



I & I News



Besides being Director of the Instruments and Imaging Section I am also Curator of Instruments – a post that I have held since 1991. As such, I am responsible for the Association’s loan collection. Since 1890 the Association has received, by gift or bequest (and occasional grants), almost 500 instruments, though only about a third of these remain in the collection, the rest having been sold, lost, destroyed, given away, or written off as useless. In addition to astronomical instruments such as telescopes, object glasses, mirrors, binoculars, micrometers, and spectroscopes, equipment received has included microscopes, theodolites, sextants, quadrants, compasses, thermometers, calliper gauges, slide rules, clocks, watches, spirit levels, artificial horizons, globes, calculating machines, planimeters, signal generators, ammeters, weighing scales, slide projectors, tape recorders, printers, and various other gadgets and devices, such as the stereo postcard viewer illustrated here. But perhaps the most startling of them is the Schmidt projection unit – a device producing 25 kV and an abundance of X-rays. Intended for use with a television set, they were mass-manufactured in 1953 in time for the Coronation, but I have no information concerning survivors.

During the early years of the Association there was no intention of forming a collection of instruments for loan to Members, though in 1897 there was an attempt to establish an observatory. The story is related in my paper, ‘The BAA observatories and the origins of the instrument collection’, published in the *Journal* (117, 6 (2007), 309–13) and available for download from the SAO/NASA ADS website at:

<http://adsabs.harvard.edu/abs/2007JBAA..117..309M>

At the moment, most of the useable instruments are on loan, but I shall be pleased to respond to any Member who enquires about availability. Note, however, that the regulations stipulate that an applicant needs to have been a Member of the Association for at least two years; that an application must be supported by another Member (preferably a Section Director); that each loan shall be for one year only, after which it is subject to review; that the Member to whom the instrument is loaned is responsible for the instrument wherever it might be housed; and that the instrument is returnable on demand. In addition, to justify the loan the borrower is expected to submit observations to the relevant Observing Sections of the Association.

Bob Marriott, *Director (and Curator)*



BAA instrument no. 134a. Stereo postcard viewer. Bequeathed by the Rev M. P. M. McLean in 1949, and sold at Christie’s in 1982.

A 10-inch f/7 Newtonian
Brian Mitchell

I have recently completed a 10-inch f/7 Newtonian with a twist top end. It is meant to be easily dismantled to take into the shed or garage, coming apart into three main parts: tube, fork, and polar mount with legs. It is not driven but is all hand-operated, so is not for deep-sky observing, though it is easy to use for visual observing. The box top and bottom parts are ply on aluminium frames, and the tube is fitted with handles for ease of carrying. When assembled on solid paving, with the two ‘T’ screws screwed down, it is adequately stable – the only unwanted movement being in fork flexure, which is slight.

Norwich b.mitchell678@btinternet.com



A 16-inch f/4.4 reflector: further developments

Len Clucas

In *I&I News New Series No. 6* I described the mechanical construction of this instrument and a short period of viewing. The next step was to aluminise the mirrors, but before that I decided on a proper bench-test of the main mirror, which was carried out by John Nichol. A Foucault test showed a smooth surface with a very slight raised zone near the centre, but a Ronchi test against a $\frac{1}{20}$ wave flat mirror of the same size showed a definite turned edge as well as the near-centre zone. The Ronchi test is twice as sensitive as the Foucault test, but seeking perfection I decided to have the mirror reworked – again a job for John Nichol, which did not take him long – and I then had the mirrors realuminised. The optics were put back in the tube a month ago, and although there have been few clear nights the viewing has shown definite improvement.

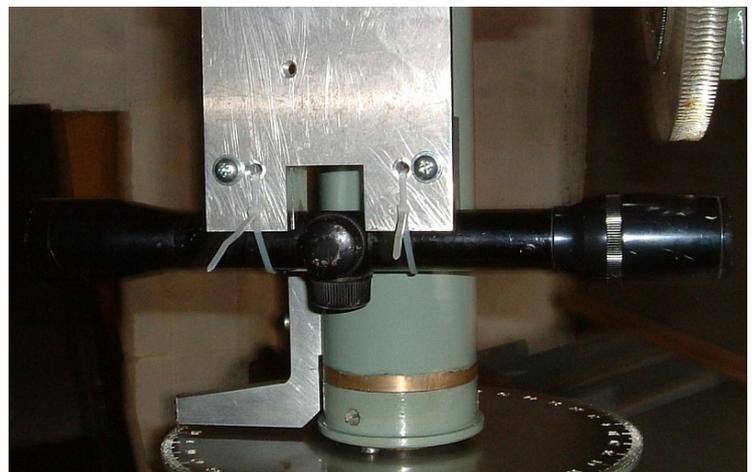
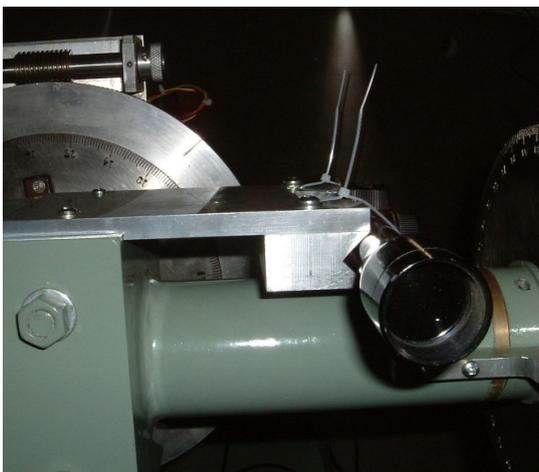
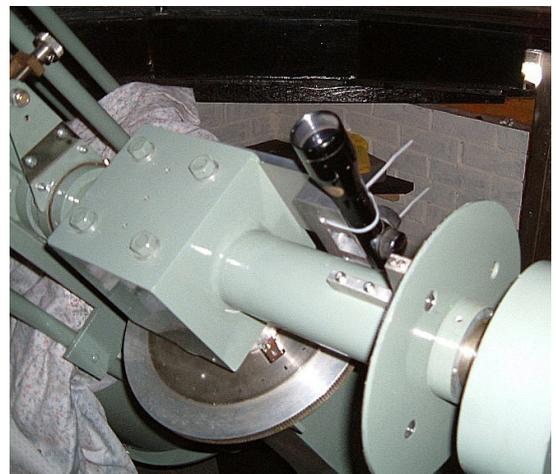
There now remains one main task before consistent viewing: polar alignment. There are several methods, among which I favour the polar telescope. Commercial mounts such as the EQ6 incorporate this telescope in the polar axis. I cannot arrange this, but because I machined the polar and declination axes and the cube to which these are fixed very accurately, some 10–12 years ago, I can fit a small telescope parallel to the polar axis. The photographs show a rifle sighting 'scope with a central cross-wire lying in a V block and attached to the corner of the cube. The V block is parallel to the cube corner and thus to the polar axis. The body of the rifle 'scope is parallel with its own optical axis (rotating it while viewing a star shows no displacement), and it magnifies 4x and has a field of view of 4°. Three $\frac{3}{4}$ -inch diameter screws adjust the whole of the mount and the 16-inch telescope.

When I am satisfied that the instrument is aligned I will pack under parts of the base frame to relieve the loading on three points only. Invaluable for this alignment is a free small software program (see URL below), which shows the position of Polaris for every minute of the year.

Wooler, Northumberland

len.clucas2@tiscali.co.uk

Polar Finderscope http://myastroimages.com/Polar_FinderScope_by_Jason_Dale/



The 1927 British eclipse: a colour cine-film

Bob Marriott

In June 1999 my paper '1927: a British eclipse' was published in the Association's *Journal*.¹ My search of possible film and sound holdings had revealed a *Topical Budget Newsreel* held by the British Film Institute, and an *Empire News Bulletin* held by Reuter's Television Library, each of them showing the day's events. I could not, however, trace the Gaumont Cinematograph Co's film (shown at the Association's meeting on 6 July 1927), nor the British Polychromide Co's colour film of the eclipse taken at Giggleswick. Enquiries at the North West Film Archive (Manchester) and the Museum of Photography and Television (Bradford) proved unfruitful, and there are no recordings in the BBC Sound Archive nor in the National Sound Archive.

The Association's meeting of 6 July – a week after the eclipse – was devoted to the discussion of observations and results of the various expeditions and of individual members. Those who presented their results included P. H. Hepburn, R. L. Waterfield, F. J. Hargreaves, G. Merton, H. H. Turner, H. Knox-Shaw, W. M. H. Greaves, L. J. Comrie, and M. A. Ainslie; and W. A. Parr extended his thanks to 'Mrs Blanche Darlington, of Leyland Road, for her generous hospitality to myself.' P. J. Melotte showed and described the best photographs of the eclipse, which had been obtained by Charles Davidson with the Royal Observatory's 45-foot camera at Giggleswick, and were developed by Melotte. Also present at the meeting were Dr Daniel W. Morehouse, of Drake University, Des Moines, Iowa, and Prof Caroline Furness, of Vassar College Observatory, both of whom saw the eclipse, addressed the meeting, and related their experiences of previous eclipses.

Several film companies had attempted cine-photography of the eclipse, and during the meeting the Gaumont Cinematograph Co's film of the day's events was shown; and as it was a newsreel the audience was able to watch other events of the day, including Wimbledon tennis and the Hendon air tournament. The film was shown again later during the meeting, and so even those who a week earlier had waited under clouds were able to see the eclipse twice.

The most important of the cine-films was the British Polychromide Co's colour film, which was shown at the meeting of the Royal Astronomical Society on 11 November. It was also sent to the Royal Observatory, Greenwich, to be examined and assessed, and in December a short paper, 'Note on the height of the chromosphere as shown on the colour film taken at Giggleswick, 1927 June 29', was published, without illustrations, in *Monthly Notices of the Royal Astronomical Society*.² It was 'Communicated by the Astronomer Royal', and no author is cited. The assessment showed that 'results of value as to the heights of various layers in the Sun may be obtained from cinematograph records of eclipses. The question of taking a well-timed film with a spectrograph may well be considered for future eclipses.'

A few days after the *Journal* containing my paper was issued I received a telephone call from Ewen Whitaker, in Tucson, Arizona. Ewen had worked at the Royal Observatory until the establishment was transferred to Herstmonceux in 1956, and was Director of the BAA Lunar Section 1956–58. Gerard Kuiper then invited him to work at Yerkes Observatory, and later in Tucson at the newly founded Lunar and Planetary Laboratory. Ewen told me that when some of the departments at Greenwich were being cleared he had found a small box that had been discarded. It contained five 3½-inch square glass slides (the old lantern-slide format), each holding twelve frames of a cine-film – the British Polychromide Co's colour film of the 1927 eclipse. I am very grateful to Ewen for deciding that 43 years after its rescue it should have a new home, and a few days later it arrived in the post.

Colour photographs in the nineteenth century were produced by a variety of methods, including the use of filters and artificial colouring. The first method devised for colour cinematography was the additive-colour system patented in 1899 and tested in 1902, but the first occasion on which colour cinematography was used successfully to record a total solar eclipse was in 1927. The images seem poor compared with modern results, especially as the celluloid and emulsion have deteriorated; but they are the product of the first attempt at cinematography of a solar eclipse with colour-sensitive emulsion, and are published here for the first time. I have therefore not tried to improve the images, though appropriate processing would no doubt reveal previously unseen details.

Totality lasted 23 seconds, and each of the sixty frames, taken at one frame per second, measures 24 mm (film width) x 18 mm. Each solar/lunar image measures 5 mm, so the focal length of the lens must have been about 570 mm. In the paper published in the *Monthly Notices* (included below) there is no reference to specific frames, and I have placed the parenthesised numbered notes with a degree of judgement, while the numbering of frames (cropped to a standard size) is my own.

The author of the paper was P. J. Melotte – the only evidence being his initialled notes accompanying the slides; so, after 85 years of anonymity he can be assigned the credit. At the Ordinary Meeting of the Association held at Burlington House on 30 May this year I presented a short talk on this film – in the same room in which it had been shown previously, 85 years ago.

1 *J. Brit. Astron. Assoc.*, **109**, 3 (1999), 117–43.

2 *Mon. Not. R. Astron. Soc.*, **88**, 2 (1927), 142–4.

Video of short presentation, 30 May 2012

<http://britastro.org/iandi/BAA-OM-2012-Eclipse-1927.wmv>

'1927: a British eclipse' (paper in the *Journal*, 1999)

<http://adsabs.harvard.edu/abs/1999JBAA..109..117M>

Ewen Whitaker as Director of the BAA Lunar Section

<http://www.baalunarsection.org.uk/history.htm>

Honorary doctorate awarded to Ewen Whitaker

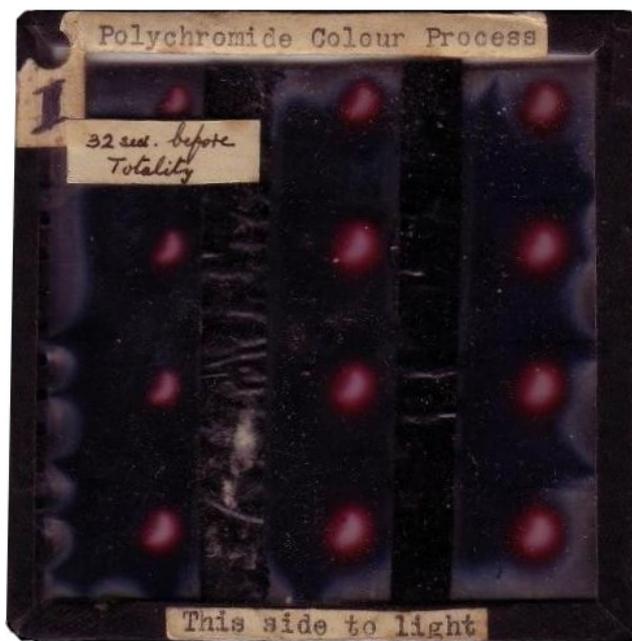
<http://www.lpl.arizona.edu/newsletter/dept/item.php?ID=110>



The Royal Observatory's 45-foot (6-inch f/90) camera and coelostat, and the cine-cameras of British Polychromide, Gaumont, Pathé, and Topical Budget. (*Daily Mirror*; author's collection.)



The box – obviously used by various departments at Greenwich.



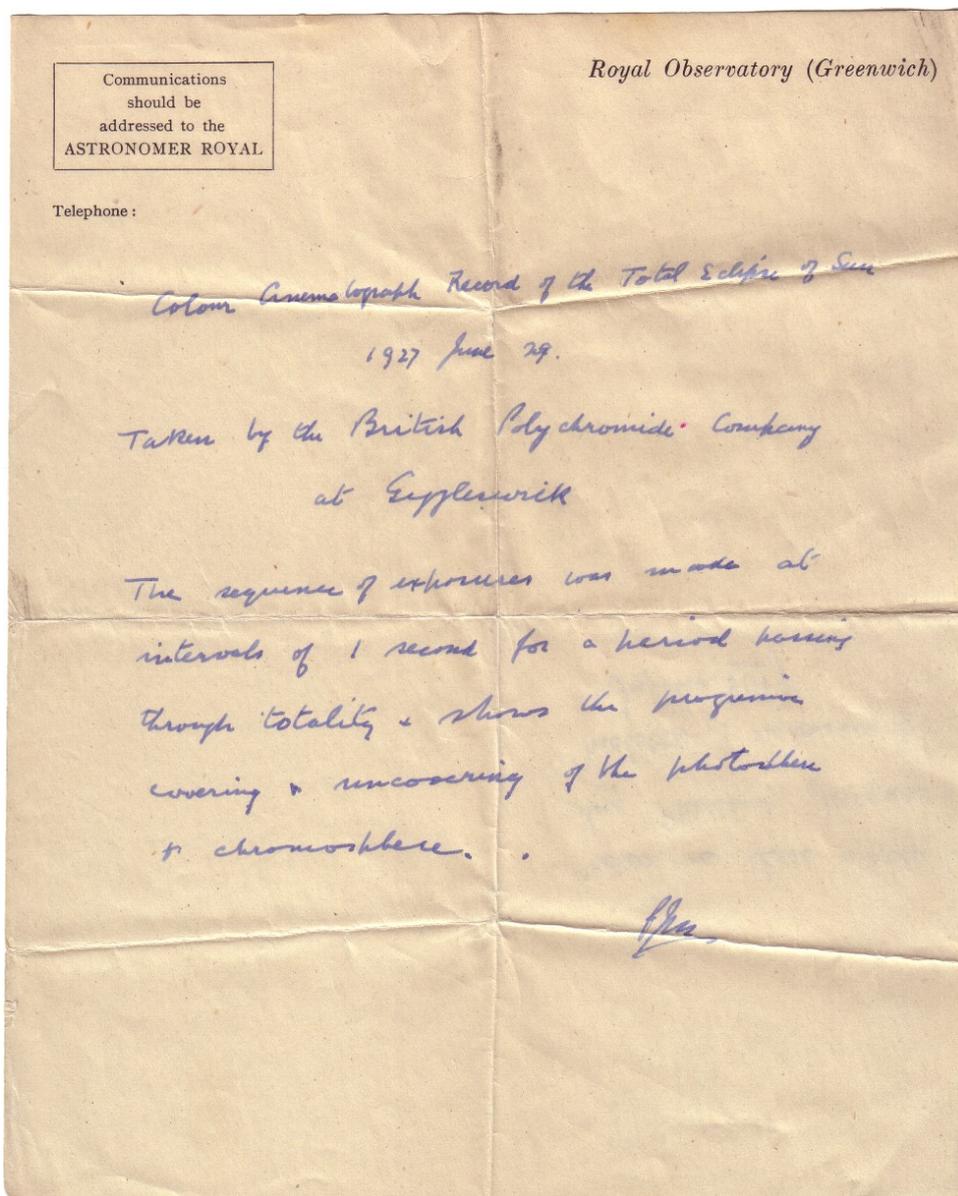
The first slide.



Philibert Jacques Melotte (1880–1961)

Melotte was a member of staff at the Royal Observatory, Greenwich, from 1895 to 1948. He was chiefly involved with photographic and computational work, and was in charge of the Astrographic Department for many years. In 1909 he was awarded the Royal Astronomical Society's Hannah Jackson (née Gwilt) Gift and Medal, primarily for his discovery of Jupiter's eighth moon (named Pasiphae in 1975). He joined the Association in 1909, was responsible for the instrument collection for several years, and served as Secretary 1913–17, 1919–21, and 1926–30, Acting Secretary 1924–25, Secretary 1926–31, and President 1944–46. He retired from the Royal Observatory in 1948, and Ewen Whitaker began work there in 1949.

(Melotte's paper follows)

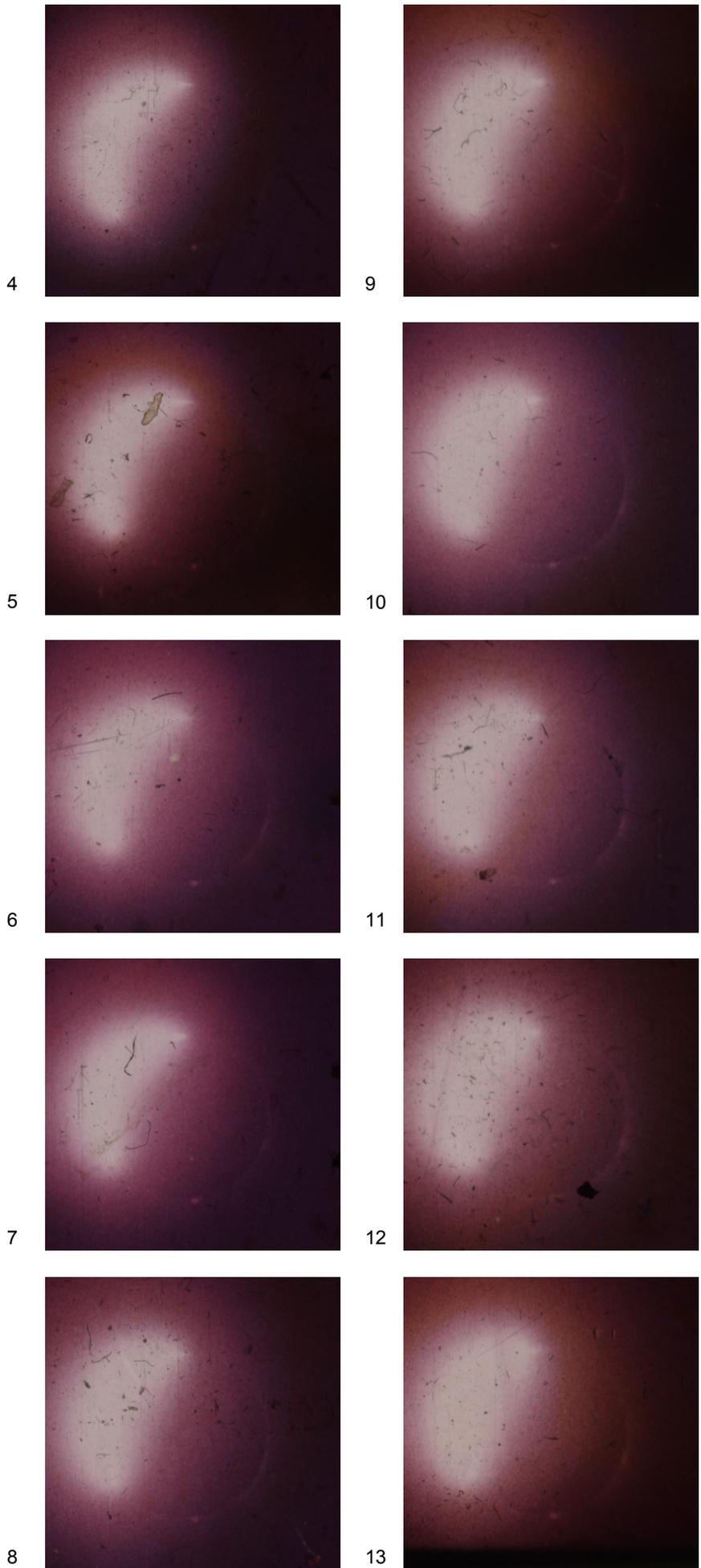


Melotte's notes.

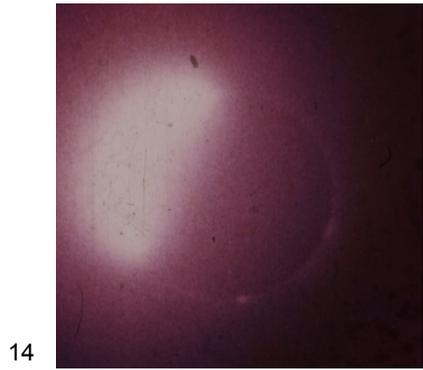
The British Polychromide Co Ltd took a colour film of the total eclipse of the Sun at Giggleswick on 1927 June 29, making exposures every second and increasing the exposure gradually to about 0.5 sec as totality approached. A detailed study of the separate exposures yields results of some interest.

For twenty-seven of the exposures it may be said that the eclipse was total, and for an additional two exposures at each end two Baily's beads are shown. From 30 seconds before the beginning of totality the corona and prominences can be traced on the limb of the Sun opposite to the crescent, and the same phenomena can be traced as long after totality. The corona shows a somewhat bluish girdle round the Moon during totality. Outside totality this bluish colour can also be seen at times, but generally the coronal arc appears rather reddish, a result probably due to the process employed. The chromosphere appears quite red, while the prominences vary from a deep to a whitish red.

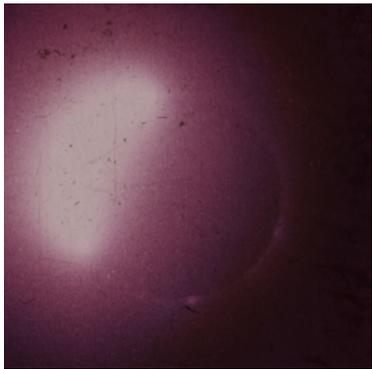
The sequence of the photographs is as follows:



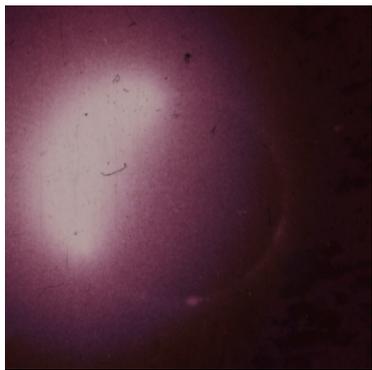
(1) The large red prominences in position angle 325° appeared.



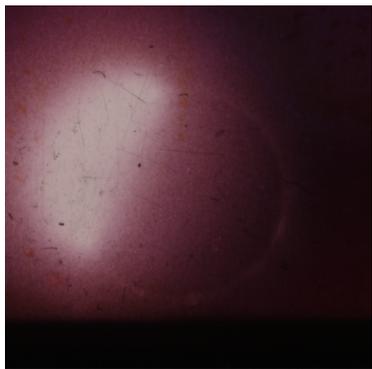
14



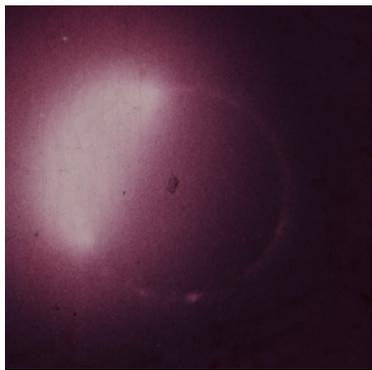
15



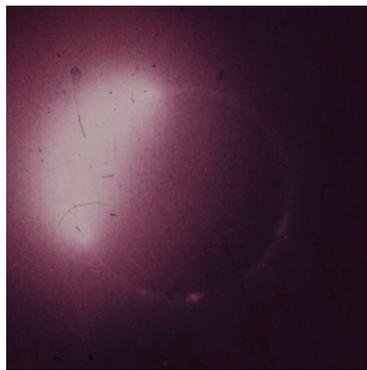
16



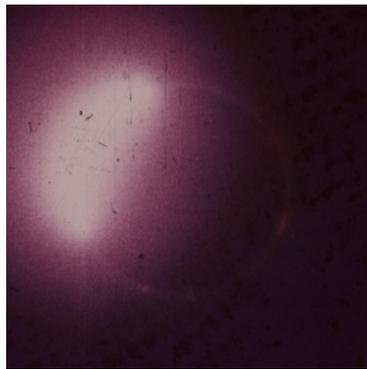
17



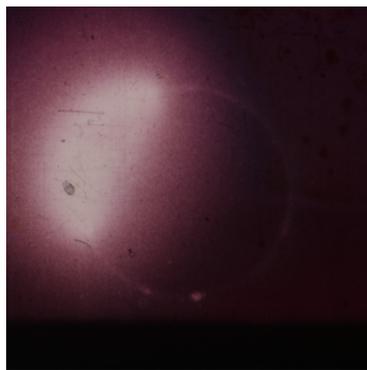
18



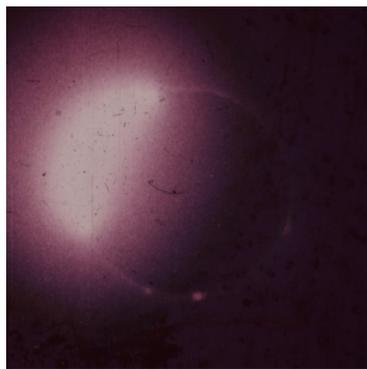
19



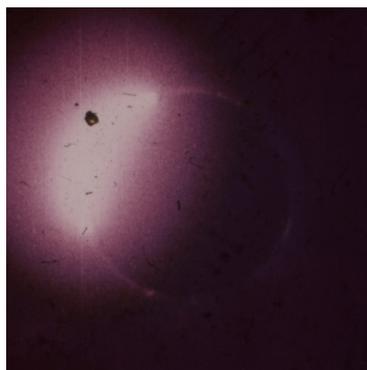
20



21

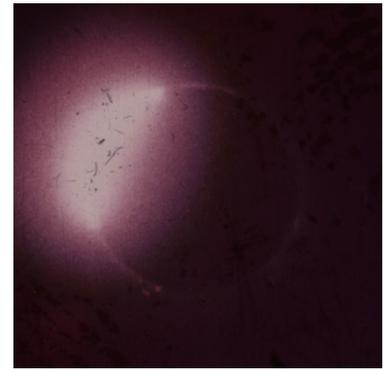


22

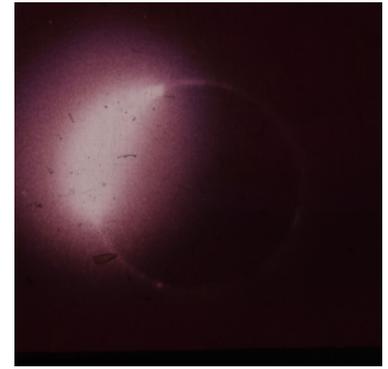


23

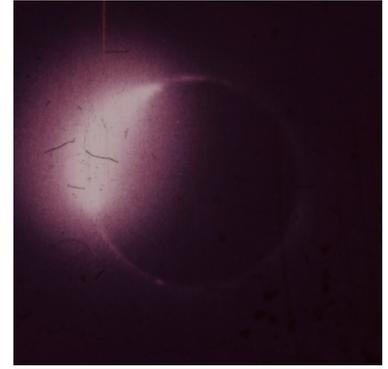
(2) A semicircle of corona appeared opposite the crescent, the more or less uniform layer of the chromosphere being still covered by the Moon.



24



25

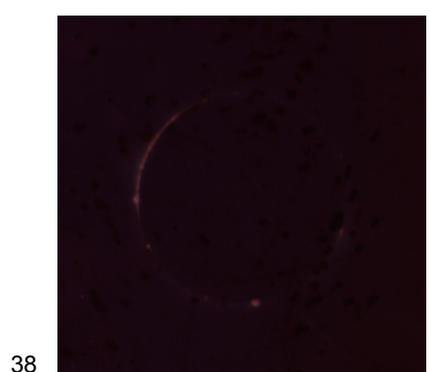
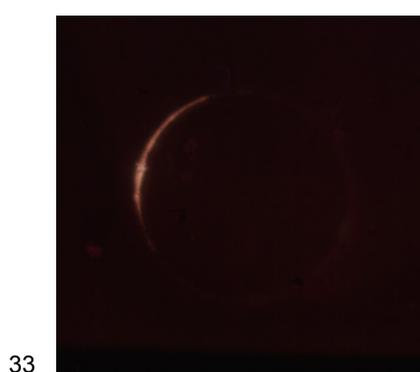
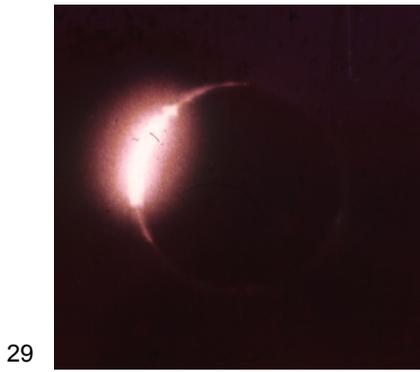
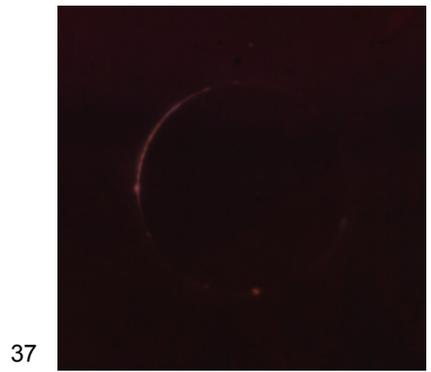
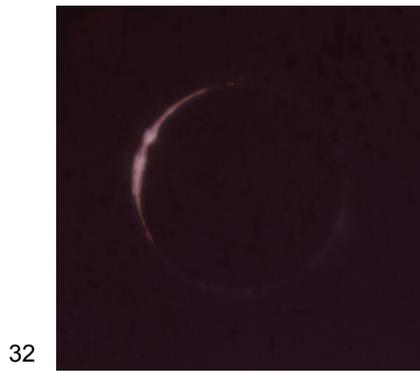
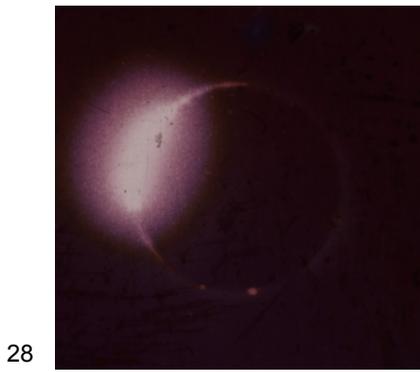


26

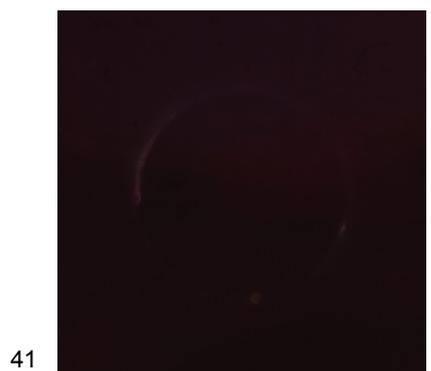
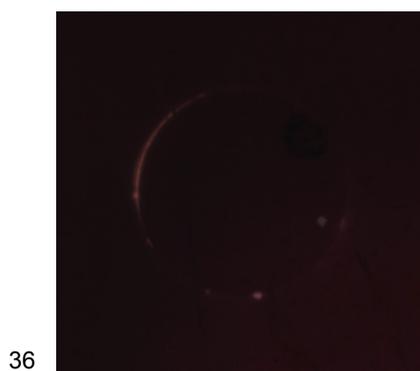
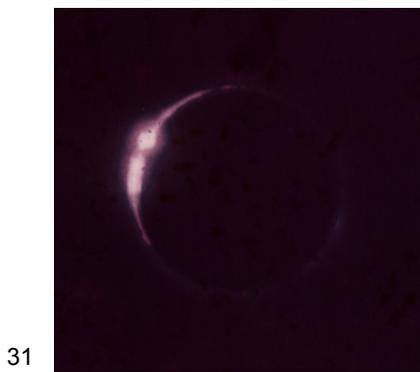
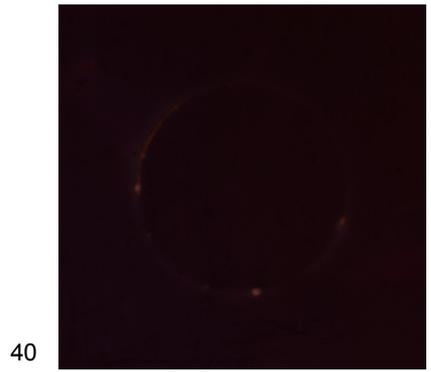
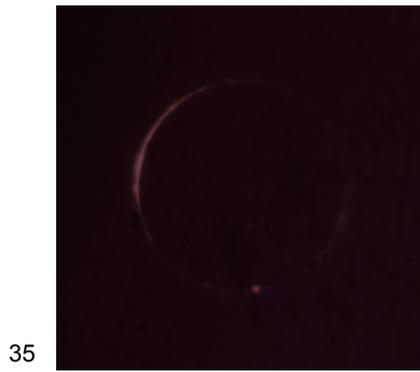
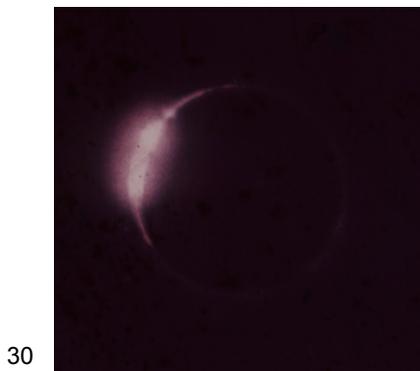
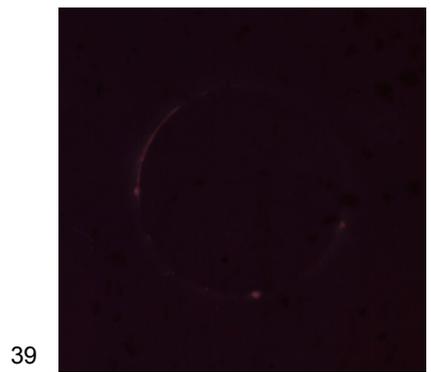
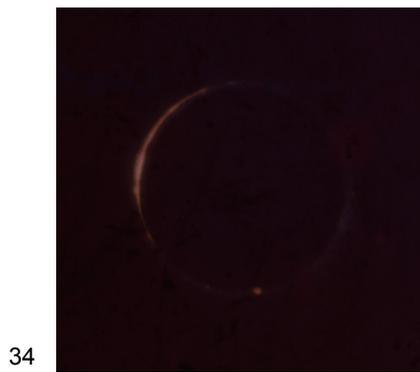


27

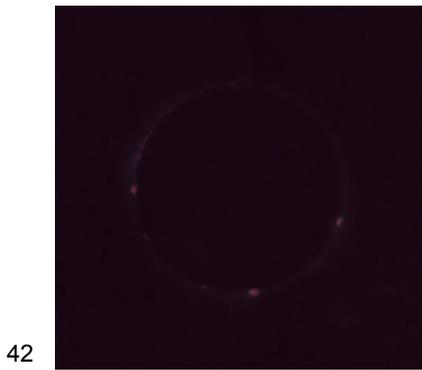
(3) As lower levels of the corona were uncovered by the Moon, the coronal arc increased in visibility. On some exposures it appeared relatively blue, on others relatively red. The redness is due to the process employed, as it decreased with the approach of totality right up to mid-totality. There was no real red to be seen on the west limb before totality except that mentioned in (1). The material near the solar equator in position angle 265° was definitely bluish.



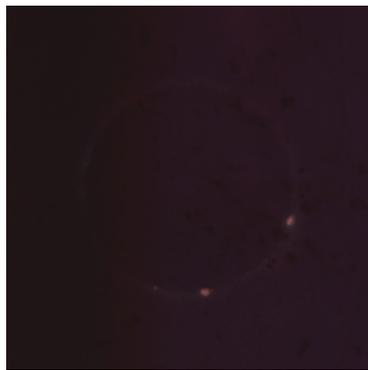
(4) About 2 seconds before totality the solar crescent, less than 90° long, flattened in the middle and proceeded to split into two beads, which faded away together, gradually reddening, but remaining for a second or two after totality rather whiter than the rest of the chromosphere.



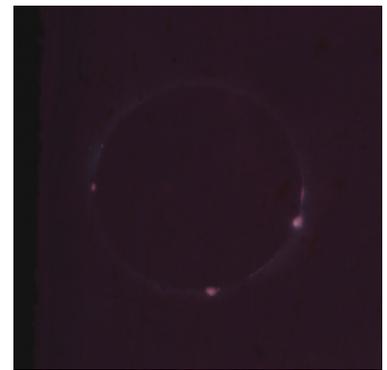
(5) When totality commenced there was a continuous reddish arc of chromosphere on the east limb extending for about 130° with red prominences, but still the only red prominence on the west side was that mentioned in (1).



42



47



51

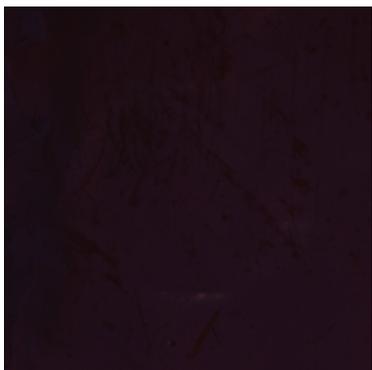


43

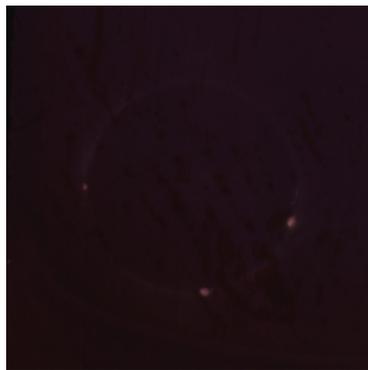


48

(8) With the passage of the Moon across the Sun the faint prominences on the east limb were soon covered, while the prominences on the west increased. A third one appeared about position angle 245° , being at the beginning redder than that at 260° .



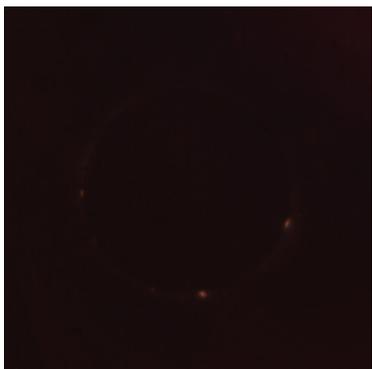
44



49



52

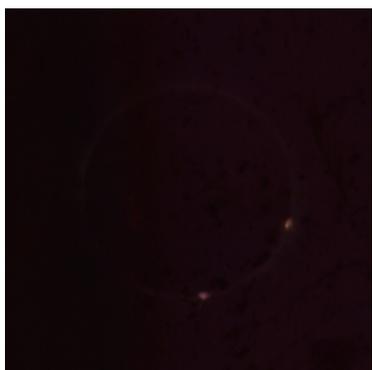


45

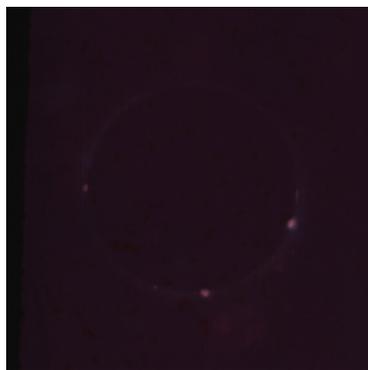
(6) About 9 seconds after the beginning of totality the red chromosphere had nearly disappeared from the east limb, and except for the blue corona there were only three prominences shown, viz., those in position angles 325° , 75° , and about 260° . The last was associated with coronal matter and not nearly so red as the others.



53

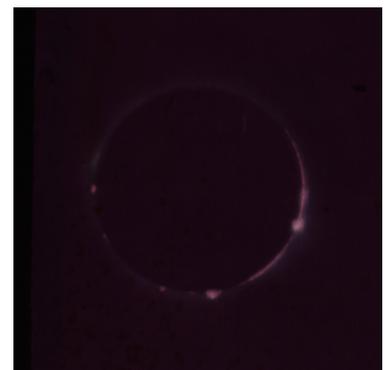


46



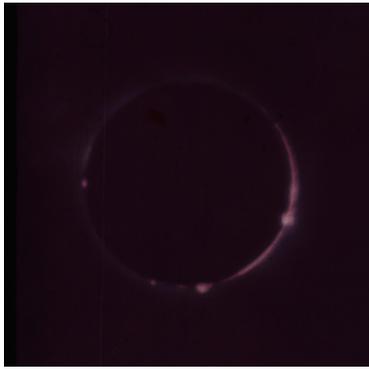
50

(7) By the next exposure the uniform chromosphere had broken up on the east limb, and a number of faint red prominences appeared interspersed with blue corona.



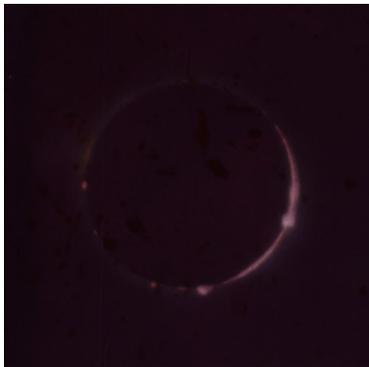
54

(9) About 6 seconds before the end of totality the uniform chromosphere appeared on the west limb.

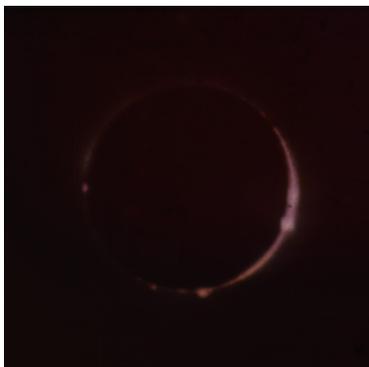


55

(10) The chromosphere on the west limb steadily brightened. The prominence at 260° whitened but remained larger than that at 245° till about 1 second before the end of totality, when the latter rapidly brightened, and in place of the two prominences there appeared two Baily beads close together, that at 245° being much brighter.



56



57

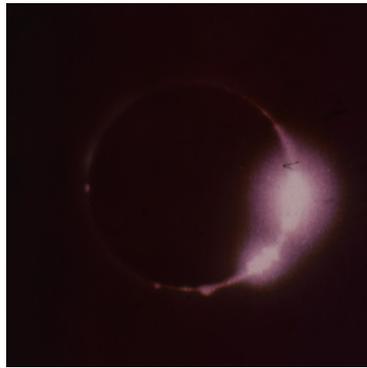
(11) The two beads joined and formed a crescent of the Sun, and phenomena similar to those before totality took place in the reverse order.



58



59



60

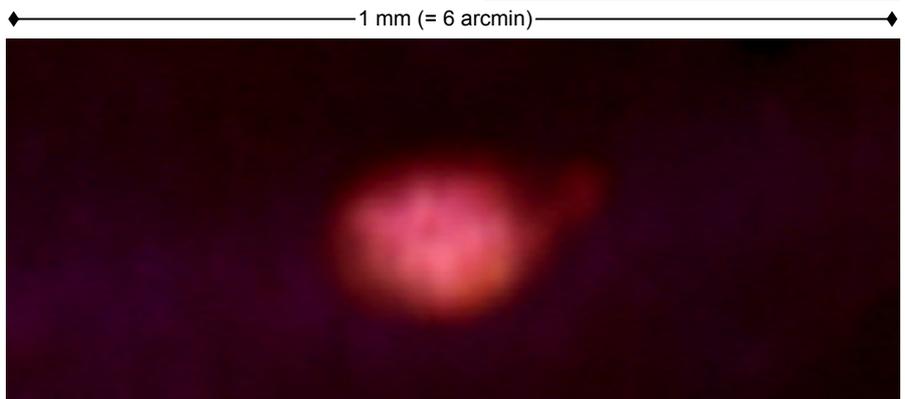
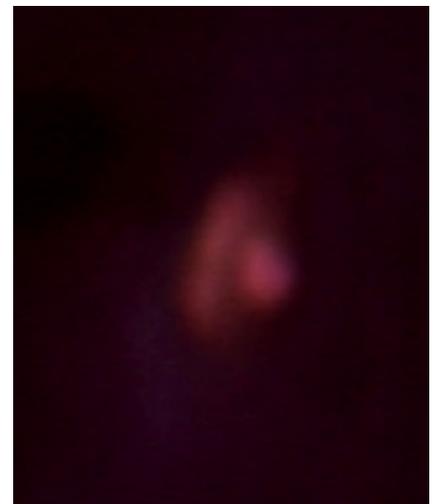
As the excess of the Moon's diameter over that of the Sun is $13''.1$, and the duration of totality 23 sec, the figures indicate that the heights of the bright,

more or less uniform, chromosphere on the east and west limbs were about $5''.1$ and $3''.4$, or 3,700 km and 2,400 km. This height is considerably less than that usually ascribed to hydrogen, but from the photographs it appears to correspond to a definite layer of the Sun's atmosphere. A similar result is indicated by the fact that the uniform red chromospheric layer did not show at the Sun's poles.

At the end of totality it was stated that two beads appeared – the first being definitely associated with a reddish-white prominence, the second appearing later and increasing with great rapidity. The first bead, which is associated with a prominence, may be due to an elevation of the surface layers of the Sun above their normal level, the second to a depression in the Moon's surface.

These photographs indicate that results of value as to the heights of various layers in the Sun may be obtained from cinematograph records of eclipses. The question of taking a well-timed film with a spectrograph may well be considered for future eclipses.

We have to express our thanks to the British Polychromide Co Ltd, for their kindness in supplying us with copies of the individual pictures obtained at the eclipse so that they might be studied in detail.



Three details from frame 39. Scale: $\blacklozenge \text{---} 1 \text{ arcmin} \text{---} \blacklozenge$ (= 0.167 mm on each frame).

**DAILY
EXPRESS**

**WONDERS
OF THE
ECLIPSE CAMP**

**BY PROFESSOR
STEAVENSON**

£50,000 FREE INSURANCE

A rare item of ephemera: a newsagent's flyer (30 x 20 inches) that would normally have been thrown away the following day. Note that W. H. Steavenson has been unofficially elevated from 'Dr' to 'Professor'. The offer of free insurance was not connected with the eclipse. (Author's collection.)

The Romsey observatory

The Rev Edward Lyon Berthon (1813–1899) was vicar of Holy Trinity, Fareham (1846–59), and Romsey (1859–92). He studied theology, medicine, architecture, philosophy, mechanics, sculpture, art, and astronomy, and invented several nautical devices including the clinometer, the roll-and-draft indicator, the nautochometer (speed indicator), and the collapsible boat – the latter being manufactured by the Berthon Boat Co Ltd, which employed 100 workmen. He also designed screw-propellers, anchors, collapsible pontoons, portable hospitals, tents, several types of telescope mount, and various other devices, including the dynamometer. The design for his Romsey observatory was published in *The Intellectual Observer*, 5, 6 (July 1864), 445–8.

The following description of a very inexpensive garden observatory will most probably be acceptable to those amateur astronomers who have felt the want of a shelter for their instruments and themselves, and have hitherto been deterred from the enjoyment of such a luxury by the supposed costliness of its erection.

In the *Intellectual Observer* for May 1864 appeared a description of a cheap observatory recently built by Mr Bird for his large silvered-glass reflector, and it is, the writer is assured, with the best wishes of that able astronomer that the present account of a cheaper observatory makes its appearance.

It is not necessary to repeat the cogent reasons that those who study the hosts of heaven in the chilly night should do so with as much comfort as possible. A cutting wind on a frosty night, which agitates both the observer and his telescope together, is the best argument in favour of laying out a few pounds for such a purpose.

The drawings which accompany this description represent, in elevation and ground plan, a very pretty rustic observing-house, which the writer erected in the garden of Romsey vicarage last summer; it has answered every desired purpose most perfectly, and though the situation is wet, being almost surrounded by water, the building itself is remarkably free from damp of every kind, not a speck of rust having appeared on some bright steel and iron work kept in it the whole winter. It will be seen that the form of the building is twelve-sided, and the following particulars will enable any one desirous of adopting the design to build it.

Twelve rough fir poles, or any straight trees, about 4 inches thick and 8 feet long, are fixed in the ground in a true circle of 10 feet diameter, and at equal distances from each other, i.e., about 2 feet 6 inches; their tops must then be cut off level 6 feet 6 inches above the ground.

To do this part of the work quickly and well, a straight post should be set up in the centre of the circle, on the top of which a horizontal rod 5 feet 2 inches long is made to revolve; this will indicate the height of each post and the position of the centre of its head. This being done, some pieces of inch deal or other plank must be cut just long enough to reach from centre to centre of the posts, and these twelve pieces, 4 inches wide, must be nailed on their tops.

The walls of the house must now be made by nailing weather-boards on the inner sides of all the posts, beginning at the upper part, and only leaving the apertures for the door and windows.

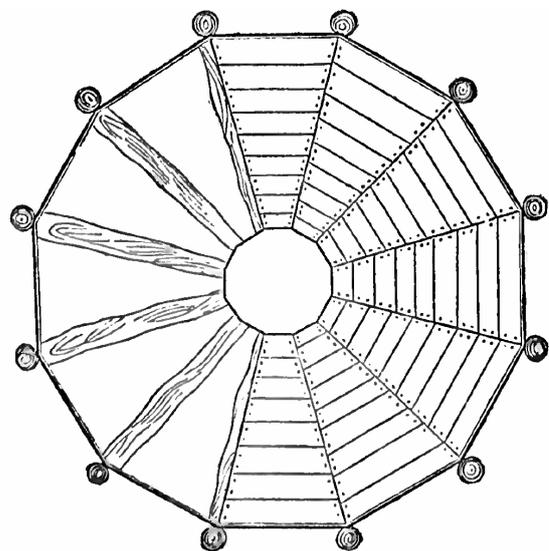
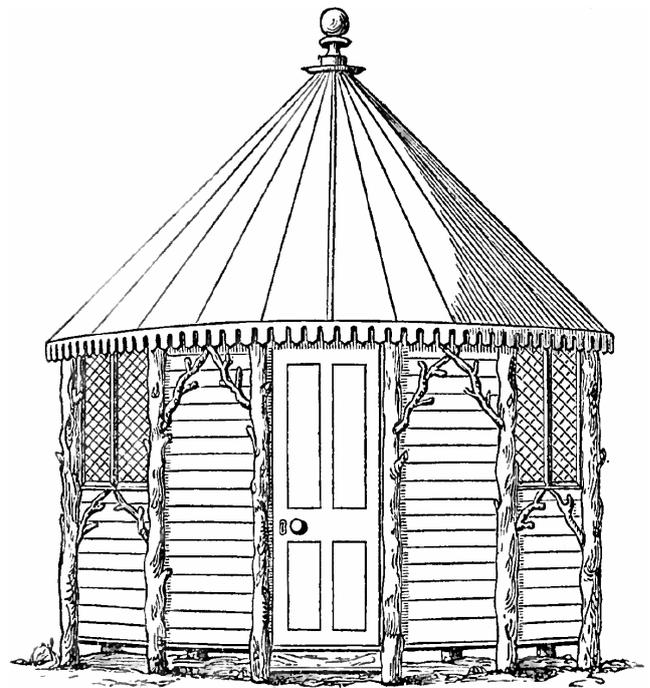
The bearers for the floor can be laid next; they consist of slabs of any kind of timber with their smooth sides up. Supposing the brick or stone pedestal for the telescope to be 2 feet in diameter, these slabs will be 4 feet long; they may be supported on logs of wood, or any other blocks, so that the floor when laid upon them is 1 foot above the ground. Care must be taken that neither they nor the boards touch the pedestal.

The ground plan shows the arrangement of the boards, five of the spaces being left open in the drawing to show the bearers.

The door and windows can be made according to the taste of the builder, but simple and neat cases for them can be formed by nailing inch board, planed, against the rough posts. Very simple frames for the windows, with one large square of glass in each, look quite as well as casement, and are very cheap.

The next part is the roof, which is constructed as follows. Twenty-four pieces of inch plank, about 6 inches wide and between 2 and 3 feet long, are so cut that twelve of them shall form a circle 10 feet 3 inches wide at its inner edge; these being laid out in a true circle, marked in chalk upon a flat floor, the other twelve are laid upon them, crossing the joints; they are then all nailed together and clinched. The inner edge is then made to a true circle, and smoothed with a compass plane.

Next the rafters must be cut, twelve or twenty-four in number, or intermediate as best suits the canvas. The Romsey Observatory has twenty-four; they are 7 feet 6 inches long, and 2 by 1 inch thick. Being cut to the right bevel, their feet are simply nailed down to the great wooden ring above described; their upper ends meet on a block surmounted by a knob.



Strong canvas is now to be nailed with tinned tacks upon the rafters. A space will be left in the roof nearly 6 feet wide, wherein no rafters are fixed. It is the opening for the telescope, and is closed with shutters in this way. Suppose the number of rafters be only twelve, then two triangular frames of the same wood, each comprising one-twelfth part of the cone, will be hinged to the contiguous rafters on each side, and the canvas nailed over the joints. A broad thin strip of wood covering the part where these shutters meet will keep out the rain; the only place where it might come in is at the extreme apex, and to prevent it a round disc of zinc must be put on under the knob, but high enough above the upper ends of the rafters to allow the triangular shutters to open. The writer has constructed his shutters in four pieces, hinged two and two together, so that he can open them from 18 inches to 6 feet.

The roof being completed and well painted inside and out, is ready for lifting on, which can be done bodily; but first the gear for causing it to revolve must be contrived. For this purpose eighteen iron sash-rollers of good size must be got from any good ironmonger. Twelve of these must be sunk in the plates of wood on the top of the posts, and just over them. The other six rollers must be attached to some stout blocks of wood, so as to revolve vertically, and these blocks will be screwed to the plate, between the posts, in alternate spaces, so that when the roof is on, the inner edge of the great ring or circle touches, or may touch them, to prevent the roof going off sideways. The twelve rollers should be well oiled, and they will be found to bear the roof, and allow it to revolve with a very moderate force.

The shutters must have a bolt to keep them shut; and about four bent pieces of iron driven into the top of the posts, with a sort of hook projecting a little over the inner edge of the great circle of the roof, will keep it from being lifted by the wind.

It only remains to remark that the extreme dryness of this building arises from its being raised a foot clear from the

ground, but it is better and warmer if roofing-felt be nailed on inside the boards. Some very cheap stuff, cotton or linen, etc., nailed inside the felt will receive the paper which, with a simple cornice, finishes the interior.

The weather-boards outside can be tarred over or painted roughly, and where loppings of oak can be had, some of the crooked branches put on in a gothic pattern produce a very pleasing effect. The eaves can be ornamented according to taste or local facilities.

The following is an estimate for materials and labour on a high computation, not including the pedestal of the telescope; but in most parts of the country, especially where English fir can be obtained, and the wages of a carpenter are less than 5 shillings a day, a considerable saving may be effected, so that the expense of this pretty little building will vary from £7 to £10, according to local circumstances.

Twelve rough fir poles	£0 12 0
165 feet of 3/4-inch weather-board for sides	1 7 9
165 feet of inch deal board, for floor, plate, windows, door, and entire roof	1 13 4
Slabs for bearers of floor	0 4 0
15 yards of yard-wide canvas	1 0 0
Eighteen sash-rollers (iron)	0 3 0
Nails, screws, and tacks	0 8 0
Lock, hinges, and bolts	0 6 0
18 square feet of glass for windows	0 2 0
18 yards of roofing-felt for inside of weather-boards	0 12 0
18 yards of lining	0 6 0
Paint, etc.	0 6 0
Labour, twelve days at 5s per day	3 0 0
Total	£10 0 1

NB: Prices for 1864 should be multiplied by 100 to derive the equivalent prices for 2012. Thus it can be easily demonstrated that the relative costs of the various materials are now different, and that the rates for labour (= £150 per 6-day week in 2012) have increased.



The Rev E. L. Berthon aged 85, in 1898. The 16⁵/₈-inch Grubb reflector, Berthon's 'equestrian' mount, and the Romsey observatory were destined for 'a gentleman at Johannesburg'. (Photograph discovered by Peter Hingley in the RAS archive.)



The Romsey observatory housing the 8-inch Cooke refractor at Cambridge Observatories.