An early astronomical society:

Highfield Astronomical and Meteorological Society, Halifax (1859)

David Sellers

The Minute Book of the Highfield Astronomical and Meteorological Society of Halifax, West Yorkshire, reveals the quirky meetings and personalities of one of the UK's first astronomical societies. Highfield AMS was established in 1859 and consisted almost exclusively of gentlemen drawn from moneyed circles. The society's instigator, William Richardson, was born into poverty, but became a well-known popularizer of science and a successful instrument maker, with his own impressive observatory. Despite an abundance of enthusiasm, the society seems to have lasted scarcely three years before it broke up acrimoniously.

1. The travelling 'natural philosopher'

The audience in the darkened lecture hall sat transfixed. A delicate coloured light played on their faces as William Richardson (1804–78), an itinerant scientific lecturer, adjusted the electrical potential being applied to his apparatus on a small stage in the Huddersfield Guild Hall in 1846 January.[1] Local newspapers reported the ethereal light as having 'a similar appearance to the aurora borealis', achieved 'by passing frictional electric fluid through an exhausted tube'.

Richardson, while aiming to entertain, also saw himself as an educator, responding to the public thirst for knowledge of the latest scientific wonders. For each experiment he took care to explain the current thinking. The rival fluid theories of electricity by the American Benjamin Franklin (1706–90)[2] and the Frenchman Charles François de Cisternay du Fay (1698–1739)[3] were contrasted as explanations of the light from the tube; Richardson preferred Franklin's idea.[4] For experiments involving the deflection of a magnetic needle by a 'galvanic current' – the basis, Richardson informed his audience, of new developments in telegraphy – the interpretation of the Danish physicist Hans Christian Oersted (1777–1851) was invoked.[5]

This was one of a course of four Philosophical Lectures that Richardson had been delivering throughout the North of England (Figure 1). The advertisements promised that

> The above departments of Modern Science will be illustrated by his splendid Apparatus, with which he will perform a variety of Electric, Galvanic, Electro-Magnetic, and Pneumatic Experiments. Mr R. will exhibit Two working Electro-Magnetic Engines, and his powerful *Coil Shock Machine*, producing 500 Shocks per second, and giving the appearance of LIFE TO A DEAD BODY!! At the request of a few Friends, Mr Richardson will introduce the NITROUS OXIDE, OR LAUGHING GAS!!

The lectures proved very popular: halls were often full to overflowing, at prices of one shilling for front seats, six pence for back ones, and half-price for children. As Richardson travelled around, his apparatus was so 'extensive and complete and of such superior finish that it formed quite an exhibition in a little market town or village'.[6] The audiences must have been at once amused, enthralled, and instructed, scarcely guessing at the humble origins of this erudite man.

1.1. *Life of William Richardson*

Richardson was the only child of a miller, Jonathan Richardson (1771–1814) and his wife Alice Freeman (1775–1808). They married in 1801 at Southowram, a village on the southeastern outskirts of Halifax.[7] William was born on 1804 March 10 at Brookfoot Mill, Brighouse, about two miles to the southeast of Southowram. He was orphaned by the age of 10 when first his mother and then his father died, after which he went to live in Southowram with his uncle Samuel Freeman (1786–1858), a local stone merchant.[8]

Two years later the young William was apprenticed to learn cloth weaving with a relative at a farm near Dudley Hill, Bradford. There, he was enticed into the study of nature as he wandered in his leisure time in

the surrounding countryside, being quickly drawn to experimentation and natural philosophy.

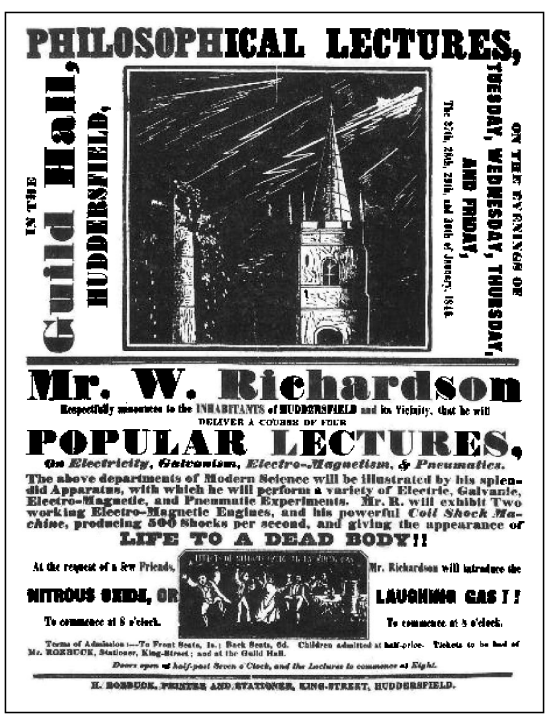
A succession of jobs followed: ironworks labourer, wagon driver for a tanning house, and managing a farm. Once married to Ellen (1802–67) and in a home of his own, he taught himself the art of scientific instrument making and soon became adept.

William and Ellen had three sons and a daughter. They apprenticed their second son, Robert (1833–1918), to the Leeds optical instrument manufacturer Gabriel Davis (dates unknown). William and Robert set up an instrument-making business together under the name William Richardson and Son at High Field, the family home in Pinnar Lane, Southowram. Their instruments were sold all over the country.

William Richardson's interests were wide-ranging and not confined to scientific matters. He had a passionate interest in literature and was an acquaintance of the Brontë sisters and their father who came to his lectures in Haworth.[9] He was said to have an excellent memory and could recite passages from Shakespeare and other authors at will. By the time of his death he had amassed an impressive library of some 1400 volumes. William also befriended the radical journalist William Cobbett.

The reverse side of a photographic portrait of William Richardson taken in the mid 1850s (Figure 2), declares that he is an 'Optician, Lecturer, and Geologist'.[10] He died at High Field on 1878 June 24.

Fig. 1: Poster for one of the 'Philosophical Lectures' given by William Richardson in the 1840s. (Huddersfield Local Studies Library, Kirklees Council, ref. B808)


PHILOSOPHICAL LECTURES,

IN THE Guild Hall, HUDDERSFIELD,

ON THE EVENINGS OF TUESDAY, WEDNESDAY, THURSDAY, AND FRIDAY,

Mr. W. Richardson

Respectfully announces to the INHABITANTS of HUDDERSFIELD and its Vicinity, that he will DELIVER A COURSE OF FOUR

POPULAR LECTURES,

On Electricity, Galvanism, Electro-Magnetism, & Pneumatics.

The above departments of Modern Science will be illustrated by his splendid Apparatus, with which he will perform a variety of Electric, Galvanic, Electro-Magnetic, and Pneumatic Experiments. Mr. R. will exhibit Two working Electro-Magnetic Engines, and his powerful *Coil Shock Machine*, producing 500 Shocks per second, and giving the appearance of

LIFE TO A DEAD BODY!!

At the request of a few Friends, Mr. Richardson will introduce the

NITROUS OXIDE, OR LAUGHING GAS!!

To commence at 8 o'clock. To commence at 9 o'clock.

Terms of Admission:—To Front Seats, 1s.; Back Seats, 6d. Children admitted at half-price. Tickets to be had of Mr. ROBBUCK, Stationer, King-Street; and at the Guild Hall.

Doors open at half-past Seven o'Clock, and the Lectures to commence at Eight.

H. ROBBUCK, PRINTER AND STATIONER, KING-STREET, HUDDERSFIELD.

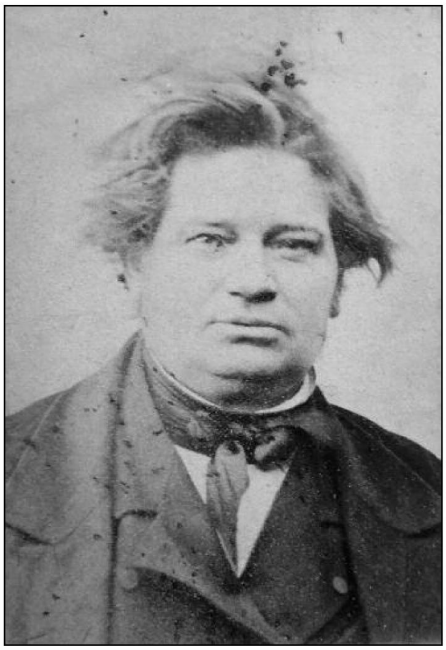


Fig. 2: William Richardson (1804–78), founder of the Highfield Astronomical and Meteorological Society of Halifax, photographed at age 50. (Calderdale Local Studies Library, Calderdale Council)

2. Public interest and formation of the society

There was a real thirst for science among the wider population of all classes at that time. Astronomy received a boost on the occasion of an annular solar eclipse on 1858 March 15. The centre track passed from Lyme Bay in the south to The Wash in the east and many Yorkshire folk observed it intently. As the Leeds Mercury reported: 'In the town of Leeds itself the event caused an unusual degree of interest … Crowds of spectators assembled in the streets wherever a sight of the phenomenon was most likely to be obtained. Nearly all appeared to be prepared with stained glass as a protection to the eyes.'[11]

Hard on the heels of the eclipse came the spectacle of Donati's Comet (C/1858 L1), the second most brilliant comet of the 19th century, which was especially prominent, high in Ursa Major, during September and October of 1858.

Animated by the collective enthralment at these celestial wonders, Richardson invited a number of local devotees of science to meet at his house on Wednesday 1859 August 17 with a view to forming a regular discussion circle. Thus, with Richardson in the chair and 10 other 'gentlemen' present, the inaugural meeting of the Highfield Astronomical and Meteorological Society took place.

Most of the attendees were from the manufacturing and professional circles of Halifax and the surrounding industrial townships.[12] On display at the meeting was an impressive array of telescopes, including, according

to a local newspaper report, 'a choice Gregorian, of six inches aperture, by Cuthbert; and two beautiful refractors, each about 3½ inches aperture, one by M. Chevalier, of Paris, and the other by Messrs. Cook and Sons of York'.[13] These instruments were set out on an observatory tower that consisted of an open platform above High Field house (Figure 3).

Samuel Baines (1815–66), a worsted spinner and manufacturer from Lightcliffe, a village about a mile east of Halifax, who had also become known as a scientist, geologist, and philanthropist, was elected as president of the new society.[14] Richardson became the vice-president. Francis Alexander Leyland (*c.*1815–94) agreed to act as secretary. Leyland was a bookseller, printer, and stationer who later became an admired antiquarian and local historian. The identity of the minute-taker is not stated, but his remarkably frank record of proceedings during the three year period that the society flourished allows us to glimpse the activities and motivations of this little fraternity. The Minute Book is now held by the West Yorkshire Archive Service in Calderdale and the following account of the meetings is based on quotations from it.[15]

Meanwhile, 25 km to the northeast, another group, drawn from similar strata of society, had gathered to form the Leeds Astronomical Society. The Leeds group had been inspired by recent celestial events too, but their moving spirit – a 14-year-old boy, William Trant (1844–1924) – had also been enthused by the introduction of an astronomy course into the programme of the Society of Arts Examinations for 1858.[16] Unfortunately, although the new Leeds society had plenty of impressive 'hands-off' patrons and did its best to advertise its existence, within seven or eight years it perished.

A feature of the Highfield society was that its key dates would be set by the sky. The annual subscription of 10 shillings and 6 pence was to be due on midsummer's day and the monthly meetings were to be on 'the Wednesday before full moon'. In contrast to the Leeds Astronomical Society, whose subscription rate was much cheaper (only 4 shillings per year in 1863),[17] membership of the Highfield society seems to have been by invitation only, and patrons were not sought.

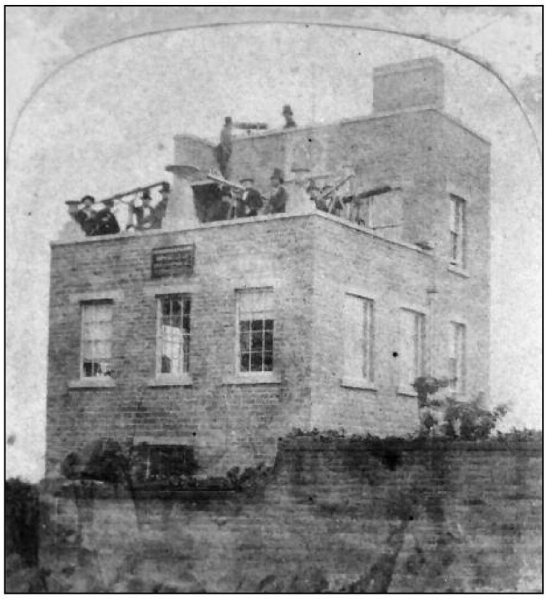


Fig. 3: Members of Highfield Astronomical and Meteorological Society pose with telescopes at the Highfield Observatory on Pinnar Lane, Southowram, possibly on the occasion of the Society's first meeting on 1859 August 17. The sides of the observatory were aligned north, south, east, and west, and on one wall was a round dial connected to a weather-vane on the roof that indicated the wind direction. (Calderdale Local Studies Library, Calderdale Council)

3. First meetings

At its second meeting on 1859 September 7, Baines gave an address on the objects of the new society and then a review of the present rapidly changing state of science, giving particular attention to 'nebulous theory', the 'new theory of the expansion of the Earth', and

> the conflicting opinions of the learned upon questions affecting cherished theories, and conclusions long received with confidence on the authority of great names. Such was the confusion recent ideas had created in certain branches of science, that opinions long held with confidence had become questions of doubt, and the scientific enquirer following the track which philosophy had made, baffled and uncertain, was compelled to retrace his steps.[18]

The meeting was reported in the *Halifax Guardian*, which added that 'The society is about to put down a water gauge … removed as far as possible from all atmospheric influence, so that an opportunity will be afforded for testing the alleged statement of a gradual diminution in the fall of rain having taken place.' [19]

A succession of meetings, with discussions ranging from comets to meteorology, took place as the society got off to a flying start. Overtures from a local astrologer, Charles Grendell, were summarily rebuffed: 'As this science did not come within the scope of the Society it was unanimously resolved that Mr Grendell's theses could not be entertained'.[20] Significantly, there was no recorded discussion about recruiting, holding public events, or admitting women.

For a while, after the 1860 February meeting, the minute-taker seemed to run out of steam, simply noting that 'several meetings of the society followed at which little more than desultory conversations on various scientific subjects took place'. Then, in the strikingly informal tone which characterized the new society, the minutes continue:

> For some months during the summer the meetings were not regularly held, and the Minute Book was misplaced, not as was facetiously supposed left at

the 'Cock & Bottle' [a pub in Southowram – see Figure 4] for on several occasions Mrs Newsome the hostess [i.e. landlady] was questioned about it but could give no information as to its whereabouts.

The surmise was perhaps not altogether out of place, inasmuch as it was the custom of the Halifax members, after the toilsome ascent of the hill, on their way to the Observatory, to regale themselves at the aforesaid *Cock & Bottle* spending some time in cracking jokes and smoking their pipes before the ruddy fire of the old hostelry. The principal attraction at the *Cock & Bottle* during the winter meetings was a splendid sample of Jamaica Rum, which Mr John Youd averred, he had never, through the whole of his long-life experience, seen equalled! The other members, on his recommendation, also patronized it; and, at all times, whenever they called at the said hostelry, Mrs Newsome the hostess laid herself out to the utmost of her ability to promote the comfort of her guests. And they, frequently, on their part, after having enjoyed her good cheer, and well fortified with it, issued forth to brave the driving sleet or pelting rain which in those winter nights oftimes whirled round the elevated point on which the Observatory stands. Thanks to Mrs Newsome – if she were a buxom widow –

"Bachelor, bachelor, bachelor John! –
He should marry her, he's the mon!"

Prosperity to the *Cock & Bottle*, and may the members of the society from the town long live to enjoy such *noctes* as the gatherings of the Highfield Astronomical afford them on their way to its observatory! With regard to the missing Minute Book, the fallacy of the supposition that it had been left at the *Cock and Bottle*, was shewn by its being afterwards discovered in a cupboard!

Fig. 4: The Cock & Bottle in Southowram, the favourite watering hole of the Highfield Astronomical and Meteorological Society, still stands at the junction of Common Lane and Bank Top. It was refurbished and expanded in 2010 and again in 2017. This is how it appeared in early 2019. (David Sellers)

The jovial atmosphere of the meetings is conveyed by the minute for 1860 August, when Baines and Richardson spoke on 'the grand epochs of the earth's history, and the stupendous phenomena which had wrought the mighty changes of its crust' and 'the hospitality of the worthy vice-president was enjoyed for the remainder of the evening in perfect hilarity and reciprocal good feeling'.

A report for the benefit of local newspapers stated, with more sobriety, that 'The primary object of the society is to record faithfully the atmospheric changes of our neighbourhood, and to note such celestial phenomena as may appear. This it is enabled to do by the aid of valuable meteorological and astronomical instruments, with which the observatory has been supplied by the vice-president.'

At each meeting there would usually be an address on an astronomical (or frequently geological) topic by a member, but occasionally an invited outside speaker would do the honours. Thus, in 1860 November, a certain Mr Bowman gave a talk on mathematics, but overestimated the staying power of the members and left the minute-taker utterly bewildered. Fortunately, it was recorded, 'The remainder of the evening was enjoyed in an edifying manner. There was an absence of learned formality and of that frigid restraint, which too often casts its shadows over scientific gatherings, and whose chilling influence retards, rather than promotes the desire for information.'

4. Controversies

Despite the conviviality evinced by the minutes, there were often disagreements at meetings – especially when discussion turned to topics such as evolution and the chronology of the Earth. Nevertheless, we read that within the Society, 'whatever the heat of discussion, one gratifying result of its learned *noctes*, and that not the least, is, the perfect amity and good understanding which subsists amongst the members: amongst gentlemen maintaining opinions the most opposite. One section hold that man is destitute of a faculty to comprehend fully that which is presented to him on the evidence of his senses; while the other, reject all and everything they cannot prove to demonstration…'

Sometimes, when faced with a puzzle, the members would vow to investigate further, leaning on the goodwill of their hapless 'Corresponding' Secretary. At the 1861 March meeting

> there was brought before the society… an extraordinary statement made by Capt. Drayson R.A.[21] in a paper on the '*Expansion of the Earth's Crust &c*' read before the *West Riding Geological and Polytechnic Society* in the year 1859 to the effect that between the years 1827 and 1858 the Observatory of Edinburgh had moved 1373 yards towards the north from the place it occupied previous to the former

> date.[22] Nothing could exceed the surprise of the members at this marvellous assertion and it was proposed by the president in a perfect maze at the Captain's extravagance and seconded by Mr J W Ward on the plea that as they had a secretary they ought to find him something to do – that that functionary be requested to communicate with Mr Chas. Piazzi Smyth on this subject.

Leyland duly wrote to the Astronomer Royal for Scotland, Charles Piazzi Smyth (1819–1900), and received a pithy reply by return of post:

> I can only say, that not being aware of the Observatory having moved during that time so much as a tenth of an inch, & not having seen the printed Report, I have no idea what can be meant.[23]

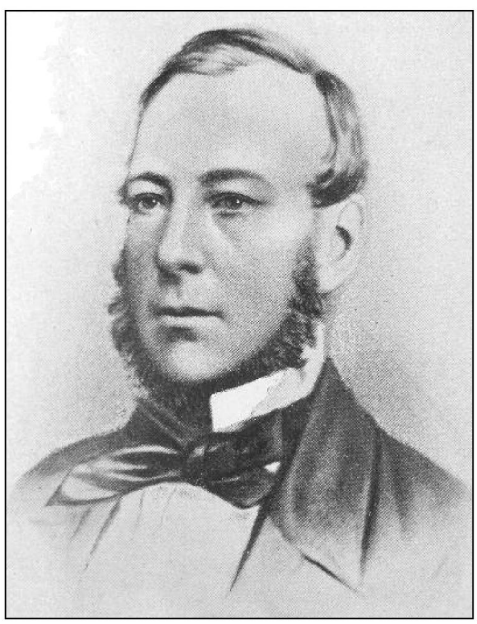
Whenever the meetings were held at the High Field observatory, if seeing conditions permitted, the members would gather on the roof to look through the telescopes. Thus, at the 1861 April meeting

> the moon, being in her first quarter, the large Gregorian (eight inches in diameter) by Mr R. Richardson [presumably William's son Robert], was brought into requisition. Fine views were obtained of the walled plains, Archimedes and Plato; and of the Mares Imbrium and Tranquilitatis… Equally fine views were also obtained of the planets Jupiter and Saturn.

The minute-taker, as usual waxing lyrical, this time on a melancholy matter, reported that

> After these interesting observations, Mr Baines took the chair in the room below, and with great feeling announced the death of Mr Green of Bradford who, although not actually a member, always evinced the warmest interest in the welfare of the society. After a long and laborious life he had arrived at that period of his existence when he hoped to enjoy the fruit of his labours. And, like the husbandman who has stored in his granaries the produce of the harvest, and who at the end of his toil looks forward to the rest, which is the reward of the faithful:- he – enabled by the success of his calling – surrounded himself with books on every science and the appliances necessary for their pursuit, trusting to spend the residue of his days in the enjoyment of the society of the learned. But, as if to satisfy more fully the longings of his spirit after that knowledge which appertains to the phenomena of nature in their grandest and most mysterious forms, he was summoned, let us hope not to a state of unconsciousness, not to annihilation, but to a more perfect knowledge of the Great first Cause and the inconceivable majesty of his works!

Fig. 5: Samuel Baines (1815–66) was president of the Highfield Astronomical and Meteorological Society during its brief life. (Calderdale Local Studies Library, Calderdale Council)



5. Social class

On roughly the second anniversary of the society the meeting was held at the home of their president, Samuel Baines (Figure 5). The minutes, signed by Baines, take obsequiousness to new heights, but in doing so give us a candid view of the social circles involved:

> It was at the invitation of Mr Baines and his amiable lady that the Annual Meeting was held, this year, at their own house [Holroyd House, Lightcliffe]. Imbosomed in trees, and surrounded by gardens, vineries, greenhouses and fish ponds this mansion affords the ease and enjoyment which fall to the lot of one who has borne the heat and burden of the day. It is here that surrounded by the books, collections and appliances of science, and encircled by his chosen friends, who are engaged in the same pursuits with himself, the worthy president of our society
>
> 'Keeps the noiseless tenor of his way'[24]
>
> And without ambition, pride or ostentation imparts ungrudgingly, the knowledge which he has acquired by long and patient sedulity; and holds no reward more precious than the internal satisfaction felt by a generous soul in the successful performance of good deeds! But it was not on this occasion alone that the society had enjoyed the hospitality of Mr Baines and it would be unjust if this fact remained longer unrecorded. Indeed the warm-hearted interest which he has on all occasions evinced for this society, as well as for science in general – accompanied, as it always is, by his well-known urbanity of manner, his unostentatious demeanour and his genuine goodness of heart – demands, on our part, this grateful and sponta-

neous expression of acknowledgement. After tea, which had been provided with Mrs Baines's usual plentifulness and good taste, members adjourned to the library.

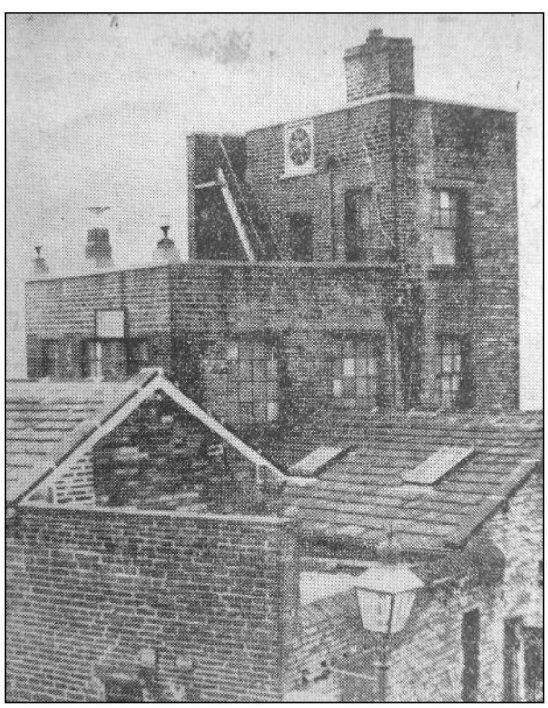
As chance would have it, the library was not to last. Less than four years later, a business disaster forced Baines to put his library under the hammer. It was sold at auction in 1865 April: more than 4000 volumes of scientific works, along with his collection of rare birds, fossils, minerals, and philosophical instruments.[25] The following year he died, a broken-hearted man.

Another sidelight on the social position and views of some of the members was revealed at the 1862 February meeting, when Christopher Ward gave an account of his travels in the southern states of America:

> The condition and occupation of their inhabitants and the contentment of the slave population were brought before his hearers in a familiar and interesting manner. The excellent relations of the slaves with their owners were illustrated by incidents which threw doubt on the policy of their emancipation; and rendered negatory the zeal of their liberators!

This blinkered view within the privileged, educated, layer of society is in stark contrast with the voices of the supposedly uneducated, untravelled, mill workers of Yorkshire and Lancashire, who, at roughly the same time, were offering their support to the struggle for the emancipation of slaves. The poor in the cotton-spinning valleys of Lancashire and Yorkshire were suffering drastically from the interruption of cotton imports as a result of the American Civil War.

Fig. 6: Highfield Observatory as it appeared in 1935. The building was the highest point in Southowram and stood as a conspicuous local landmark until the 1960s when it was demolished. (Halifax Courier/Calderdale Local Studies Library, Calderdale Council)



Yet, on 1862 December 31, a meeting of cotton workers at the Free Trade Hall in Manchester resolved to support the Union in its fight against slavery. They wrote, 'in the name of the Working People of Manchester', to Abraham Lincoln, President of the United States, saying:

> the vast progress which you have made in the short space of twenty months fills us with hope that every stain on your freedom will shortly be removed, and that the erasure of that foul blot on civilisation and Christianity—chattel slavery—during your presidency, will cause the name of Abraham Lincoln to be honoured and revered by posterity.[26]

Ward's defence of slavery, by contrast, smacks of wilful ignorance, or worse.

6. Dissolution

On 1862 March 12, the Society meeting was attended by eight members and four visitors (including a Unitarian Minister). The address for the evening, by Baines, was on the subject of why many of the lower orders of animal had superior faculties to those of Man.

> Mr Baines had expressed an opinion that the eagle, vulture and hawk, as well as other birds and animals, had not been created as we find them, but, their exquisite faculties of sight and scent had been perfected by the circumstances in which they had been placed. Mr Christopher Ward objected to this view and gave a succinct account of the habits and distinctive qualities of many of the feathered tribe which were known to have been the same in every respect, in no way inferior, and possessed of precisely the same faculties and instincts, so far back in point of time, as human information reaches, as they are known to ornithologists at the present day. The eagle, above two thousand years ago, when placed on the standard of Imperial Rome to illustrate the vigilance, the lofty aims and fearless energy of the people and Senate, was in every respect as now. Above three thousand years have been added to the world's age since the Egyptians revered and embalmed the Ibis. On a comparison of these mummy birds with the living examples still extant, the inference is justified that their instincts, habits and natural characteristics, as now existing were implanted in them on the fiat of their creation.

This could have been a sensitive topic, touching as it did on the evolution or transmutation of species. In the event, such matters did not cause offence. But a spat developed after Richardson had cited, as a possible illustration of Baines's conjecture, the multi-lensed eye

of the trilobite. This, he said, could have possibly arisen as a result of repeated 'muscular commotion' as the creature tried to see through turbid estuarine waters. At this point, the minutes record an intervention from another member, which ultimately was to cause the dissolution of the society:

> It is exceedingly to be regretted, that this ingenious theory was met by one member in a spirit of banter, quite contrary to the aim & scope of the Society. He said, that if "muscular action had added so many lenses to the visual organs of the Trilobite, Mr Youd might, if he had exercised his eyes upon the heavenly bodies for the last thirty years past" with greater energy than he had done might have been enabled, by this time, to dispense with the use of a telescope. And he further recommended Messrs Richardson who are engaged in the laudable task of making Gregorian telescopes, to urge upon astronomers and microscopical Inquirers the advantage of promoting the muscular action of their eyes, in the habit of the Trilobite, in order that they might pursue their scientific researches without the aid of optical instruments. As no society exists without having some member who may be counted inferior to the rest in all those amenities which grace the scientific circles of this country, considerable indulgence will be extended to the member in question. No other incident occurred to interrupt the gravity of the evening's discussion and the meeting broke up at an early hour; its members instructed by the evening's debate and fortified by the "collodion" of the Society.

Fortified or not, members were somewhat agitated at the next meeting on 1862 April 15. The minutes of the previous meeting, although 'read and applauded', were the subject of considerable discussion. They ended up not being signed by the President, because

> An influential member repudiated the construction put upon his words and asserted that a liberty had been taken with his sentiments and opinions. While several of the society expressed their entire satisfaction with the Report, others affirmed that the obnoxious passages ought to be obliterated.

Although the members agreed to meet again, the Minute Book terminates abruptly at this point and a resignation letter from Leylands, the secretary, is pasted onto the next page. It is dated 1861 November 27, suggesting that he had already contemplated resignation nearly five months earlier.

7. Conclusion

Thus, apparently, less than three years after its formation, ended the Highfield Astronomical and Meteorological Society, one of the first amateur astronomical societies in the country. It had a group of enthusiastic and able members, prepared to make their way to the meetings via an exhausting hill climb, even in snow blizzards. It had the use of a permanent observatory, equipped with fine instruments. It also had the ear of the local press and a mission to make valuable meteorological measurements. And yet, it appears, pride and personal conflicts proved to be their undoing. The intriguing Minute Book and a handful of newspaper reports constitute the only reminder of its brief flowering, and a warning to others.

Acknowledgements

I thank the staff of West Yorkshire Archive Service Calderdale, the Local Studies Department of Calderdale Central Library, and the Huddersfield Local Studies Library, for their friendly help in locating some of the above material. In particular, I am grateful to Julie Mahoney and colleagues at the latter institution for expending a great deal of effort to recover from the archives the poster depicted in Figure 1.

References and notes

1. The Guild Hall, Huddersfield, 1846 January 27–30.
2. Benjamin Franklin proposed that electrostatic forces indicated the presence of a single fluid, carrying positive electric charge. He also proposed that charge is conserved. See Helrich, C. S., *The Classical Theory of Fields: Electromagnetism* (Heidelberg, 2012), p. 5.
3. Charles du Fay considered that electrostatic phenomena indicated the presence of two fluids.
4. See also *The Sheffield & Rotherham Independent*, 1855 April 7, p. 6, for remarks at a delivery of two lectures at Hoyland Mechanics' Institution 1855 March 28 and 29.
5. Hans Christian Oersted discovered the force caused by an electric current on a magnetic compass needle in 1820 April.
6. Hepworth, George, 'A Famous Lecturer Sixty Years Ago, William Richardson and His Work', in *Yorkshire Weekly Post*, 1911 March 18. Hepworth was an acquaintance of Richardson.
7. Bull, Malcolm, *Calderdale Companion* http://www.calderdalecompanion.co.uk/mmr37.html#135
8. Bull, Malcolm, *Calderdale Companion* http://www.calderdalecompanion.co.uk/mmr37.html#195
9. Hepworth, op. cit. (ref. 6).
10. Calderdale Central Library, Photographic Collection. Portrait of William Richardson by Thomas Illingworth, Photographer, of Gibbett Street, Halifax.
11. *Leeds Mercury Supplement*, 1858 March 20, page 1, column 4. Rather than 'stained glass', perhaps the reporter meant smoked or coloured glass.

12. Present at the meeting were: Mr William Richardson (scientific instrument maker and lecturer); Mr Samuel Baines (worsted spinner and manufacturer); Mr John Youd (banker's clerk); Mr Ehud Hanson (dyeing employer); Mr Jonathan Wainhouse (accountant to a worsted manufacturer?); Mr Ward (John Whiteley Ward or Christopher Ward, brothers, who were both textile manufacturers employing hundreds of people, and both members of the Society); Mr Gledhill; Mr Robert Richardson (optical instrument maker, son of William); Mr John Green (soap manufacturer of Bradford); Mr Hartley (of Bury); Mr Francis Leyland (bookseller and stationer). Source: minute of 1859 August 17 meeting.
13. *Halifax Guardian*, 1859 August 20.
14. Turner, J. Horsfall, *The History of Brighouse, Rastrick & Hipperholme* (1893), pp. 273 and 280. Samuel Baines lived at Holroyd House, Hipperholme, near Brighouse. He was a member of the Leeds Philosophical and Literary Society and the Yorkshire Geological Society. He owned Victoria Mills in Brighouse, where he employed more than 70 people, and was responsible for introducing the first fire engine (Neptune) to the town. He also owned a large amount of farmland.
15. West Yorkshire Archive Service, Calderdale office, Halifax. Halifax Antiquarian Society Records: HAS 1324 (721).
16. The Irish mathematician and educationalist, the Rev. Dr James Booth (1806–78), wrote in the *Leeds Mercury* for 1860 March 31: 'I first introduced the subject of Astronomy into the programme of the Society of Arts Examinations for 1858 … This introduction of the subject into the Examination Scheme, I now, for the first time, learn was the origin of the Leeds Astronomical Society'.
17. Leeds Astronomical Society leaflet, 1863 March 31 (Society scrapbook).
18. *Halifax Guardian*, 1859 September 10, p. 4.
19. Ibid.
20. Minute Book, 1859 October 5.
21. 'Captain Drayson' was Alfred Wilks Drayson (1827–1901); he was also interested in spiritualism and conducted psychic research with Arthur Conan Doyle.
22. 'On the geological evidence of the secular expansion of the crust of the Earth, the increase of its orbit, and the effects produced thereby, as propounded by Captain Drayson, R.A. By the Rev. W. Thorp, Vicar of Misson, Notts', *Proceedings of the Geological and Polytechnic Society of Yorkshire*, vol. 4, issue 1, 52nd Meeting, on 1859 July 1.
23. Charles Piazzi Smyth, the Astronomer Royal for Scotland from 1846 to 1888, was based at the Calton Hill Observatory in Edinburgh. Smyth's reply is dated 1861 April 12 and is pasted into the Minute Book.
24. A quote from Thomas Gray's *Elegy Written in a Country Churchyard* (1751):

    Far from the madding crowd's ignoble strife,
    Their sober wishes never learn'd to stray;
    Along the cool sequester'd vale of life
    They kept the noiseless tenor of their way.
25. *Athenaeum*, no. 1955, 1865 April 15, p. 508. The sale was at Baines's home, Holroyd House, by Messrs. Hardwicks & Best on 1865 April 19–21.
26. Wyke, Terry, *Public Sculpture of Greater Manchester* (Liverpool University Press, 2004), p. 89.

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