmly and deeply. For example, in meditative mood, when considering the implications of his balloon ascents, he accepted that when an aeronaut’s revolt against gravity was over, he had to return to earth, but went on to question if it was correct to accept that ‘bounds were set to our dwelling on the planet (103)’.

9 FAMILY MATTERS 1868–1903

In 1869 May Glaisher’s travels in the air came to an end. The previous year his daughter Cecilia had married another resident of Greenwich, a medical student by the name of Frederick Hunt. The young man was the elder son



FIG. 5. James Glaisher with his daughter Cecilia Apollina c. 1864. Laser and photographic copies in the Royal Astronomical Society Archives.

of the late Dr F.Knight-Hunt, formerly Editor of the *Daily News* which, as we have seen, was the newspaper in which daily weather reports were first published. He had also been sub-editor of the *Illustrated London News* at the time when the Glaisher articles on the Royal Observatory were published in that magazine. The marriage was against Glaisher's expressed wish. His strong dislike of de Fonvielle's political stance has been noted. The Hunts were radical and impulsive, qualities of character which Glaisher would have abhorred (104). Mrs Glaisher accepted the situation and her husband developed a coolness towards his wife and daughter which was never to be overcome. This was unfortunate because family feelings seem to have been strong (Fig. 5). According to the writer's grandmother Mrs Glaisher and her children used to go on holiday to Hastings. On one of these occasions in the late 1850s Mrs Glaisher drew a sketch of Battle Abbey, near Hastings, for her

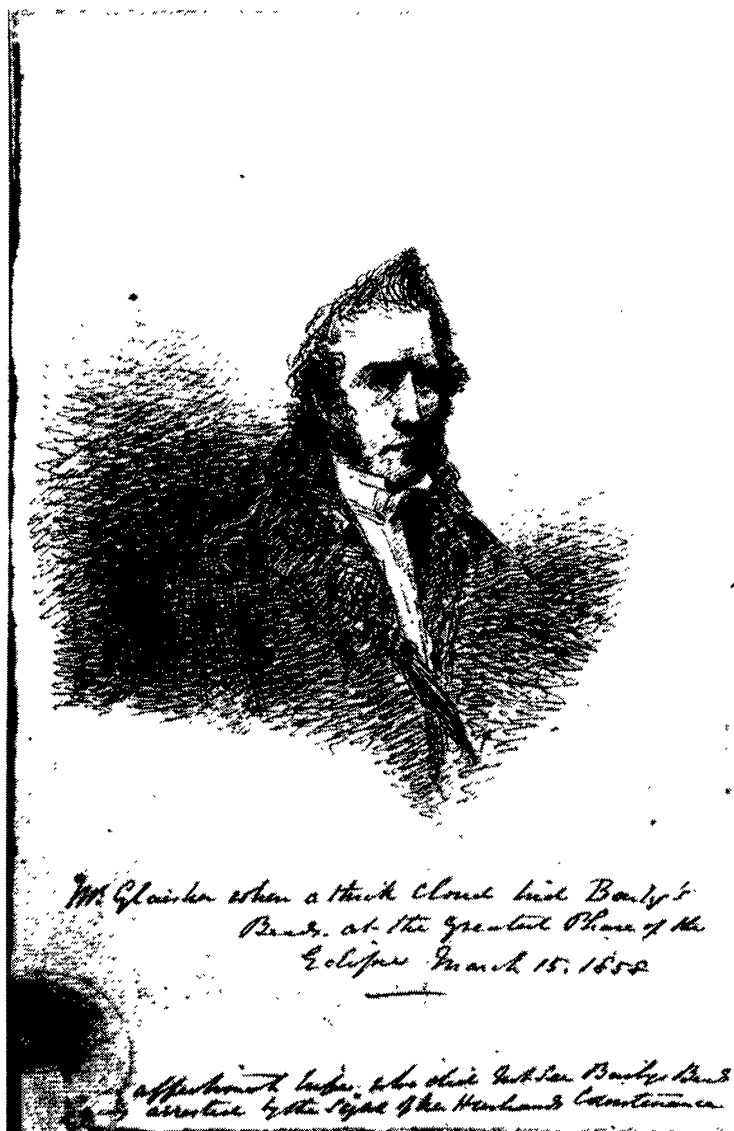


FIG. 6. Sketch of James Glaisher viewing an eclipse 1858 March 15 by his wife Cecilia Louisa Glaisher. Original in the Royal Astronomical Society Archives.

daughter. This sketch is still in the possession of the writer's family. She also sketched her husband as he viewed an eclipse at his home on 1858 March 15 (Fig. 6). It bears the following inscription:

Mr Glaisher, when a thick cloud had hid his Baily's Beads at the greatest phase of the eclipse. From his affectionate wife who did not see Baily's Beads, being arrested by the sight of her husband's countenance.

The original of this drawing is held in the Royal Astronomical Society archives.

Glaisher read his report on the physical effects of that eclipse to the British Meteorological Society on March 24 of the same year (105). In this Report there were interesting observations on the effect that this eclipse had on birds and animals.

In 1858 September, 2 months after the birth of their younger son Ernest, the Glaishers went to Hastings on holiday. Glaisher returned to London on September 12 and the next day his son Lee wrote an affectionate letter to him describing the scene at the Hastings Regatta which was then taking place (106).

After Dr Lee's death in 1866 Mrs Glaisher and her daughter often went to stay with Mrs Lee at Hartwell House. The women were undoubtedly a comfort to each other (Mrs Lee had no children), at a time when the domestic harmony of the Glaisher household was becoming increasingly disturbed. Glaisher's daughter married on 1868 March 7 and then spent most of her time at Hartwell House, in effect becoming Mrs Lee's companion. Meantime, her husband was completing his medical studies. When finally he graduated from Edinburgh in 1872 May his wife had already given birth to two sons.

Mrs Glaisher was a talented artist and it would seem she spent many hours perfecting her technique. She drew portraits of her younger son Ernest (born 1858) and a little girl, thought to be her half-sister, Ruth Belville, who was born in 1854 (Fig. 7 and 8). Both these portraits are in the possession of the writer's family. Several other crayon drawings which are also in the possession of her descendants have been attributed to her, though none of the work is signed. All the drawings were given to her daughter when she emigrated to New Zealand in 1880 with seven children under 12 years of age. Copies of the drawings have been lodged with the Glaisher memorabilia in the Royal Astronomical Society library.

In 1881 Glaisher had moved from 3 Dartmouth Terrace to 1 Dartmouth Place (now Hill), Blackheath. The Census Return for that year shows that he was living with his younger son Ernest (who was 22) and with a housekeeper and a housemaid. It would seem that by this time Mrs Glaisher had left the family home. In papers deposited in the Royal Greenwich Observatory Archives at the Cambridge University Library in 1992 it was stated that W.C.Nash claimed that Mrs Glaisher left Greenwich at a time of family conflict in the company of a Mr Silk (107). Her daughter told members of her family that her mother attempted to emigrate to New Zealand on several occasions in the 1880s. She said that once she was apprehended in Gravesend attempting to join a ship. Mrs Glaisher eventually died from bronchitis in Notting Hill in 1892 at the age of 64 years and was buried in Kensal Green.

Ernest Glaisher had died in 1885. He was a naturalist who, towards the end of his life, became Curator of the Georgetown Museum in British Guiana (now Guyana). He made journeys up tropical rivers in the area to study the river people and the wild life. An account of one particular journey was published and a Report presented to the Royal Agricultural and Commercial Society (108).

Glaisher's elder son, the mathematician and astronomer J.W.L.Glaisher, was a constant companion to his father. They shared similar scientific interests and a passion for books and old English pottery. J.W.L.Glaisher bequeathed his pottery collection to the Fitzwilliam Museum in Cambridge. In his later years James Glaisher shared his home with William Perigal, the meteorologist. There is a photograph of Glaisher and Perigal among the Glaisher manuscripts in the Library of the Royal Astronomical Society. This was taken shortly before Perigal died in 1898 at the age of 98 years (109).

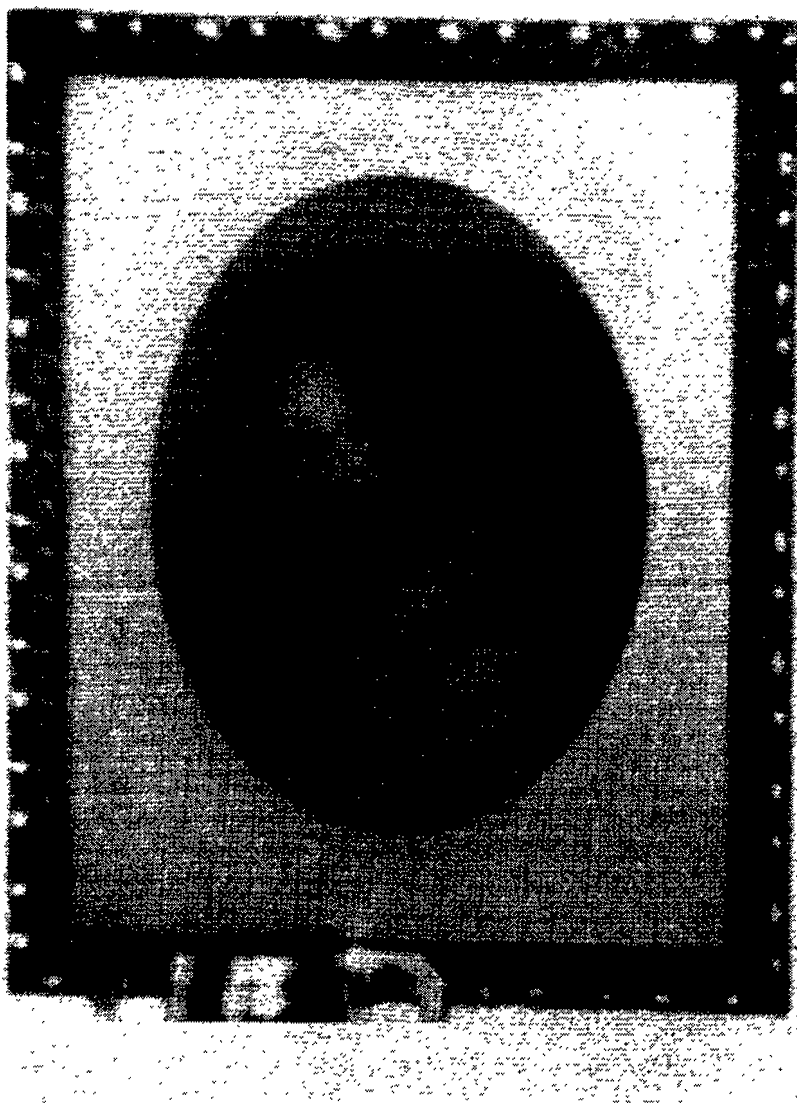


FIG. 7. Ernest Glaisher as a boy – crayon drawing by Cecilia Louisa Glaisher (c. 1864). Photograph in the Royal Astronomical Society Archives.

Glaisher's daughter returned to see her father after her husband's death in 1900. She was accompanied by her youngest son and daughter for whom Glaisher arranged private tutors. She attempted to persuade him that it would have been appropriate for him to have inscribed 'in loving memory' on his wife's tombstone but was firmly rebuffed, and by the time she returned to New Zealand no family reconciliation had taken place (II0).

10 ACTIVITIES 1868–1903

On 1871 January 28 Airy wrote to Glaisher:

I see with great pleasure that your son Lee has attained the honourable position of Second Wrangler and I congratulate you heartily upon it (III).

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FIG. 8. Little girl; crayon drawing thought to be Ruth Belville by Cecilia Louisa Glaisher (c. 1866). Photograph in the Royal Astronomical Society Archives.

Airy's son had a less distinguished career at Cambridge, though he edited his father's autobiography for publication in 1896 (II2).

From 1869 to 1892 Glaisher was President of the Royal Photographic Society (Fig. 9). He joined the Society in 1954. It was the Fellows of the Royal Photographic Society who raised the money for a marble bust of Glaisher. This was presented to him in 1877 and then given by his son to the Royal Meteorological Society after his father's death (II3). In 1978 it was moved from Herstmonceux to the entrance hall of James Glaisher House in Bracknell, which in that year became the new Headquarters of the Royal Meteorological Society. These Headquarters have now moved to Reading and the bust has been placed in the Council Room.

It seems that James Glaisher was not a popular President with all members of the Royal Photographic Society. In 1874 there was an open revolt against him and his Council. At this time it is said that the Presidency was offered to Fox Talbot who was 74 years of age. Thirty years previously Fox Talbot had published the *Pencil of Nature*, the first book illustrated with photographs. Like Glaisher, he had also displayed an interest in astronomy and mathematics but, unlike Glaisher, he was a considerable savant and in 1856 had become one of the first people to decipher ancient Assyrian texts (II4).

His chief recommendation for the post of President of the Royal Photographic Society would have been his pioneering work in photography which he developed independently of Daguerre. In 1842 he had been awarded the Rumford Medal of the Royal Society (II5). Subsequently, he became somewhat litigious about his scientific work. One is tempted,

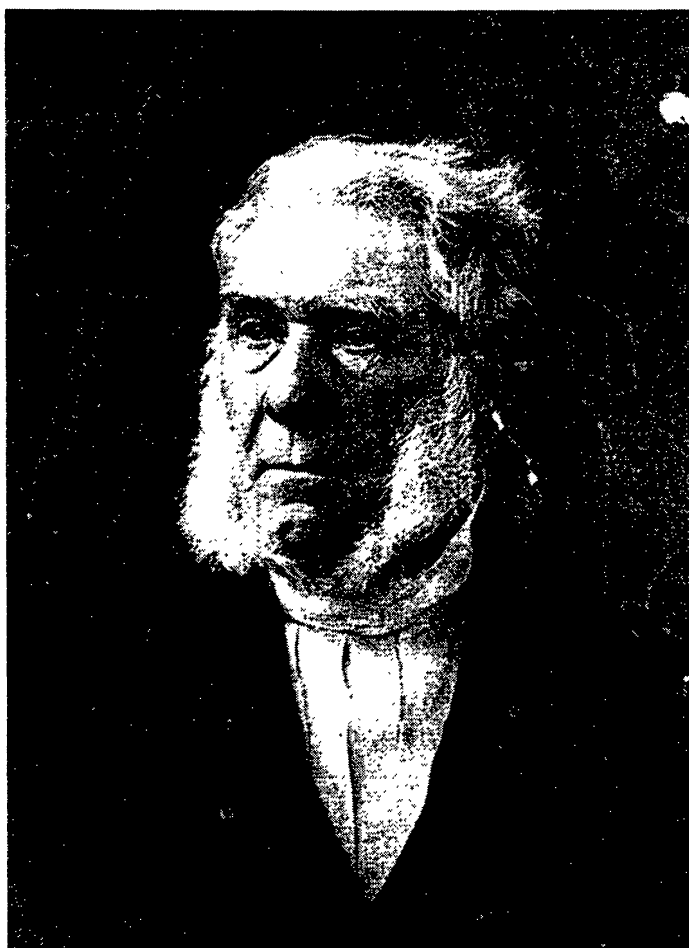


FIG. 9. James Glaisher FRS: President of the Photographic Society of Great Britain (c. 1872). The engraving was based on a photograph by John Mayall which was originally published in the *Journal of the Royal Microscopical Society* (Series 2, Vol. 5) in 1885 and then reproduced in the *Proceedings* of the same Society in 1979 May (Vol. 14/3).

therefore, to speculate whether this combative aspect of his character would have rendered him at an advanced age an even more difficult associate than Glaisher had proved to be.

Sir John Herschel who, as we have seen, was involved with Glaisher at the Royal Society in the 1850s and 1860s was another pioneer experimenting with new methods of photography and a close friend of Fox Talbot. His name in connection with photography is now chiefly associated with the discovery that sodium hypophosphite ('hypo') is an efficient fixing agent for silver photographs. Although it was later replaced for this purpose by sodium thiosulphate the name 'hypo' continued to be used for the agent used for fixing (II6).

Some may have considered Glaisher's tenure of office at the Royal Photographic Society as its glacial age but during his Presidency the Society passed from near insolvency to a healthy economic state. It is not difficult, of course, to accept that Glaisher could not have been an easy man to oppose, but the fact remains that he continued as President until 1892, at

which time he was 82 years of age. When he died the *Photographic Journal* of 1903 February 28 maintained that throughout his long association with the Society he had carried out 'all that he could to maintain its status and dignity (117)'.

In 1874 Glaisher resigned from the Royal Observatory. His letter of resignation was handed in immediately after receiving a note from Airy which read as follows:

It would be convenient and advantageous and conformable to the usages of the Observatory, that Mr Glaisher should not quit the Observatory till 2pm each day. No other officer of the Observatory leaves before 2pm (118).

Glaisher's reply began as follows:

Your fault-finding note to me this morning is so painful that in consequence I wish to resign (119).

Airy repented and asked Glaisher to withdraw his resignation in a letter to him dated 1874 September 7 but Glaisher insisted that his resignation go forward to the Admiralty and this was carried out on 1 October. He received a pension of £289.5s per annum having left the Royal Observatory when receiving a salary of £430 per annum. Glaisher did not visit the Observatory again until after Airy's retirement, although he continued to live close by. It was said that Airy gave more freedom of action to his staff as he grew older but Glaisher seems not to have been mollified by this change of attitude and stayed away.

A good illustration of Airy's attitude to his staff is the note which he sent to Glaisher on 1874 May 20, shortly before his resignation, which read as follows:

I much wish that this work was pushed on energetically to completion. If the present computers are not competent to carry it out they must be dismissed and other men must be sought (120).

After leaving the Observatory Glaisher continued to be involved in academic pursuits. In 1875 he joined the Committee of the British Association dealing with Mathematical Tables and completed their Factor Tables for them. In this he was associated with J.W.L. Glaisher who acted as Reporter to the Committee.

James Glaisher was admitted to the freedom of the City of London in 1881. The document has been placed in the Royal Astronomical Society Library (121). He was Director of the Crystal Palace Gas Company until 1901, and a member of the British Association for the Advancement of Science until his 90th year.

In 1868 Glaisher joined the Executive Committee of the Palestine Exploration Fund and became Chairman of the Executive in 1880. A bound volume of addresses of congratulation was presented to him on his 89th birthday (1898 April 9) by members of the General Committee of the Palestine Exploration Fund. It was a personal tribute to 'our grand old man' and has been preserved at the Royal Astronomical Society Library. By that time Glaisher had been a member of the Executive Committee for 30 years, its Chairman for 18 years and assisted in nine successive expeditions to the Holy Land. His reports on climate and meteorology in Palestine were published in the Palestine Exploration Fund's Journal. He discussed

observations of atmospheric pressure, temperature, wind, rain and cloud at points in Palestine in 15 papers published in Quarterly Statements to the Palestine Exploration Fund between 1891 and 1902 (122).

In the address sent by members of the Fund to Glaisher it was stated that apart from responsibility for climatology and meteorology, he had contributed over the years ‘to the flood of light poured upon the splendour of Jerusalem, the interpretations of the Bible, the surveying of the country, its fertility, and the understanding of the land and its people (123)’.

11 PUBLICATIONS

Glaisher published more than 125 papers on meteorology between 1847 and 1902. It is difficult to be precise about the exact number because this depends on how one defines a ‘meteorological paper’. In addition, he published many studies on astronomy to which he was attached in early life. There is a list of Glaisher’s work in a series of three catalogues of Scientific Papers published by the Royal Society in several volumes from 1800 to 1900. Marriott (1904) also compiled a bibliography of his meteorological writings in an article which appeared in *The Quarterly Journal of the Royal Meteorological Society* (124).

Glaisher’s original manuscript of working papers for the popular handbook on meteorology published in 1857 in *Hughes’ Reading Lesson Book Series* was presented by Glaisher in June of that year to Dr John Lee and preserved in the Library of the Royal Aeronautical Society at Dr Lee’s request (125).

In 1877 Glaisher edited *The World of Comets* in its English version (126).

It seems odd, therefore, that a man with such a prolific output of work should have been accused of showing a cavalier attitude towards his time-keeping at work. He had acquired an international reputation and some of his meteorological articles were published in periodicals in France, Germany and Russia. This fact may illustrate why Airy did not get on well with Glaisher. Airy preferred as colleagues diligent but unremarkable men and Glaisher was a distinguished and rather exotic researcher.

12 DEATH

Glaisher died at ‘*The Shola*’, 2 Heathfield Road, Croydon on 1903 February 7, 2 months short of his 94th birthday.

Obituaries appeared in academic journals and newspapers at home and abroad, including a careful assessment of the man and his work in a Report to the Council at the 84th Annual General Meeting of the Royal Astronomical Society (127). This account described his efforts in establishing the Magnetical and Meteorological Department of the Royal Observatory and also dealt with his independent work in the cause of scientific research. The obituary notice in *The Times* concentrated upon an account of his balloon ascents (128).

In the *Proceedings of the Royal Meteorological Society* W.C.Nash, a

colleague and a Greenwich townsman by birth, summed up the opinion of Glaisher's contemporaries thus:

He seldom attempted anything to which his powers were not fully equal, and, as a consequence, whatever he did, was done well (129).

His son Lee (J.W.L.) survived until 1928, his daughter Cecilia until 1932. They were 80 and 87 years old respectively at their deaths.

Members of the Glaisher family seem usually to have been long-lived. James Glaisher's health must have been good, but there are three accounts of periods of illness in his long life. We have noted the respiratory problems he experienced in Ireland in 1830.

In the mid-1840s Glaisher contracted a rheumatic disorder which persisted for several years. When he was carrying out his research on the irradiation of heat from the earth and from various bodies placed on or near the surface of the earth he insisted on lying on the grass for long hours on many nights watching for the formation of the dew and this probably caused, or at least aggravated, his rheumatism (130). After that episode he remained fit for 20 years. His next illness occurred in 1866 November when Nash noted that an incapacity prevented him (much to his chagrin) from observing the return of the Leonids (131). It was in the following year that he was absent from work for a period of 6 weeks during which time he had an operation. However, whatever caused the need for surgery – one might speculate that it could have been a hernia or a dental abscess – did not affect his long-term health and he remained in robust condition for the rest of his long life until he suffered a sudden cerebral haemorrhage in 1903.

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