

William Andrews, a 19th century amateur astronomer

Howard Miles

William Andrews (1835–1914) lived and worked for most of his life in Coventry in the silk weaving industry. He kept a diary from 1850 onwards, in which he records his astronomical observations made either with the naked eye or by using a small telescope. As far as is known, he never made contact with any other astronomers and so his record is important historically because it illustrates that, even in the mid-19th century, there existed a section of the community which, although not making its mark in the annals of that period, was very interested in what was happening in the heavens.

Introduction

The middle of the 19th century was a critical period in the development of astronomical knowledge. The reason for this is threefold. First of all, the introduction of new techniques, such as photography, permitted a more accurate record to be kept and, secondly, there were many famous astronomers who, as keen observers able to use these new techniques, produced tremendous advances in our understanding of the heavens. This was helped by a third factor: the abundance of spectacular events which seemed to grace the sky during that period.

Much has been written about these famous astronomers and, since 1890, our Association has provided the means for many leading astronomers to publish their findings. Their work will without doubt be part of the permanent record in the history of astronomy. Nevertheless the Association includes as members many individuals who take an interest in astronomical matters but whose names will never be part of the astronomical record. Did such individuals exist before the formation of the Association? It must be remembered that only a relatively small percentage of the population had more than a rudimentary education and many could not read or write. For the working man, the hours of labour were very long, leaving little time for extra activities such as hobbies. It was, however, common practice for those who could read and write to keep a diary. In such a diary, kept by a working man living in Coventry, there are many references to observations of the night sky and this paper extracts those of astronomical interest and comments on these entries.

The existence of this diary came to my knowledge by an advertisement on the fly-leaf of a reprint of the famous Carew's *The Survey of Cornwall*.¹ This mentioned a publication² that included, *inter alia*, parts of a diary kept by a William Andrews,³ who lived and worked not far from where I spent most of my life. This link caused me to read the book and I became fascinated by Andrews' astronomical entries.

William Andrews was born in 1835, son of a local business man. He went to a local private day school

where he received a good grounding in mathematics. He was apprenticed at the age of 13 in the design department of a local silk-weaving firm. During his career in the silk weaving industry he won many prizes for his design work. He was, however, a very ruthless person and quickly aligned himself with the interests of his employers, actively resisting the demands of the workers for a fair wage more strongly than the employers themselves. Obviously, he reached managerial positions very quickly and his contemporaries described him as widely respected person, but also feared and disliked. Although the diary, starting in 1850, concentrates on his rise from an apprentice to a relatively wealthy businessman, he records interesting observations about the night sky as seen from his home in Coventry. He was certainly interested in astronomy, especially in his early years. The diary shows that he was more active astronomically during periods of unemployment or depression in business, when he obviously had more time to spare. Although he kept a diary until 1913, shortly before his death, the diaries are far less detailed after about 1866, the last date of any entry having an astronomical bearing. This paper extracts those items from the diary which have an astronomical interest and, to give them more meaning, further details have been added. It is felt that this will give a better insight into 19th century amateur astronomy.

Extracts from Diary

1850 Dec 20 – *Slight Aurora Borealis*

1851 Jan 22 – *Aurora Borealis*

1852 Feb 19 – *Aurora Borealis tonight – a splendid display.*

Records show that 1850–52 lay about half way between sunspot maximum and minimum and it is quite instructive to learn that auroral activity was at such a high level as to be seen so many times from the Midlands in a relatively short period. What is very surprising is that the dates of the first two entries do not appear in the exhaustive catalogue of auroral displays seen in Europe below latitude 55° from 1700 to 1890 collected by

Alfred Angot.⁴ However, the catalogue records the display of 1852 February 19 as being seen over the whole of England and much of Europe.

It was during these years that interest in aurorae was developing but, of course, it must be remembered that at that time the connection between aurorae and solar activity was by no means widely accepted.

1851 Jly 28 – Great eclipse of sun today. Cloudy, could not see it, was dusky at middle of eclipse about 3 o'clock.

It is obvious that Andrews had learned that an eclipse was going to occur. In other places in the diary there are references to an almanac but no details are given. The eclipse of 1851 July 28 was observed from Norway and Sweden by several British astronomers, the path of totality crossing the Atlantic Ocean from Greenland to Norway–Sweden, well clear of the British Isles. It is therefore likely that the duskiness reported at the time of mid-eclipse was not due to the eclipse. The first eclipse photograph, a daguerrotype, was taken at this eclipse by Berkowski using the Königsberg heliometer.

1852 Apr 12 – Pillar of light in sky after sunset.

Apr 19 – Same appearance in sky.

Andrews gives no details of these phenomena and so he may be just recording the presence of sun pillars. Alternatively, they could refer to the zodiacal light, which can be seen at this time of the year under ideal weather conditions from the UK.

1852 May 3 – Saw Jupiter's satellites for the first time with a small telescope.

No indication is given of the size and type of telescope he used.

1853 Aug 28 – Saw the comet tonight, the nucleus very bright, tail about 3 degrees long, a very beautiful object.

This was 'Klinkerfues' Comet 1853III (1853c) discovered on June 10/11. It had brightened rapidly during July to become a naked eye object by August 11. On August 26, the tail was 10° in length and with a nucleus of 1st magnitude it was visible in strong twilight. On August 30, Schmidt saw the comet telescopically in the mid-afternoon.

1854 Mar 5 – Noticed a star of 5th magnitude in Taurus NW of Aldebaran disappear behind the Moon at 9^h 5^m. This occultation was not mentioned in the almanacs. Sky very clear and excellent view of disappearance. The star beamed twice half extinguished and then instantly disappeared. At 9.45 the star had not emerged and the sky became hazy, at 10 clouded.

Because of the sharpness and suddenness of stellar occultations, Bessel had concluded in 1834 that if a lunar atmosphere existed it must be less than 1/500 that of the Earth's atmosphere, but Sir John Herschel in

1851 gave an upper limit of 1/1980. Andrews' observation, obviously using a telescope, is quite precise. The approach of the star must have been strongly oblique because of the reported variations in the brightness just before the occultation.

1854 Mar 30 – Saw the new comet tonight, its nucleus-star of 1st magnitude.

Mar 31 – Comet's tail about 2 degrees long.

Apr 1 – Comet just below α – Arietis, tail vertical.

Apr 3 – Comet's tail inclined to left.

Apr 4 – Last sight of comet with naked eye.

Apr 7 – Saw comet with 1 in aperture. It is becoming faint and distant.

Apr 11 – Comet still visible with telescope, tail short and faint.

These were observations of the 'Great Comet' 1854 II (1854b), discovered in England. On March 29, the nucleus had a magnitude of +2 rising to +1 on April 1. A 4° tail remained for several days but at the beginning of April the comet faded rapidly having a magnitude of only +4 by the 6th.

1857 Jan 2 – Saw an occultation of Jupiter well this afternoon. Saw it well and all 4 satellites were visible. The planet was rather paler than the Moon. Jupiter was visible at 3.30 this afternoon.

Jan 19 – Saw emersion of Jupiter's 1st and 3rd satellites. Our time appears to be about seven minutes fast on Greenwich.

No indication is given about the size of his telescope but it is thought to be less than 3 inches because he comments later that he had bought a new telescope of 3-inch aperture and that he could see more. The comment on the time is quite interesting. Coventry, at longitude 1° 30' west has a local mean time 6 minutes later than Greenwich. It is not known what time standard was used by Andrews but the timings given in an almanac would have been geocentric. If nothing else the entry shows that Andrews was a very careful and precise observer.

1857 Apr 7 – See a small telescopic comet near α Persei – a very faint [D'Arrest's comet] quite invisible to the naked eye.

1857 Apr 19 – See a small comet in Perseus exactly like the other.

Although on the former date Andrews identifies correctly that the object was D'Arrest's comet, the implication is that he is not so sure about the second. He reports D'Arrest's comet as quite invisible to the naked eye yet other reports on this object described it as a naked eye object (4th–5th magnitude) with a visible tail.

1858 Mar 13 – Aurora Borealis tonight.

Angot's catalogue⁴ reports that the aurora was seen from Oxford and Armagh. The fact that it was also seen from Coventry indicates that the display was visible

Mar 5 noticed a star of 5th mag

in Taurus NW of Aldebaran
disappeared behind the moon at
9^h 5^m this occultation was not
mentioned in the almanacks.
Sky very clear, and excellent
view of disappearance, the star
became twice half extinguished
and then instantly disappeared.

at 9.45 the star had not emerged
and sky became hazy
at 10 sky clouded

Mar 24, Friday walked to Brandon
and back before breakfast.

28 war proclaimed

30 Saw the new comet tonight
its nucleus a star of 1st mag.

31 Comet's tail about 2° long

Apr 1 Comet just below a Arctis
tail vertical

Apr 3 Comet's tail inclined to left

4 Last sight of comet with naked eye

7 Saw comet with 1 inch aperture it is
becoming faint and distant.

An extract from the diary of William Andrews
for 1854.

over a wide area.

1858 Mar 15 - Great eclipse of Sun today. Make every
preparation to observe it. See the Sun
very well previous to commencement,
clouds come over, do not obtain a
glimpse till after totality is over. It was
about as dusky as at 6 o'clock in the
evening.

Mar 17 - It was cloudy everywhere on Monday
except at Fotheringay in Northampton-
shire.

This entry shows that Spode's law was in operation
some 130 years ago.

1858 Sep 1 - See a comet in the north tonight. It was
visible to the naked eye as a star, but
with a telescope a large tail could be
seen.

Sep 5 - Comet's tail visible to the naked eye.

Sep 9 - Tail getting brighter, nucleus 2nd mag-
nitude.

Sep 13 - Tail 4° long.

Sep 30 - Comet now very bright, tail about 20°
long.

Oct 5 - The comet passed over Arcturus tonight,
 $\frac{1}{2}^\circ$ from the nucleus. One hour in passing
over, tail is 30° or 35° long.

Oct 15 - Comet has gone away now.

This was Donati's comet 1858 VI (1858e). It was on this
occasion that Airy and others showed that, at least as
far as the tail was concerned, the view held by Sir
William Herschel that comets were self luminous, was
incorrect. Andrews' comment about the comet passing
Arcturus is reflected in the drawing of this event which
appeared in Chamber's *Story of Comets* on page 138.⁵

1859 May 8 - Occultation of Saturn tonight, saw
emersion, planet was much fainter than
the Moon.

Oct 12 - Splendid aurora tonight, the rays were a
deep crimson and converged to a point
near the zenith.

According to Angot's catalogue, October 12 was the peak night of activity which seemed to have extended over three months. On this particular night, the aurora was reported from Athens, Naples, Rome, Lyons, Luxemburg, Berne, Berlin, Dresden, Cracow, Leipzig and numerous other places in Europe in addition to Southampton, Greenwich and Oxford in the UK. Extensive displays were seen over Europe during the next ten days, this activity being in step with a solar maximum which occurred in 1859/60.

1860 Feb 7 – *Saw partial eclipse of the Moon this evening. The dark part of the Moon was very bright, the dark patches were plainly visible on it.*

The dark patches are obviously the maria.

1860 Apr 14 – *Saw Venus at 1 o'clock, east of the Sun.*
May 3 – *Saw Venus at 10½ hr am E. of the Sun, 12 hours before sunset.*

Andrews does not say how he did this but it is felt that here is a case where he has used his mathematical ability to locate the planet.

1860 May 24 – *Occultation of Jupiter at 4h. 34m afternoon. Could perceive the planet with a 2 inch aperture.*

1860 Jly 18 – *Eclipse of Sun.*

Andrews was visiting Cologne at the time. As he makes no comment on the eclipse, I think it is safe to assume that he did not see it. The path of totality crossed Spain and into north Africa.

1861 Jly 3 – *See a magnificent comet tonight near the Great Bear. The tail was 90° long and reached past the zenith at 11 pm. It has arrived suddenly and appears to be moving from left to right. Stars of 1st magnitude looked pale beside it.*

Jly 13 – *The comet gets small by degrees and less beautiful. The earth is said to have passed through the tail on Sunday, June 30th. I remember noticing on July 3rd the most unusual circumstance that the tail on the preceding side was much shorter. Did the Earth carry away a piece of the tail?*

1861 Aug 4 – *The comet is now barely visible to the naked eye.*

This is the Great Comet (or Tebbutt's) 1861 II (1861b). It was discovered by J. Tebbutt in New South Wales on May 17th prior to its perihelion passage (June 11). It became visible in the UK on June 29 although it was not generally seen until the following evening.

1862 Aug 9 – *See a comet tonight near the polestar. It is very faint and just coming into view.*

Aug 21 – *The comet continues. It is not very bright.*

This was comet P/Swift-Tuttle 1862III (1862B).

1866 May 13 – *Have recently bought of Solomans & Co. London a 3 inch astronomical telescope. It turns out satisfactory and defines well.*

1866 Nov 13 – *See the November shower of meteors this night. It lasted until 2 am. They were most numerous at 1.15, when there were about 200 per minute.*

These meteors belong to the Leonid stream. Although some meteors are seen every year around this date, a spectacular display appears every 33–34 years. The appearance of such a display proved conclusively the periodic nature of the stream. The rate of 200 per minute claimed by Andrews is a little high when compared with those claimed by Dawes and experienced observers at Greenwich.

Conclusion

The reporting of the Leonid display is the last entry of astronomical interest in the diaries that are currently in the City Archives. It is very strange that these ended abruptly, especially as he had bought a new telescope earlier that year. There is a possibility that he may have kept his astronomical record separate from his normal diary. From what I have learned about his character and his interest in astronomical matters, I feel that this is a strong possibility. It is very doubtful, however, whether this mystery will ever be solved.

Acknowledgements

I should like to thank David Rimmer, City Archivist at Coventry for his help and also for giving permission to extract the items from the diary. In the comments on the entries, I am very much indebted to Michael Hendrie for identifying the comets mentioned and providing notes about these events. Help and very useful comments about the auroral displays were received from Ron Livesey and Richard Baum, the latter also for his reading through the rough draft and making useful suggestions. Finally I must thank Valerie Chancellor for writing the book which brought to my notice the astronomical activities of William Andrews.

Address: Lane Park, Pityme, St Minver, Wadebridge, Cornwall PL27 6PN

References

- 1 *The Survey of Cornwall*, Richard Carew of Antony 1608, edited by F. E. Halliday, Augustus Kelly, New York 1969.
- 2 *Master and Artisan in Victorian England*, edited by Valerie E. Chancellor, Augustus Kelly, New York, 1969.
- 3 *William Andrews' diary* (ref. Accession No 119/1) kept in the archives of the City of Coventry Library.
- 4 *The Aurora Borealis* by Alfred Angot, Kegan Paul, London, 1896.
- 5 *The Story of Comets*, by G. F. Chambers, Clarendon Press, Oxford 1909.