

# Nathaniel Everett Green: artist and astronomer

Richard McKim

*'... An earnest study of nature is essential to the formation of a correct eye for colour; and if the picture be true in colour, it will never be found to offend.'*

N. E. Green, *Hints on Sketching from Nature* (1871)

N. E. Green, a well-known BAA member from the decade of the 1890s, managed to successfully combine his hobby with his profession as a landscape artist and art teacher. One-time drawing master to Queen Victoria, and exhibitor at the Royal Academy, Green became equally famous for his beautiful and realistic drawings of the planets, above all for his expedition to Madeira in 1877 to observe the perihelic opposition of Mars. He inevitably became an important figure in the early martian 'canal debate'. Green was an Original Member of the BAA who twice directed the early Saturn Section, and ultimately served as President in 1896–'98. In this paper Green's life and works are reviewed, together with new details of his instruments and his approach to painting and drawing. Opportunity has been taken to publish some more of his original work, in colour, for the very first time.

## A young painter

Nathaniel Everett Green (Figure 1) was born at Bristol on 1823 August 21, the third son of Benjamin Holder Green of Bristol, and of Elizabeth Everett of Crockerton, Wiltshire. His appearance on the scene fell midway between the foundation of the Royal Astronomical Society in 1820, and the opening of the Stockton & Darlington Railway in 1825. The decade of the 1820s marked the beginning of industrial growth in towns and cities. In the words of his obituary,<sup>1,2</sup> 'He was educated chiefly by his maternal uncle, the Rev. C. Everett, and in 1840 commenced life in a merchant's office in Liverpool.' But such a profession was hardly suited to Green's artistic leanings, and four years later he went to London to enrol in the Royal Academy. Here he would work with other



**Figure 1.** Portrait of Nathaniel Everett Green taken from the BAA *Journal*, 10(2) (1899).

artists whose names were to become more familiar, such as John Everett Millais (1829–1896) and Dante Gabriel Rossetti (1828–1882). [Together with W. Holman Hunt, Millais and Rossetti were founders (in 1848) of the Pre-Raphaelite movement, a group founded to protest against what they saw as low standards in British art.]

Nathaniel Green married Elizabeth Goold of Ireland in 1847 and within a short time the

couple were settled in what would be their home for 49 years: 39 Circus Road, St John's Wood, London, having been 'attracted to the neighbourhood by its quiet retirement and its favourable surroundings for the pursuit of his artistic and astronomical studies.'<sup>1</sup> At least, so it must have seemed in the halcyon days of the 1840s;<sup>3</sup> but even today there are the green areas of Regent's Park and Lords cricket ground close at hand.

## Early astronomical observations

Becoming interested in astronomy in 1859, Green first constructed a telescope for himself. He soon obtained a good quality 4.25-inch (11 cm) refractor of French manufacture, and with this began serious lunar and planetary work. Doubtless he was as attracted to planetary landscapes as he was to terrestrial ones. In 1879,<sup>4</sup> in what was to become his classic paper about Mars at its opposition in 1877, Green acknowledged Mr Banks of Ealing ('this kind and most amiable friend') as being the source of his early interest in astronomy. In his memory he named a 'Cape Banks' upon the Red Planet. W. L. Banks was a fellow artist and amateur astronomer. The two had written a joint paper about their observations of Mars at the oppositions of 1862 and 1864 for the *Astronomical Register*. Indeed, this serial was the main outlet for Green's early writings about comets, Jupiter and Mars.

Green was initially a keen lunar observer, and he became one of the early members of the Selenographical Society (whose founder had been W. R. Birt). Indeed, his early correspondence with the RAS Secretary is often about the business of that short-lived organisation, and includes a letter of thanks from him (as its Secretary) on behalf of its members

for allowing them to hold meetings in Burlington House.<sup>5</sup> His obituarist notes that Green published many drawings in the Society's *Journal*, including a study of Hyginus N.<sup>1</sup> The latter formation, a dark shadow-filled depression north of Hyginus, had aroused much interest at that time because, as Walter Goodacre later related, it 'was announced by Klein in March, 1878, as a new formation.'<sup>6</sup> Green described the history of the Society years later in the *BAA Journal*.<sup>7</sup> When the Society eventually finished, Green noted to W. H. Wesley: 'Please say the Selenographical Society does *not* exist. It was never broken up. But it disappeared!'<sup>8</sup>

Green was hardly satisfied with using what was by today's standards a relatively small refractor, and in fact he gradually tried a succession of instruments, acquiring a 5-inch (12.7cm) OG and 9-inch (22.8cm) reflector (from 1872), then a 13-inch (33cm) reflector and – finally – an 18-inch (46cm) reflector (in 1882). There were ultimately *two* observatories in his London garden.<sup>2</sup>

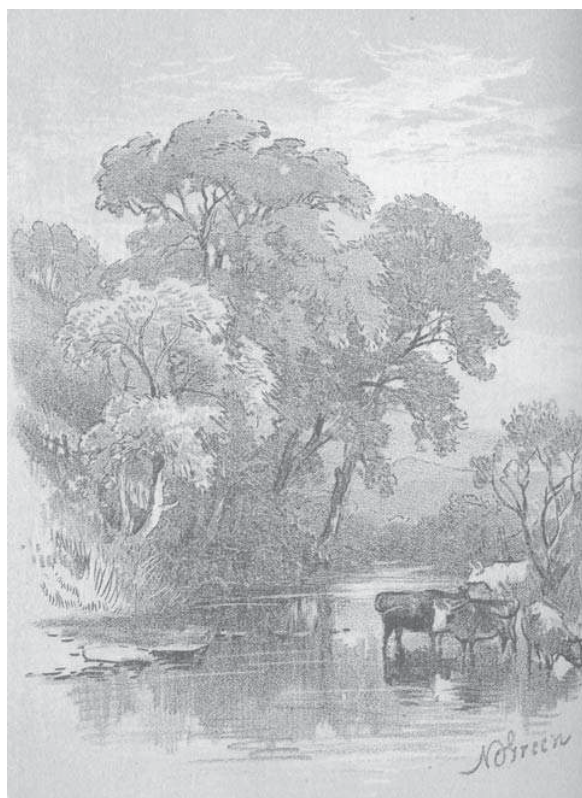
## Victorian painting, and a call to Balmoral

The Society of Painters in Watercolours was founded in 1804, marking the beginning of the medium's acceptance as an art form in its own right. Many artists such as Cotman, Cox, De Wint and Turner made annual sketching tours, the products of which were later turned into finished watercolours. The large number of competent amateurs made for an appreciative public. Acquiring skills in the technique of watercolour became one of the attributes of an elegant young lady's education. Living in London, Green would have had plenty of pupils. Indeed, the period between 1800 and 1850 was the golden age of the private drawing master.

Queen Victoria herself valued watercolours as reminders of the views and interiors that she encountered on her journeys. They would often be commissioned by the Queen, or Prince Albert, and presented to them as gifts. Sometimes they were painted by the Queen herself. And so it happened that Victoria called Green to Balmoral in 1880, 'where he had the honour of numbering amongst his pupils, Her Majesty, the Princess of Wales, and other Members of the Royal Family'.<sup>1</sup> An art reference book<sup>9</sup> adds that he was 'An astronomer and landscape painter who studied at the R.A. Schools and exhibited from 1854... He painted in Ireland and a great deal in Scotland, contributing illustrations to Queen Victoria's *More Leaves from the Journal of Life in the Highlands*, 1884. His work is pleasant, if lacking in detail, and he is fond of greens.'<sup>2</sup>

It is recorded that Green 'frequently exhibited his work, both in oil and water colours, at the Royal Academy and other galleries, but the pressing needs of a large and growing family – he had five daughters and four sons – led him to adopt teaching as a profession. In this he was eminently successful, and gained a wide-spread reputation.'<sup>2</sup>

The writer became interested in Green's non-astronomical painting and drawing when by chance he came across a copy of Green's *Hints on Sketching from Nature*<sup>10</sup> in an



**Figure 2a.** (above) A typical pencil sketch by Nathaniel Green showing an attractive pastoral scene.

**Figure 2b.** (opposite, top left) Two small watercolour paintings by Green illustrating the 'unity of effect', as described in the text. (Both reproduced from Green's *Hints on Sketching from Nature*, Rowney & Co., 1871, part II frontispiece, and part III page 60f, respectively.)

**Figure 3a.** (opposite, top right) Colour lithographs of Green's sketches of Mars in 1873, drawn with a 9-inch (228mm) silvered mirror.

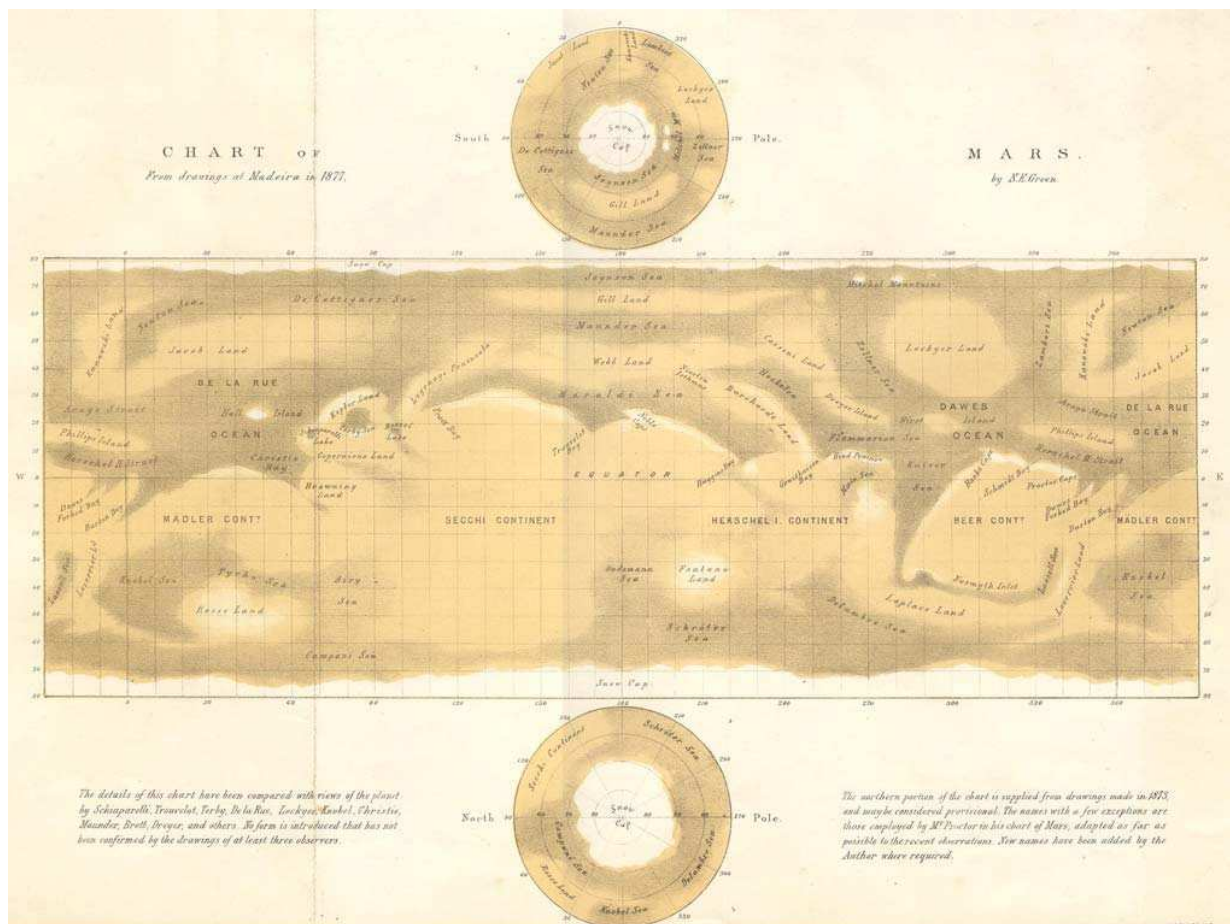
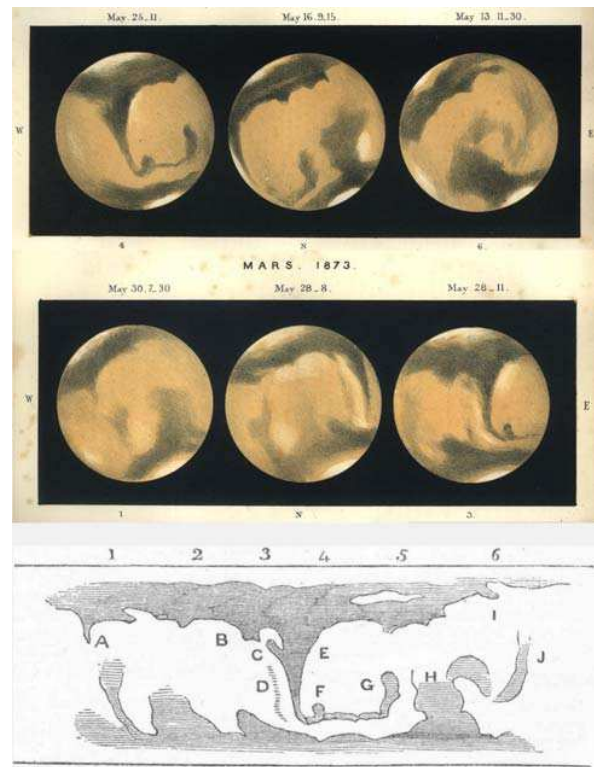
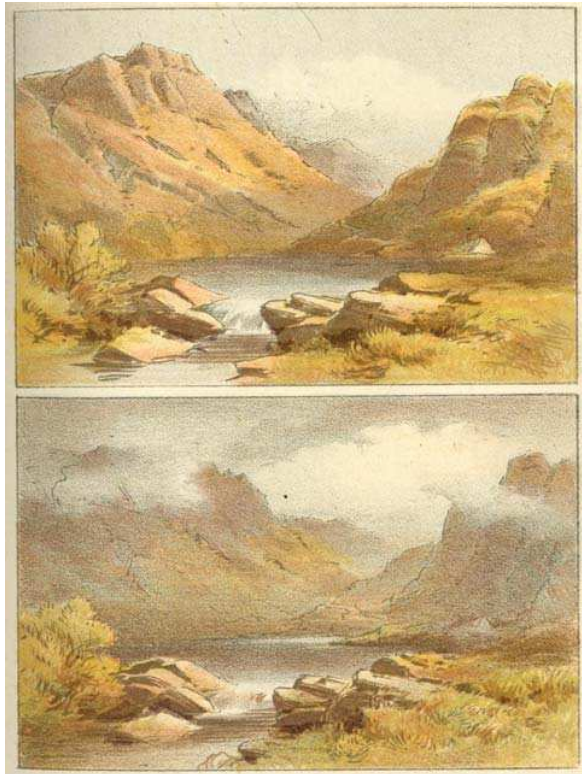
**Figure 3b.** (opposite, centre right) Green's 1873 martian sketch-map. Both reproduced from Ref. 12.

**Figure 8.** (opposite, bottom) Map of Mars for 1877, reproduced from N. E. Green's *RAS Memoir*.<sup>4</sup>

antiquarian bookshop in 2000. It had originally been published in three slim parts, and my copy has them bound together. It is a charming book, to be read with much pleasure. It amounts to what might be termed a drawing and watercolour painting 'primer' (to use a Victorian term), containing many fine examples of pencil sketches (for example, Figure 2a) and colour lithographs. We can only review some aspects here.

In his instruction manual, Green develops principles of drawing in a very easy-to-follow manner. He liked an elliptical vignette in which to place his subject. He disliked too much colour contrast, preferring to place together complementary colours from the secondary or tertiary scales rather than to allow primary colours to occur in juxtaposition; the lithographs he reproduced demonstrate the success of this approach. Writing about one picture, he says: '...the purple of the hill is contrasted, not as in the previous instance with yellow, but with olive, which is one of the tertiaries, and which forms the prevailing tone of the trees and foreground.' Thus was a 'quiet but more fuller harmony' achieved. [ref. 10 (part III, page 28)] Finally, Green was careful to stress that





the artist should strive to achieve what he called 'unity of effect', and Figure 2b is an example to illustrate this from the sketching manual: the same scene with two different effects. 'The one as it might appear on a fine day, with its blue sky and bright colouring; the other when cloud and mist are present, crowning the heights, and deepening every tone by their accompanying gloom. The latter treatment will be admitted by most persons to be more in keeping with the character of the scene, and thus be productive of the greatest amount of unity of effect.' [ref. 10 (part III, page 60)]

Artistic training and thinking often permeate Green's later, astronomical papers. Describing the partial lunar eclipse of 1892 May 11 he noted, 'The uneclipsed portion stood out brilliantly white, and the penumbra was of a most beautiful cobalt-blue tone, which might be due in some measure to the contrast of the complementary colour – coppery red – of the rest of the disk. The effect was the same as is seen when light penetrates a currant, lighting it up and bringing out the colours of the interior.'<sup>11</sup>

Green's publishers (Rowney) marketed a sketching tray designed by the artist not only to support the drawing and the materials, but also to protect and transport the finished watercolour.

His obituarist<sup>1</sup> wrote that Green was the author 'of many works on art, principally manuals and other works of a practical kind, which have had a wide circulation.' A complete list of the other works can now be given:<sup>9</sup> *Foliage Exercises for the Brush*, 1888; *A Guide to Landscape Animal Drawing*, 1888; *A Guide to Landscape Figure Drawing*, 1891. The book in my collection<sup>10</sup> uses only English locations for the subject-matter. Green seems to have been especially fond of the English coast, and he made many successful pictures in and around Hastings, for example. In 1884 he travelled to Palestine and did some of his best work there,<sup>1</sup> but he never seems to have indulged in the 'Continental Tours' of many other British artists.

The RAS Letters collection (filed by year) contain a few references to Green's profession. Thus on 1887 June 28 he writes as follows to E. B. Knobel, concerning the final revision of his classic RAS *Memoir* concerning Jupiter: 'I am far too busy to do anything to the work until after the sketching season.'<sup>12</sup> Thus even late in life Green made the most of the British spring and summer seasons for his professional work. His daughter noted that the artist was often 'claimed by his profession' from 8 o'clock in the morning till 7 in the evening. 'After a light meal he would commence work with the telescope, often prolonging his study far into the night'. On cloudy evenings he pursued another hobby, microscopy.<sup>1</sup>

## Early martian studies

Apart from the work done in 1862 and 1864 mentioned previously, Green made

several important observations of Mars in 1873, when the northern hemisphere of the planet was better displayed than the southern. These again appeared as a set of beautiful colour lithographs in *The Astronomical Register*.<sup>12</sup> Owing to Green's use of his new 9-inch reflector, much more detail is evident. We reproduce them here together with Green's little sketch map (reproduced as a woodcut in the text) in Figure 3. The planet was at that time showing some unusual aspects of its albedo features, which other observers confirmed. In particular, the long tapering northern tail of the Syrtis Major, and the large size and darkness of Coloe Palus ('F' in Figure 3b) north following it are remarkable.

In closing his descriptions, Green noted: 'With regard to the dark markings of this planet, they are generally considered to be oceans; but if this is the case, should they not exhibit something like a reflection of the sun's light when on the meridian?'

## Nathaniel Green, FRAS

It is a little strange that Nathaniel Green waited for so many years before joining the Royal Astronomical Society. But without doubt his careful papers and illustrations in the *Astronomical Register* during the previous decade would have commended him for membership. From his residence in St John's Wood, Green wrote to apply for Fellowship late in 1874. Proposed by John Browning (from personal knowledge) and seconded by A. Cowper Ranyard and William Huggins on December 11, he was elected on 1875 February 12. By a peculiar coincidence his application was approved at the same meeting as that of Edward Walter Maunder, then a young Assistant at the Royal Observatory, Greenwich, and later the founder of the British Astronomical Association. In later years, Maunder and Green would work closely together. Green was to serve on the RAS Council just once, during the 1888–'89 session.

## An 18-inch reflector

At his London address in 1882 Green set up his largest reflecting telescope, with a beautiful 18-inch (46cm) silver-on-glass mirror fashioned by George H. With of Hereford. It had a wooden tube and a rather long focal length. Green made a very large number of beautiful planetary drawings with this instrument, preferring powers of between 280 and 560 upon



**Figure 4.** The 18-in Green reflector at Headley Observatory, mounted in the open, together with the dome for Phillips' 12¼-inch reflector and 8-inch refractor, taken on 1917 August 26. Phillips set up the 18-inch for the first time in that year. The telescope remained at Headley until after WW2. (Figures 4 and 5 from 3×3-inch glass slides originally made by T. E. R. Phillips; *Author's collection*.)



Mars.<sup>13</sup> Green recognised that such an instrument would not be useful at full aperture for as many nights as his small instruments. He had a series of stops for it, including a 7-inch off-axis one. In 1892 he told a BAA meeting that With's silvering was still perfect after ten years.

In the 1890s the telescope was presented to the Association, becoming Instrument No. 3 in the loan collection. It was placed in the care of the Rev. J. M. Bacon of Newbury until 1904. Then it was borrowed and set up by the Rev. James Baikie, of Roxburghshire, who used it for lunar and planetary work until 1910. He overhauled it during 1905/6 and in that year's Council Report gave a full report upon its condition. But after 1910 the Council noted in the *Journal* that the instrument was 'unsuitable for loan', and nothing happened until its move to Headley Observatory in the summer of 1917. There it saw many years of constant use between the two World Wars, when the Rev. T. E. R. Phillips would erect it in the paddock of his Rectory at Headley, near Epsom, Surrey. Thus



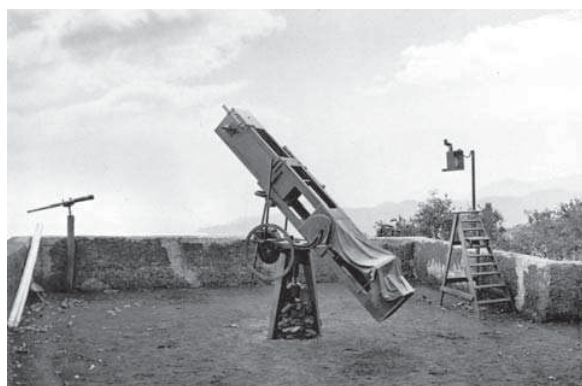
**Figure 5.** The Rev T. E. R. Phillips at the doorway to the dome of the 8-inch refractor at Headley, taken on 1917 March 18.

the tradition of planetary work was continued. The photographs (Figures 4–5) are reproduced here from original 3×3-inch glass slides taken by Phillips himself (and now in the writer's possession).<sup>14</sup> The 18-inch reflector was set up at Headley, in the open air, on a rough parallactic mounting. It remained there, being remounted inside the larger of the

two domes upon the equatorial mounting of Phillips' 12¼-inch Calver in the late 1920s, until after Phillips' death during World War II. The telescopes luckily survived intact when a flying bomb landed in the rectory garden in 1944. After the War, several persons used the 18-inch telescope, notably Dr D. W. Millar during his directorship of the Jupiter Section, and in later years, Dr Peter Cattermole. In more recent times the large With mirror was successfully remounted in a completely modern telescope with a proper drive at the observatory of Denis Buczynski after a long period of having been little used; and now it has moved on again.

## 'Mr Green's Erasing Paper'

In 1877, in readiness for the Madeira trip described below, Green had a special sort of drawing blank printed. Rowney published sheets of thick A4 card containing six planetary disks (to 52mm or 2-in diameter) on a black background. The disks were lightly coated with a layer of warm tone similar to that of Mars. The cards are stamped 'Mr Green's Erasing Paper' on the reverse. In practice, dark areas could be added in crayon, pastel or pencil in the usual manner, but there was



**Figure 6.** Green's 13-inch reflector mounted at a scenic viewpoint on Maderia. (RAS ADD MSS 93, No. 120.)

the advantage that highlights (clouds or polar cap) could simply be erased with a knife.

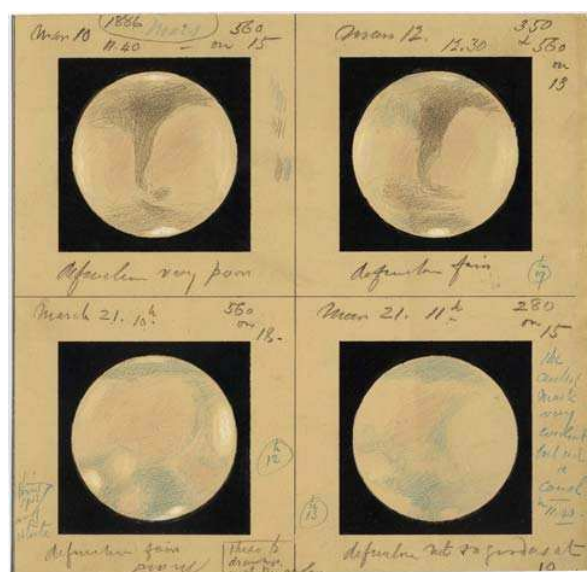
Green advertised their availability – presumably gratis – to RAS Fellows:<sup>15</sup> 'The peculiar advantage consists in the use of the knife, by which the most delicate alterations of tint or form may be effected, or the warm tone partially removed for faint lights, or entirely erased for the polar snows. The only care required is to avoid the use of India-rubber, all general softening or removal being effected by bread.' The Mars Section archives contain examples of both the used and unused versions.<sup>16</sup> Green also had similar, elliptical, blanks printed for Jupiter.

## Mars, Madeira and the 'great canal debate'

Attracted by the favourable Madeiran latitude and climate, and the possibility of travelling there by a regular boat service, Green sailed for Madeira in 1877 August, in time for the perihelic opposition due on September 5. (At this perihelic opposition the planet would not rise very high in the UK skies.) His observations covered the period August 19 to September 25. He took with him a rough, undriven altazimuth reflector, 'so arranged that it could readily be taken to pieces



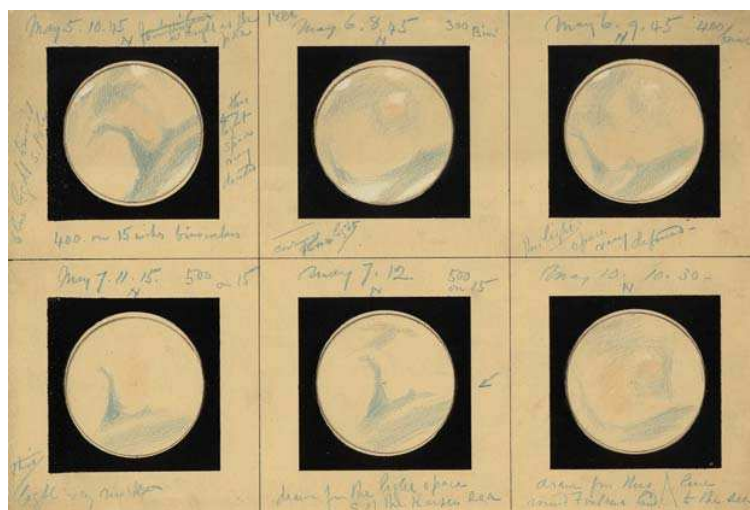
**Figure 7.** A Madeiran street in 1850, Ribeira de Santa Luzia, from a lithograph by Frank Dillon. Things would hardly have changed by 1877. (Author's collection.)



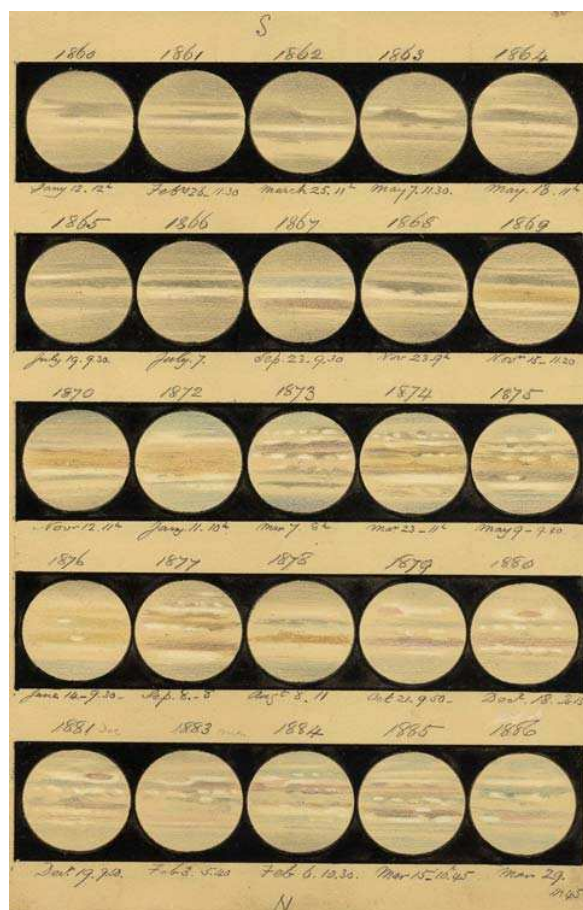
**Figure 9.** Mars in 1886, through the 18-inch reflector. Unretouched telescopic sketches on Green's own 'erasing paper', with dates and marginal notes, from the RAS Archives (RAS MSS GREEN).

and carried up the steep roads of the island.' It was provided with a 13-inch (33cm) silver-on-glass mirror loaned by George With, and a 12.5-inch (31.7cm) mirror by Horne and Thornthwaite for comparison.<sup>17</sup> An open tube was chosen so as to reduce tube currents. When presenting his results at the RAS meeting, Green laid on the table for inspection a photograph of his instrument. This photograph has never before been published, so we reproduce it here as Figure 6. It looks as though moving it from place to place would have been a very substantial undertaking.

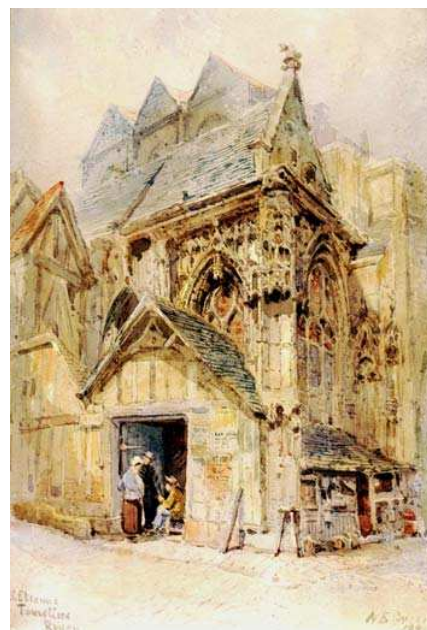
Green's account of the trip implies that he sketched the landscape by day, for he wrote that he was working 'by day and night'. In his account in the RAS *Memoirs*<sup>4</sup> he thanks friends on the island, especially Mr William Hinton, for giving him every assistance (and, one suspects from the account, food and accommodation). Moreover, he thanks Mr Charles R. Blandy for his interest and help.<sup>18</sup> By 1877 Charles Blandy (1811–1879) held the largest stock of Madeira wine



**Figure 10.** Mars in 1888 (source and details as for Figure 9). Green – by mistake – drew these sketches on Jupiter blanks, hence the crescent-shaped gaps.



**Figure 12.** A unique series of coloured pastel sketches of Jupiter by N. E. Green, reproduced from RAS MSS GREEN, showing Jupiter at each apparition from 1859 to 1887. The date is written beneath each drawing. Part of this series from 1860 to 1871 (though with some different dates in some years) was published by Green in a paper entitled 'Planisphere of Jupiter, April, 1872', *The Astronomical Register*, 10, 169–170 (1872).



**Figure 15.** Colour watercolour signed by Green, titled 'St. Etienne, Tournelle, Rouen', and dated 1890. (Author's collection.)



of any of the shipping houses on the island. Perhaps he helped Green to import or transport his equipment, as Green writes of the famous wine producer's interest in all telescopic matters.<sup>4</sup> Even if the Company's old papers are not yet in a condition to search for further clues, we do at least know that the Blandy family was at that time very interested in matters astronomical.<sup>18</sup>

Nathaniel Green began his Mars work in the hills to the east of Funchal, the island's capital (Figure 7), at an altitude of 1200 feet, but later moved 1000 feet higher to see if the seeing was even better there (it was not). There were 47 available nights on the island: 26 were favourable for drawing, 10 being passable, 10 good, four excellent, and two superb. Green ultimately made 41 exquisite pastel drawings of the planet, of which just 12 were lithographed and published in colour by the RAS, together with enlarged views of the fragmenting S. polar cap and a large folding map of the planet with named features according to the nomenclature system of R. A. Proctor. Green himself did the drawing on stone for the lithography. The results from Madeira were first presented to fellow astronomers by Green at a meeting of the RAS at Burlington House on 1877 November 9, and published as a voluminous illustrated *Memoir* two years later.<sup>4</sup> By chance *The Observatory* magazine was begun in 1877, giving for the first time full accounts of RAS meetings and discussions. Green's paper was read by him at the 1877 November meeting,<sup>19</sup> but there was not much discussion, doubtless because the controversial results of Schiaparelli of Milan had by then not become known in England.

Maps of Mars always cause their originators some difficulty, and a year was to pass before Green wrote the following to the RAS Secretary (Ranyard): 'The map is complete with the exception of naming and this can easily be added *after* the proving on stone. I should be very glad to get the approval of the Council for then I would have it ready to bind with the article in the *Memoirs*.'<sup>20</sup> An earlier letter to the RAS (1878 December 9) shows that Green first transcribed his drawings onto a globe before compiling the chart.<sup>21</sup> Needless to say, all went well, and we reproduce Green's map here in colour for modern-day readers to appreciate (Figure 8, page 15). The artist described the dark markings 'supposed to be water' as various shades of greenish-grey, but even at that time he realised that this tint was at least 'partly due to contrast with the orange'.<sup>21</sup>

Green was not the first to note clouds in the martian atmosphere, but together with Schiaparelli and Maunder he was one of the few 19th century astronomers to sketch what the writer later recognised and catalogued as a dust storm over Thaumasia and Mare Erythraeum, just south of Valles Marineris. This has been described in the BAA Mars Section *Memoir* on the subject of dust storms.<sup>22</sup>

Green's role in the 'great canal debate' has been skilfully reviewed (together with those of the other participants) by William Sheehan,<sup>23</sup> so I do not propose to go into much detail here. In a paper drawing attention to surface feature changes between 1877 and 1879, Green himself wrote that 'It is possible that some of these lines may be the boundaries of faint tones of shade, so delicate that they escape the notice of any but a well-trained eye, or they may be spaces between veil-like masses of atmosphere; in either case their position

would be variable.'<sup>24</sup> At the end of his life, on the other hand, Green seemed more readily to accept the reality of the Schiaparellian markings, even if he thought *channel* to be a more apt description, because so many BAA members appeared to have drawn them: witness his Presidential Address for 1897.<sup>7</sup>

In the beginning, the main protagonists in the debate were Maunder, Green and G. V. Schiaparelli himself. Later, Percival Lowell would join in. To the Rev. T. W. Webb,<sup>25</sup> Schiaparelli had produced a plan, whereas Green had produced a picture. To Lowell, Green was less keen-eyed, but more artistic than Schiaparelli, so that Green's map made 'a speaking portraiture of the whole'.<sup>26</sup>

## Later martian studies

It is often forgotten that Green made many studies of Mars both before and after 1877. His famous 1877 map showed the features of the entire planet, but the details from the northern hemisphere had actually been added from (lower resolution) observations made in 1873. Green was interested to confirm and refine the details of the martian N. hemisphere, and in 1886 he had the observational opportunity, adding many details within the previously blank longitude band from 90 to 180°. <sup>27</sup> Unfortunately, despite his remarks concerning the map he sent in to accompany his paper, the RAS did not reproduce it in *Monthly Notices*. Although some of Green's 1886 drawings (Figure 9) – unpublished until now – are extant, he surely must have made others, but they are not in the RAS archives. The list of Library acquisitions for 1886 lists the missing map, and tradition has it that it hung in the Society's rooms for many years. Its present whereabouts are a mystery.

Notice especially two things in these unretouched telescopic views from 1886. First, the broad, dark, curving Nilosyrtris, a 'tail' to the Syrtis Major, running to the NW, which is the typical appearance of the marking at that epoch. Second, a rare early record of the orographic clouds over the Tharsis and Olympus Mons volcanoes on the evening side for March 21 (Figure 9, lower left). Green remarks upon these markings which to him somewhat resembled what was then called Fontana Land (now Elysium). On that date Olympia is detached from the summer N. polar cap. Elysium is also covered by bright white morning cloud on the same sketch, but an hour later it is cloud-free. Green correctly speculated that 'these masses of cloud are dispersed as they pass the meridian towards the Sun'. Curiously he failed to notice the little dark feature Propontis, which is strongly marked on Schiaparelli's drawings.

Green did not describe his 1888 work in print, but this series is also of great interest, and it too is printed here for the first time (Figure 10). Green observed the planet with a binocular eyepiece arrangement from 1886 onwards, drawing the planet with north up at the telescope. His notes are as usual rather hard to read. Thus on May 5 he found the bright cloud over Hellas bluish in tint. Next day Green's drawing shows the area of Elysium to contain a small bright white

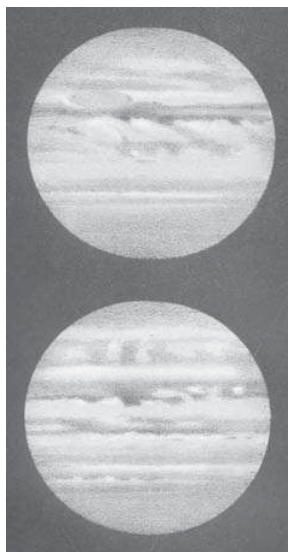
evening cloud, corresponding in position to the volcano Elysium Mons. Nilosyrtis is again well-marked, and seasonal morning cloud partly veils the Syrtis Major.

## Changes on Jupiter, 1859 to 1887

Green's other major contribution to planetary art and literature was his important paper about Jupiter. This was completed and sent to the RAS Council in 1887 May<sup>28</sup> and published in the *Memoirs*.<sup>29</sup> It was not Green's first paper about Jupiter, earlier short contributions (including one of the first-ever planispheres of the planet, dated 1872 April) having appeared in *The Astronomical Register*. In his RAS *Memoir*, Green was able to describe the many changes on the planet witnessed during the greater part of his long observational career (1859 to 1887), and further seems to have been one of the first astronomers to recognise that epochs of global change had occurred over that period. Thus he wrote that during the '4th period, from 1879 to the present... The coppery hue of the northern belt [North Equatorial Belt in modern terms] seen in 1878 gradually migrated southwards, till in 1883 it appeared in full force in the southern belt [SEB], rivalling and at last surpassing the colour of the red spot itself.'

Green was a prolific observer of the giant planet, observing it more than any other, and making as many as 156 drawings at the 1885 opposition. He was able to comment upon the possible differences in altitude between the bright and dark markings, producing evidence that the light spots were higher in the atmosphere (a correct deduction). He was struck by the fact that the darkest and lightest shades on the planet are often adjacent to one another. His work also documents the early history of the Great Red Spot. The following quote must suffice: 'The attention of the writer was drawn to it in the year 1878, and it has continued to the present time... it was then surrounded by a dense mass of white, and its colour so pronounced that it could be seen with a glass used for deer-stalking.' Rogers has described the emergence of the GRS in more detail elsewhere.<sup>30</sup>

Two of the most representative drawings from the *Memoir*



**Figure 11.** Two lithographs of Jupiter, originally in colour, reproduced from Plate I of the RAS *Memoir* by Green. *Top:* 1883 March 30, 18h 30m (showing the red spot rather pale); *bottom:* 1883 February 4, 17h 50m (showing those longitudes following the red spot). Both with the 18-inch reflector,  $\times 250$  to  $\times 500$ .

are published here in Figure 11. Of perhaps greater interest is the attractive series of penny-sized sketches he submitted with the manuscript of his paper, which give one typical jovian view per apparition from 1859 to 1887. This was not printed by the RAS Council, so we reproduce this valuable and unique record here as Figure 12.

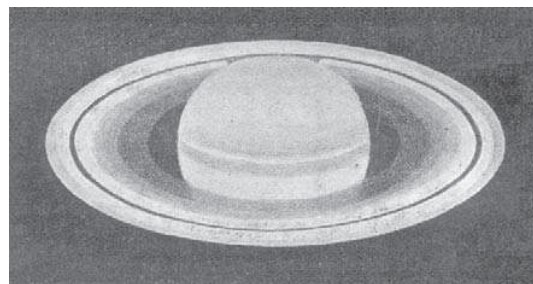
## Green and the early BAA

In 1890 October Green became a member of the Provisional Committee of the British Astronomical Association, and sat on its first Council. Several of the early Section Directors (for example T. G. Elger (Moon) and Miss Elizabeth Brown (Sun)) were literally 'stolen' from their previous roles in the then moribund Liverpool Astronomical Society. The founding of the BAA was discussed earlier by the writer.<sup>31</sup>

Green served as the first Director of the BAA Saturn Section (during 1891–'93 and also for 1895–'98), and his Section Reports in the *Journal* as well as his one Section *Memoir* stress the value of *cooperative* work, detailing who saw what on the planet. It has to be recorded that some of the Sections at that time tended just to print the individual reports of the contributors, without seeking to bring the material together for analysis. A drawing by Green of Saturn from 1883, showing the open south face of the rings, is reproduced as Figure 13.<sup>32</sup> Some of his pre-1890 work was described in the *Monthly Notices*.<sup>33</sup>

Green was in frequent attendance at the Association's early meetings (first held in Barnard's Inn, Holborn, then at University College in Gower Street and finally at Sion College on the Embankment, in Green's day) and an occasional contributor to the *Journal*. At the second meeting of the first session Green gave a talk illustrated by lantern slides about the markings on Mars,<sup>34</sup> and in 1892 he gave a masterly lecture on 'Astronomical Drawing'<sup>35</sup> which has often been quoted. Green gave practical tips, describing the form of observing chair he employed. In the printed version, Green says, 'A remark has been made in this room to the effect that I prefer an artistic drawing to a correct one; but I know no difference between the two.'

Green's last serious work concerning Mars was the editing of the 1894 BAA Mars Section *Memoir*, which had been prepared by the Director of the day, B. E. Cammell, but which the Council had found too long to publish.<sup>36</sup>



**Figure 13.** Saturn, 1883 December 3 by N. E. Green (from the BAA *Journal*, 7, 239 (1897)).



**BRITISH ASTRONOMICAL ASSOCIATION.**

**RETURN OF THE ECLIPSE EXPEDITIONS.**

**A CONVERSAZIONE**

WILL BE HELD AT

**SION COLLEGE, VICTORIA EMBANKMENT, E.C.,**

ON

Tuesday, April 19th, 1898, from 7.30 to 10.30 p.m.

**PROGRAMME.**

7.30-8.0 Reception by the President.

8.15 Address by Mr. E. Walter Maunder, F.R.A.S., on the work of the Eclipse party stationed at Talni.

9.0 Address by Dr. Isaac Roberts, F.R.S., on The Evolution of Stellar Systems, as illustrated by his astronomical photographs.

9.45 Address by the Rev. J. M. Bacon, M.A., F.R.A.S., on the work of the Eclipse party stationed at Buxar.

The addresses will all be illustrated by the lantern, and it is hoped that Mr. Bacon will be able to exhibit the Eclipse Kinematograph.

There will also be an exhibition of Microscopical Objects by Fellows of the Royal Microscopical Society and Members of the Quekett Microscopical Club.

In the intervals between the addresses a number of astronomical photographs and drawings will be on exhibition.

The Bijou Orchestra will give a selection of Music during the evening.

Tickets, 3s. 6d. each, including refreshments, will be sold to Members only, but each Member will be permitted to purchase tickets for one or more visitors in addition to his own. In case, however, of a Member applying for tickets for more than one friend, the second and subsequent tickets will be granted so far as there are tickets remaining unsold after Wednesday, April 6, and in the order of the date of application.

Applications for tickets should be made at once, and must be accompanied by the necessary remittances, and addressed to the Assistant Secretary, Mr. T. Frid Maunder, 26, Martin's Lane, Cannon Street, London, E.C.

p. 6424.

**Figure 14.** Loose advertisement for the BAA's first-ever 'Conversazione', as inserted into the *Journal* for 1898 March.

In 1896 Nathaniel Green joined 57 other passengers aboard the 'Norse King' which sailed to view the total solar eclipse of August 9 from Norway, the first of several early BAA eclipse expeditions. 'On the morning of the eclipse doubt, elation, and despair followed each other quickly', he wrote after the event.<sup>37</sup> This eclipse was thwarted by cloud,<sup>38</sup> as was to happen later for the BAA 'Eclipse Camp' at Truro School in 1999. Of totality he nevertheless later wrote that the darkness was very great, 'and continuous nearly to the horizon, but there a long streak of orange light was reflected from the clouds beyond the edge of the shadow, broken occasionally by grey and faint greenish patches. The colour of the Moon's shadow seemed of a purplish-black tint, very difficult to describe, but it was as in Egypt of old, 'a darkness that might be felt'.<sup>37</sup> An Expedition Dinner was held in the Caledonian Salon of Holborn Restaurant on October 27, when Green, rather poignantly, related how he himself 'had known it to be his last and only chance of seeing the corona, and it was gone'.<sup>38</sup>

In 1896-'98 Green served as President of the BAA, following Maunder's term of office, and he carried out his duties well. In the Association's history his Presidency is described thus: 'He was in fact a delightful President, and there was something in the frank and simple way he would turn to

the Secretary at his side with a low-voiced question, 'What do I do now?' or 'What comes next?'.<sup>39</sup> The meeting reports from those years reveal a lot of excellent discussions with much good humour.

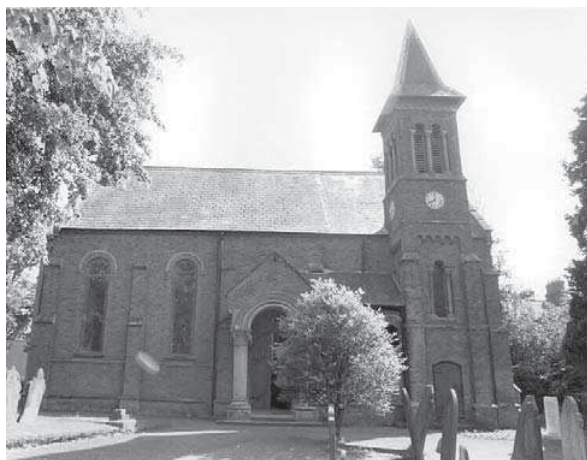
Several significant things happened during Green's Presidency. There was a move to more spacious accommodation for the Library and meetings at Sion College, which was to become home to the Association for over four decades. In 1897 the Association actually accepted an offer from the Royal Botanical Society to set up an observatory on their land in Regent's Park.<sup>40</sup> Green, then President, offered his 18-inch telescope, which might well have figured in the project, but the amount of money needed for the building proved to be too great, and the plans were eventually abandoned with regret. In any event the nascent BAA Instrument Collection soon acquired Green's 18-inch (when Green moved out of London). In 1898 Green suggested the first BAA 'Conversazione', comprising lectures, both astronomical and microscopical exhibitions, and music, which was held on Tuesday April 19 (see Figure 14). Later, this idea developed into the modern-day Exhibition Meeting.

## The final years

In 1890 Green's wife was experiencing problems with her health, and following 'a succession of dreary winters in London',<sup>1</sup> the family began to winter at Cannes in southern France, so avoiding the cold British weather (and perhaps moreover the London smog). Green was also able to extend his 'sketching season', and spent six winters in Cannes, ending with his 1897-'98 trip. His departure for France in the winter of 1893 was given as the reason for his resignation from the Directorship of the Saturn Section, handing over to his Deputy, the Rev. A. Freeman.

Figure 15 (page 18) is a fine example of Green's architectural watercolour painting, now in the author's possession, even if the blues of the sky are more fugitive than originally, after the intervening century of exposure to light. In this and in other similar works, Green has retouched the highlights with Chinese White. The painting is signed and dated 'N. E. Green 1890' in the lower right hand corner, and titled (on the left) as 'St. Etienne, Tournelle, Rouen'. It is therefore a representative (and very beautiful) example of Green's mature style, and moreover one from his very first visit to the Continent.

In 1898 Green's long series of astronomical observations came to an end, and in 1899 the family moved permanently out of London. One of his daughters had evidently by then married the Rev. Laurence Bomford, vicar of St Mark's of Colney Heath, some four miles from St Albans, so probably the Greens went there with the intention of living with their daughter and son-in-law in the rectory. Bomford had worked as a landscape painter (and had actually been a pupil of Nathaniel Green) before seeking ordination. Green's *MN* obituary notice understandably does not record the fact that he had resigned his membership of the Royal Astronomical Society a few months before his death. His final letter to the



**Figure 16.** St Mark's church, Colney Heath, St Albans, showing the tower which contains the memorial clock to Nathaniel Green (from the St Mark's website).

RAS Secretary stated that the artist-astronomer was now no longer able to attend meetings of the Society, would not again be living in London, and could obtain all the information he needed from BAA publications.<sup>41</sup>

Following a very short illness Green died on 1899 November 10, at what was then a very advanced age (he was 76 years old). He was buried in St Mark's churchyard.<sup>42</sup> His widow and children survived him. The clock in the church tower (Figure 16) was subscribed to in 1901 as a memorial to him. A tablet in the church aptly describes Nathaniel Green as an 'Artist and Astronomer'; indeed, our subtitle for this paper.

## Conclusion

Nathaniel Green emerges from our analysis as a fine example of a talented Victorian amateur astronomer. We have not tried to trace his living descendants, nor to give an exhaustive summary of everything he painted or described, but enough has been written to demonstrate Green's importance in the history of planetary astronomy and to the early years of the BAA. He used his artistic and practical talents to the full over a long astronomical career: he employed the best equipment, understood its strengths and weaknesses, above all strived for accuracy and realism in his work, and sought to break new ground.

Green wrote the following in 1871, at the peak of his career (at the conclusion of his *Sketching from Nature*<sup>10</sup>), and it will be an appropriate point at which to end our account of his life and work, testifying as it does to the difficult but nonetheless happy and rewarding life of the landscape artist. 'We must not omit to recognise the chequered character of a landscape artist's life, its sunshine and shade, its cloud and storm, its frequent disappointments, and many ups and downs; but, with every drawback, it is still a most delightful career, and it would be difficult to conceive one more full of gentle and happy thoughts. Of the artist it may be said: A student he ever lives, acquiring knowledge daily, and thus he carries into old age the freshness of youth. The spring of

nature's loveliness is ever flowing, and from this pure and inexhaustible stream he daily receives those invigorating supplies which sustain him through a life of art.'

## Acknowledgments

The writer thanks Peter Hingley, RAS Librarian, for drawing his attention to the existence of Figure 6, which had not been catalogued in the printed Archive catalogue of the Society (*Mem. R. Astron. Soc.*, **85** (1978)). Mary Chibnall, RAS Assistant Librarian, also copied important documents for me. Michael Blandy of the Madeira Wine Company kindly put me in touch with the family historian, Murray Symonds of Australia. John McGowan (Oundle School Art Department) contributed useful notes about the 19th century emergence of watercolour painting as an accepted art form. Julian Baum kindly scanned the pictures of Figure 3 from a volume of the *Astronomical Register* not available in the RAS library. Richard Baum gave the writer much encouragement and inspiration with regard to the present paper.

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## Notes and references

- 1 For Green's BAA obituary notice, see *J. Brit. Astron. Assoc.*, **10**(2), 75–77 (1899), from which Figure 1 is reproduced.
- 2 Green's RAS obituary notice is printed in *Mon. Not. R. Astron. Soc.*, **60**, 318–320 (1900). The BAA notice is anonymous and almost identical to the RAS one; the RAS Council acknowledged notes provided by Miss Green, one of Nathaniel's daughters. A shorter version of the same notice appeared in *The Observatory* magazine. Miss Green was probably synonymous with Miss M. H. Green, of 39 Circus Road, St John's Wood, who joined the BAA in 1891.
- 3 R. A. Marriott once drove past the house, describing it to me later as a substantial villa, but now located in an area inevitably clogged with traffic and proliferating double yellow lines. Postal enquiry addressed to No. 39 was not answered. Before the mid-1860s the Greens lived for some years at No. 3 Circus Road. The latter is now the *Richoux* restaurant.
- 4 N. E. Green, *Mem. R. Astron. Soc.*, **44**, 123–140 (1879). This *Memoir* was published in 1879 October, as noted in a notice of it published in *The Observatory*, No. 31, 1879 November 1. The early joint paper by Banks & Green appeared in *The Astronomical Register*, **3**, 71–72 (1865).
- 5 RAS Letters, 1882, N. E. Green (undated)
- 6 Walter Goodacre, *The Moon*, privately printed by Pardy & Son, Bournemouth, 1931, page 59. See also Green's original paper upon the same subject in the *Astronomical Register*, **17**, 144–145 (1879).
- 7 N. E. Green, *J. Brit. Astron. Assoc.*, **8**, 3–7 (1897)
- 8 RAS Letters, 1888, N. E. Green, February 13
- 9 H. L. Mallalieu, *The Dictionary of British Watercolour Artists up to 1920*, Volume 1, Antique Collectors' Club, 1986, page 152. Examples of Green's works can apparently be viewed at the Beecroft Art Gallery, Southend. It is also written that Nathaniel's brother David Gould Green, R. I., (1854–1917) was a landscape artist who exhibited from 1873, and was elected R. I. in 1897. He lived (and died) in London, and had a similar style to his brother. He published a book entitled *Marine Painting in Water-colours* and his works can be seen at Maidstone Museum in the UK. This text also adds, perhaps a little uncertainly, that N. E. Green '...was presumably related to the formidable Mary Anne Everett Green, and her son or husband George Pycock Everett Green who painted



- in Wales.' I have not attempted to confirm this statement. Queen Victoria's *More leaves from the journal of a life in the highlands; from 1862 to 1882* (Smith, Elder & Co., 1885) is easily obtained through the antiquarian book trade. It contains three black and white sketches initialled 'NEG'.
- 10 N. E. Green, *Hints on Sketching from Nature*, George Rowney & Co., n.d. (1871). Rowney's Victorian catalogues also list several similar works by other artists.
  - 11 N. E. Green, *J. Brit. Astron. Assoc.*, **2**, 379 (1892)
  - 12 N. E. Green, *The Astronomical Register*, **11**, 179–181 (1873). The volumes of this 19th century serial are not only very rare today, but were unfortunately printed on paper which has now become very brittle, like some other journals of the time. Camille Flammarion reproduced four of the 1873 figures again in his classic *La Planète Mars et ses conditions d'habitabilité*, volume 1, Gauthier-Villars Paris, 1892, pp 218–221, but much detail was lost in the reproduction in black and white.
  - 13 The RAS archives contain many beautiful finished and unfinished sketches by Green, though very little in the way of notes (except marginal ones on the drawings themselves), and almost no MSS. There are no lunar sketches, just views of Mars and Jupiter, even though Green is known to have left a lot of such work upon his death. (See the RAS archive catalogue by J. A. Bennett in, *Mem. R. Astron. Soc.*, **85** (1978). The collection consulted here is listed therein as RAS MSS GREEN.)
  - 14 A box containing dozens of 3×3-inch glass slides appeared in the BAA Library in the early 1980s, having come from the estate of the late E. H. Noon. At that time the BAA Librarian (J. L. White) was in the process of disposing of almost the whole of the Association's historic (but impractical) collection of such slides, and so the box was sold to the writer for a nominal sum. The slides were, I gather, used by Phillips in the lectures he gave, and contain several interesting pictures of Headley and of Jupiter, several of which are apparently unpublished. An obituary for T. E. R. Phillips can be found in *J. Brit. Astron. Assoc.*, **52**, 203–208 (1942).
  - 15 N. E. Green, *Mon. Not. R. Astron. Soc.*, **37**, 424 (1877)
  - 16 The writer had much enjoyment (and a little frustration, perhaps because he had not then read Green's advice about using bread) in trying these forms out for the first time in 100 years. They yield slightly impressionistic drawings which perhaps propagate the desirable illusion of the artist of there appearing to be more fine detail than is actually the case.
  - 17 Described in the preliminary paper in *MN*: N. E. Green, *Mon. Not. R. Astron. Soc.*, **38**, 38–42 (1877). Green was therefore effectively a very early astro-tourist, like the example of E. A. L. Atkins who followed in Green's footsteps for the 1924 opposition of Mars, and, like his predecessor, found that seeing did not improve with altitude. See R. J. McKim, 'Mars 1924: E. A. L. Atkins on Madeira', *J. Brit. Astron. Assoc.*, **113**, 196–200 (2003).
  - 18 The Blandy family was then (and continues to be today) the leading producer and exporter of fine Madeiran wines. In Funchal their premises can be visited, and the writer would recommend the splendid vintage tasting room (and especially the island's 1948 and 1958 vintage *Boal* (or *Bual*)) to all holidaymakers. It may be of interest to add that Lord Kelvin had been a guest of Charles Blandy's on Madeira in the 1870s when involved in the laying of a submarine telegraph cable. He later returned to marry Blandy's daughter: another scientific connection between Great Britain and the island. The writer thanks Mr Michael Blandy of the Madeira Wine Company for modern-day family information, and for offering to search family papers for any further information about Nathaniel Green's trip. Meanwhile Mr Murray Symonds of Australia, the family historian, has sent the following extract from the journal of Anne Blandy, sister of Charles. '1843 March 10th: The comet has been visible for several nights, and has a very long feathery tail, but the star is very small, and can scarcely be distinguished without the aid of a glass.'
  - 19 *The Observatory*, No. 8, 1877 November 20, page 235. (Further discussion of the results was initiated by Green at the RAS on 1878 December 13, where he read out a letter from Prof. Trouvelot, supporting his representation of the martian markings.)
  - 20 RAS Letters, 1878, N. E. Green, December 13
  - 21 The discovery that colours affected the perceived tints of their surroundings was due to the French chemist Eugène Chevreul, Director of the dyeing department at the Gobelins tapestry factory in Paris, as described in his book entitled *The Principle of Harmony and Contrast of colours, and their Application to the Arts* (1839). The Impressionists were to make great use of this theory in their painting. Phoebe Pool (in her book *Impressionism*, Thames & Hudson Ltd., 1967, pp 14–15) has explained that Chevreul 'observed that any colour seen alone appears to be surrounded by a faint aureole of its complementary colour – that is, a red spot on a white ground will seem to tint its background green.' Furthermore, 'two threads of different dye appear to have a single colour when seen together from a distance.' This theory of 'optical mixing' led the Impressionists 'to juxtapose colours on the canvas for the eye to fuse at a distance, thus producing colours more intense than could be achieved by mixing on the palette.'
  - 22 R. J. McKim, 'Telescopic Martian Dust Storms: A Narrative and Catalogue', *Mem. Brit. Astron. Assoc.*, **44** (1999). See in particular pp 21–24, where this event is described and illustrated. There was no planet-encircling dust storm in 1877, just two small events.
  - 23 W. P. Sheehan, *Planets and Perception: Telescopic Views and Interpretations, 1609–1909*, Arizona University Press, 1988
  - 24 N. E. Green, *Mon. Not. R. Astron. Soc.*, **40**, 331–332 (1880)
  - 25 T. W. Webb, *Nature*, **21**, 213 (1880), quoted by Sheehan, *op. cit.*
  - 26 Percival Lowell, *Mars and its Canals*, New York, MacMillan, 1906, page 24
  - 27 N. E. Green, *Mon. Not. R. Astron. Soc.*, **46**, 445–447 (1886)
  - 28 RAS Letters 1887, N. E. Green, May (undated): 'I send a *Memoir* of 25 oppositions of Jupiter together with the drawings made at the telescope during 1882–3 in order that the character and amount of the material employed in preparing the various chapters may be known.' The writer has seen the original pastels. They are quite superb.
  - 29 N. E. Green, *Mem. R. Astron. Soc.*, **49**, 259–270 (1890) (the publication of the whole volume was complete in 1890, but each part was published when ready, so Green's paper appeared in 1888 or '89).
  - 30 John H. Rogers, *The Giant Planet Jupiter*, Cambridge University Press, 1995
  - 31 R. J. McKim, *J. Brit. Astron. Assoc.*, **100**, 166–168 (1990)
  - 32 An oil painting of this view was found in the Association's Library by the writer in the early 1980s and was sent to the BAA Saturn Section. This had actually been reproduced in one of Green's Saturn Section Reports in the *Journal* (**7**, 239 (1897)) and is dated 1883 December 3, and shows the south face of the rings. It was also reproduced as an early BAA 3×3-inch slide.
  - 33 His paper concerning the 1884–1885 apparition was published in *Mon. Not. R. Astron. Soc.*, **45**, 401–402 (1885).
  - 34 N. E. Green, *J. Brit. Astron. Assoc.*, **1**, 110–113 (1891)
  - 35 N. E. Green, *ibid.*, **3**, 367–368 (1892)
  - 36 B. E. Cammell, *Mem. Brit. Astron. Assoc.*, **4**, part 4 (1895)
  - 37 A. M. Downing (ed.), 'Expedition for the Observation of the Total Solar Eclipse', *Mem. Brit. Astron. Assoc.*, **6**, part 1 (1897), page 25. Green was to have coordinated the efforts of the sketching party.
  - 38 Quoted from the account of the Expedition Dinner in *J. Brit. Astron. Assoc.*, **7**, 15–18 (1896).
  - 39 H. L. Kelly (ed.), 'The British Astronomical Association: The First Fifty Years', *Mem. Brit. Astron. Assoc.*, **36**, part 2 (1948). This was reprinted under the supervision of the present writer as *Memoirs*, **42**, part 1 (1990), with the addition of many illustrations, including a group photograph from the Norway expedition (as Figure 14) in which N. E. Green can be seen.
  - 40 The announcement was made by E. W. Maunder at the Ordinary Meeting of 1897 October 27, and published in *J. Brit. Astron. Assoc.*, **8**, 3 (1898).
  - 41 RAS Letters, 1899, N. E. Green, August 29. The address given on the letter is: The Rectory, Colney Heath, St Albans. (In the List of BAA Members for 1899 September it is given as 21 London Road, St Albans.)
  - 42 This and certain other information was taken from the St Mark's Church website.

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