



LUNAR SECTION CIRCULAR

Vol. 52 No. 2 February 2015

Unforeseen circumstances have delayed production of the LSC this month. In order to maintain the sequence, we have prepared this reduced issue in the hope that things will return to normal next month. In the meantime, apologies to all those whose submissions have had to be held over.

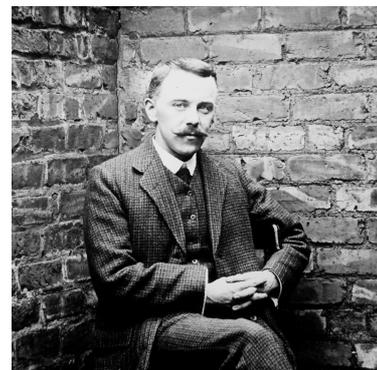
FROM THE DIRECTOR

From the Archives: William Porthouse

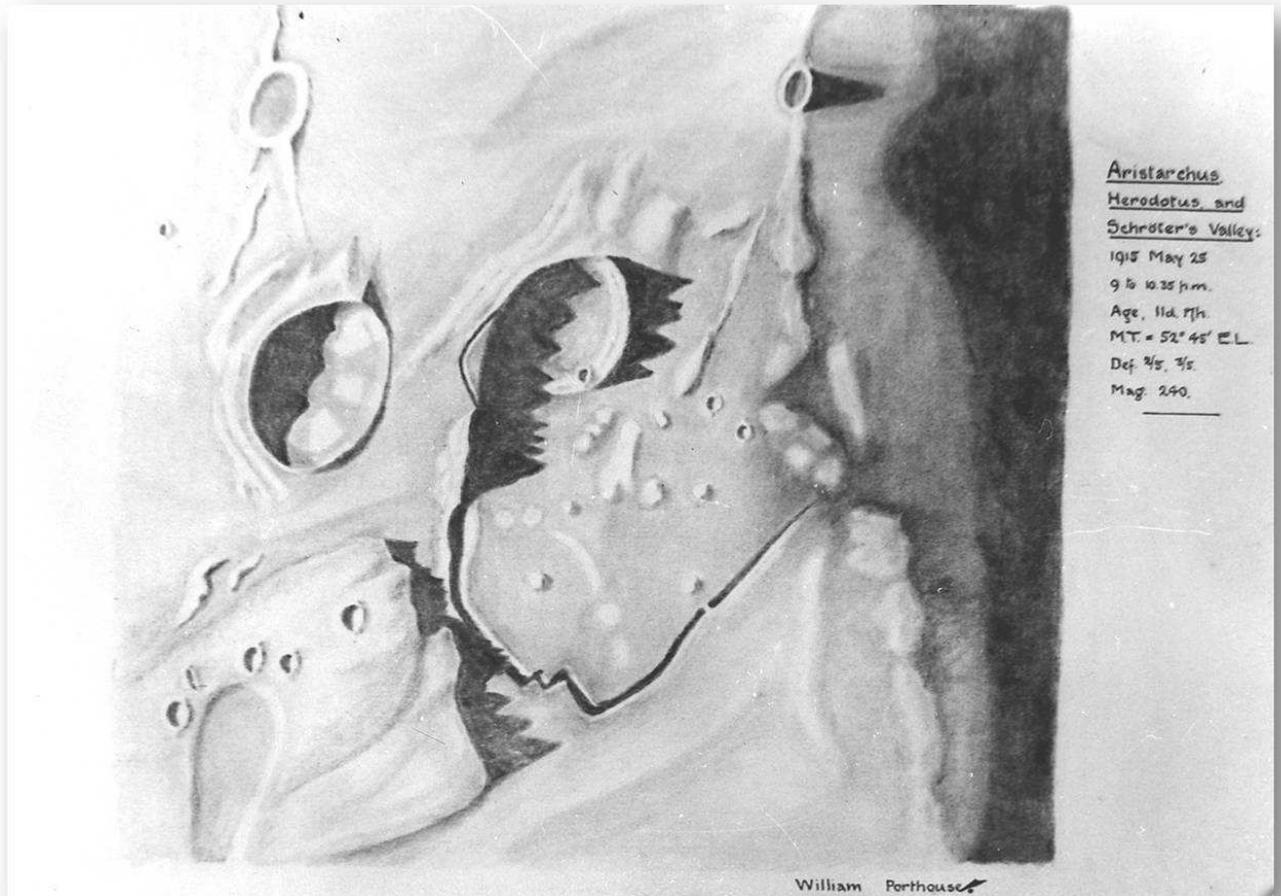
The BAA Lunar Section has a long and venerable tradition of observational activity stretching right back to the formation of the Association in 1890 and our first Section Director, Thomas Gwyn Elger. We are fortunate to have Elger's observational notebooks in the BAA archive, but history has been less kind when it comes to the preservation of other material: we have next to nothing by Walter Goodacre, our second and longest-serving Director, and most of the surviving notebooks of H. P. Wilkins are not in the BAA's possession (although some are preserved at the National Maritime Museum).

However, the surviving Section archive does include much interesting material, and at some point in the future it might be possible to make some of it available via the Section website. In the meantime I thought that it would occasionally be worthwhile to bring examples to the attention of our members.

Some years ago, the family of William Porthouse loaned me his lunar observational notebook for scanning. Porthouse (fig. 1) was born in Carlisle in 1878 and later worked for Manchester Corporation. He was a keen amateur astronomer with a special interest in selenography. He joined the Manchester Astronomical Society in 1905 (eventually serving as President) and the BAA on 1913 November 26th. He was a prominent member of the Lunar Section



during the directorship of Goodacre, and the latter made much use of Porthouse's work in his magnum opus, *The Moon*, published in 1931, as well as in the numerous *Section Memoirs* that appeared in those years. Much of Porthouse's observational work was done with an 8½-inch Calver reflector as well as with the famous 13-inch 'Madeira' reflector (made by With) that had been used by Nathaniel Green to make his classic observations of Mars in 1877.



Porthouse died on 1964 July 15, but his observational drawings survive and show him to have been a gifted and accurate student of the lunar surface. The example reproduced here shows his rendering of the Aristarchus region (fig. 2).

Finally, a reminder that in last month's issue I invited members who might be interested in supporting a Section meeting at some point in the future to get in touch with me. I have had only one response so far, but this may be because of Christmas and New Year distractions. I repeat the invitation now, and if there is still no real interest I shall shelve the idea for the time being.

Bill Leatherbarrow

The Burckhardt rille, a valley by any other name?

Nigel Longshaw

Among the fine images of the lunar surface which graced the pages of the January circular one in particular caught my eye. It was the appearance of a distinct valley in Dave Finnigan's image of the Burckhardt region on page 10 which drew my attention. Dave captured the region as I have seen it on a couple of occasions in the past, namely on 2013 December 12 under colongitude 118.64 degrees using a 78mm refractor, and more recently on 2014 December 8 using a vintage Celestron C90 telescope under colongitude 114.54 degrees. At times of raking sunlight the valley-like feature to the north-east of Burckhardt, which extends up to the outer south-eastern ramparts of Geminus, presents a most striking object. Harold Hill (1920-2005) produced a beautiful and atmospheric observational drawing of the region on 1998 December 5 when colongitude was 115-116 degrees. His fine drawing is reproduced from the lunar section archive as figure 1.

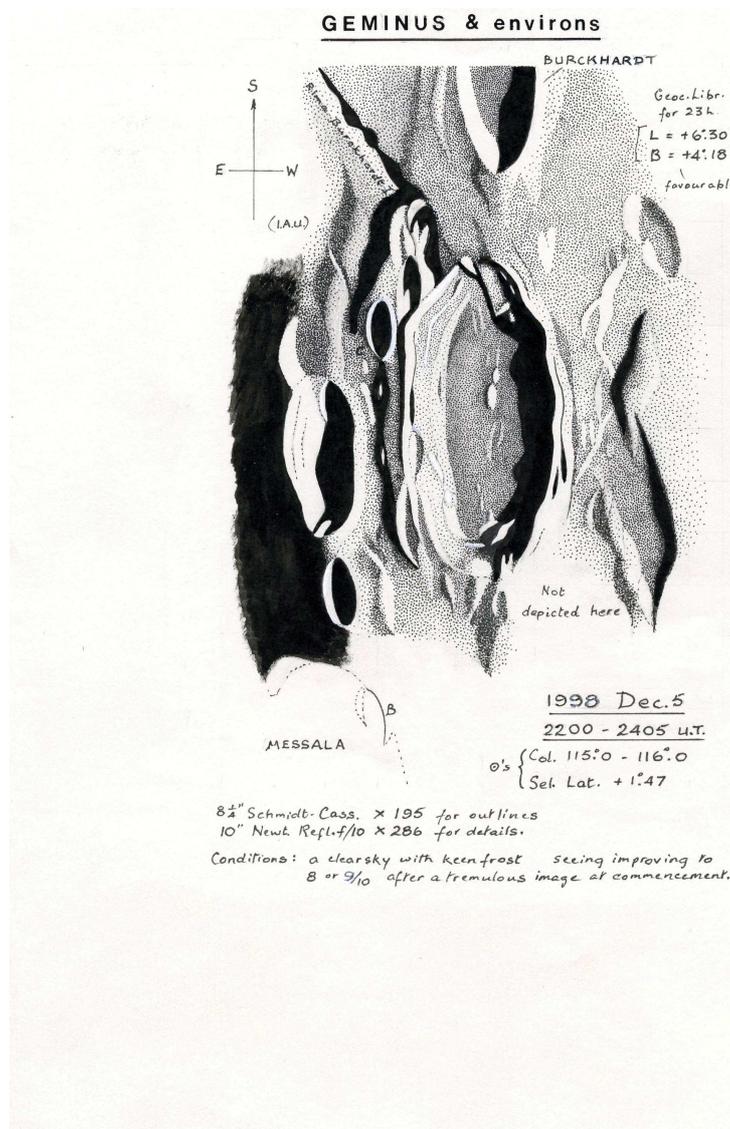


Figure 1; 'Geminus and environs', an observational drawing by Harold Hill dated 1998 December 5.

Harold clearly shows, and marks, the main valley-like feature, named Burckhardt I, but not the apparent graben-like feature running parallel to the north, which Dave's image picks out so well. However, from his own notes Harold's main objective on the evening of 1998 December 5th was a general survey of Geminus, and he remarks that the feature '...seems to have been rather neglected by observers over the past years, perhaps because of larger, more imposing, formations presented down the same terminator'.

It is perhaps this neglect in favour of the 'more imposing' formations that has drawn observers away from the Geminus/Burckhardt region under what might be termed ideal conditions to observe Rima Burckhardt I, and has led to very few records of the formation in the lunar literature. Early selenographers are somewhat scant in their descriptions. Under his notes in relation to Burckhardt, Edmund Neison (1849-1940) suggests that '...towards Geminus, extends a rill, declared by Schmidt to form part of a remarkable rill system, of which he gives no particulars'. Writing some 19 years later in 1895 T.G.E. Elger (1836-1897) describes a cleft running up the south west wall of Geminus '...and then striking across the plain in a S.W. direction [classical orientation]. Here it is accompanied for a short distance by a somewhat coarser companion, running parallel to it on the North' (could this be the secondary graben-like feature?). In their book *The Moon* H.P. Wilkins (1896-1960) and P. Moore (1923-2012) note that a '...ravine or cleft on the south [of Geminus] continues beyond the walls, and can be traced as far as the crater Burckhardt'. Descriptions penned by selenographers of the past seemed to do little justice to the feature which had appeared so prominent in the eyepiece of my small telescopes. So I was pleased a short time ago, whilst browsing copies of old ALPO Journals on line, to find a small drawing of the valley-like feature made by Isamu Hirabayashi in 1959 (see fig 2).



Figure 2; 'Lunar valley near crater Geminus', a drawing by Isamu Hirabayashi using a 100mm reflector dated 1959 September 19, reproduced from 'The Strolling Astronomer', publication of the Association of Lunar and Planetary Observers, vol. 16, no. 5-6 1962, p143.

It might be said the Japanese had rather a monopoly of observing these limb valleys during the 1950's (see the drawings of the Miyamori Valley in the January issue of the LSC). It seems apt therefore as part of the current discussion, and in light of the paucity of descriptive notes from the past, to include the detailed description of the 'valley' as it appeared in the ALPO Journal *The Strolling Astronomer*, vol.16, no. 5-6 1962, by Isamu Hirabayashi:

'I am the leader of a club of Lunar and Planetary Research, composed of about 30 Japanese amateur astronomers, most of them senior high school and University students. We have observed a large valley near Geminus on the Moon. It is not present at all on the Goodacre map of the Moon; and while on the Wilkins map something is drawn with a dotted line, I think this object is smaller and less prominent than my observed valley. It is a very curious thing that, as far as I know, this prominent object is not recorded in any lunar maps at all. The object can be called either a 'valley' or a 'grove' but for convenience I shall call it a valley. I first observed this valley on January 7, 1958, at 12h 12m U.T., colongitude 114.8 deg. The overall appearance as observed by members of the club is as follows [all orientations in 'classical' style].

The valley runs southwest from near the west edge of Geminus to a large plain. The east end of the valley contacts a craterlet near Geminus, and the west end reaches to the small hill (or mountain) west of Burckhardt. Under poor seeing the valley looks like a chain of craterlets, but we can observe complex objects with good conditions and proper solar illuminations. The valley is about 50-100 km long and about 15 km wide at its widest part. It is deeper and wider in its east part than its west part, which is hard to detect under high lighting since it is very shallow and narrow. No mountain nor cleft has been found on the interior. One observer says that this large valley is formed from two parallel grooves. If so there is a convexity in this valley as in the Ariadaeus rill.'

Hirabayashi goes on to say 'I think it unlikely that the valley can be observed usefully on the narrow crescent Moon'.

Dave Finnigan's image clearly shows the main 'valley' along with the secondary grabe-like feature running parallel to and on the northern side of the main 'valley'. This secondary feature appears to be unnamed, however does appear to form a distinct feature in the image. Rukl's *Atlas of the Moon*, which many regard as the ideal atlas for the lunar telescopicist, indicates the main valley only, in what might be described as a somewhat 'stylised' form when compared to the CCD image. Due to the apparent lack of attention paid to this feature in the past, its depiction in at least one of the 'modern' atlases, and the general topography of the region, it seems as though there may be opportunity here for both the visual observer and the CCD imager to add something to our knowledge of the appearance of the area from our earth-based perspective. It would be interesting to establish if the graben-like feature which runs parallel to the main valley can be picked up visually under suitable lighting conditions. Further how does the region appear under opposite illumination, i.e. under sunrise conditions? As noted by Hirabayashi, this would be a very difficult visual observation to make due to the Moon's young age at the appropriate time and in this regard such an observation might favour the CCD imager.

Having briefly examined the area using the Quickmap website there are perhaps a number of questions which might be worth further investigation by those more versed in the morphology of the lunar surface. As noted, the 'secondary' linear feature to the north of Burckhardt I has all the hallmarks of a graben; however, the Burckhardt rille itself appears to have a somewhat different profile, almost 'V' shaped for part of its length. Also, what is the significance, if any, of the apparently craterlike, but somewhat jumbled terrain forming the depression at the valley head adjacent to the south-east wall of Geminus? Orbiter imagery appears to suggest a continuation of the alignment of Burckhardt I to the west beyond the outer wall of Geminus in the form of an escarpment. Is this a related feature which formed part of a much longer linear feature than the section of valley we see today, which was perhaps interrupted by the formation of Geminus?

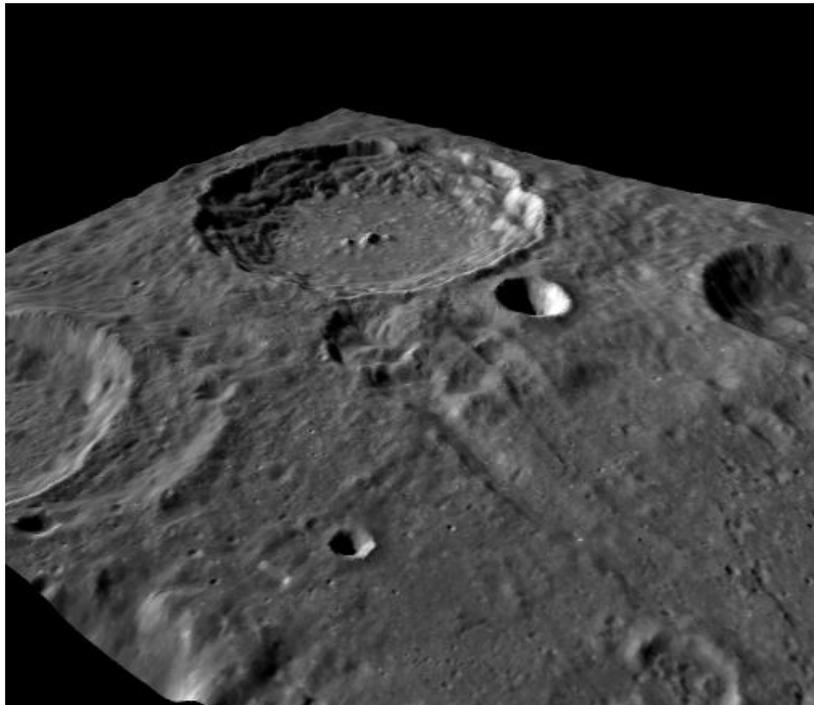
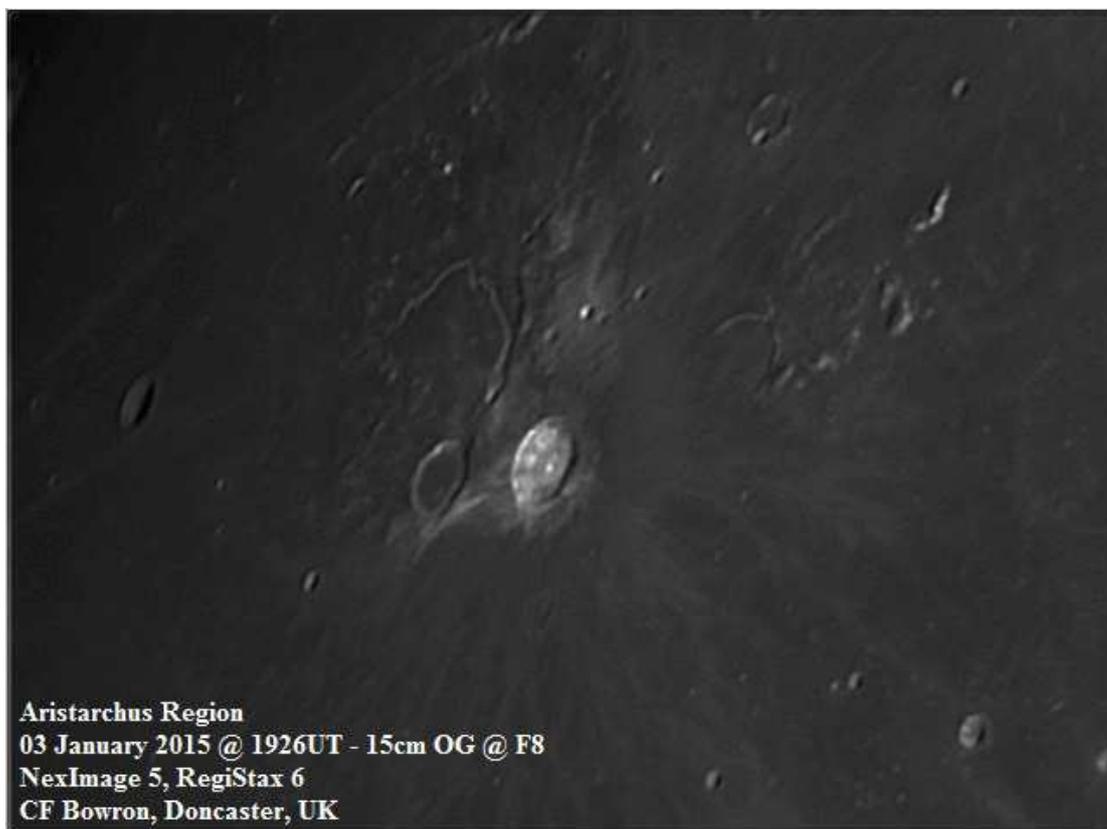
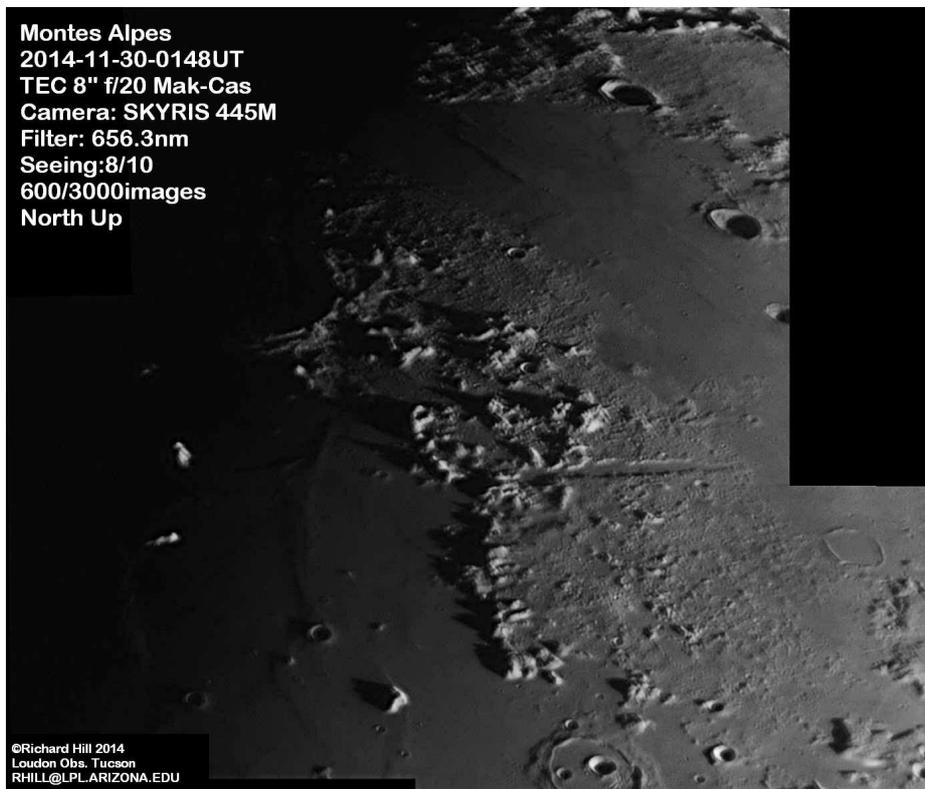
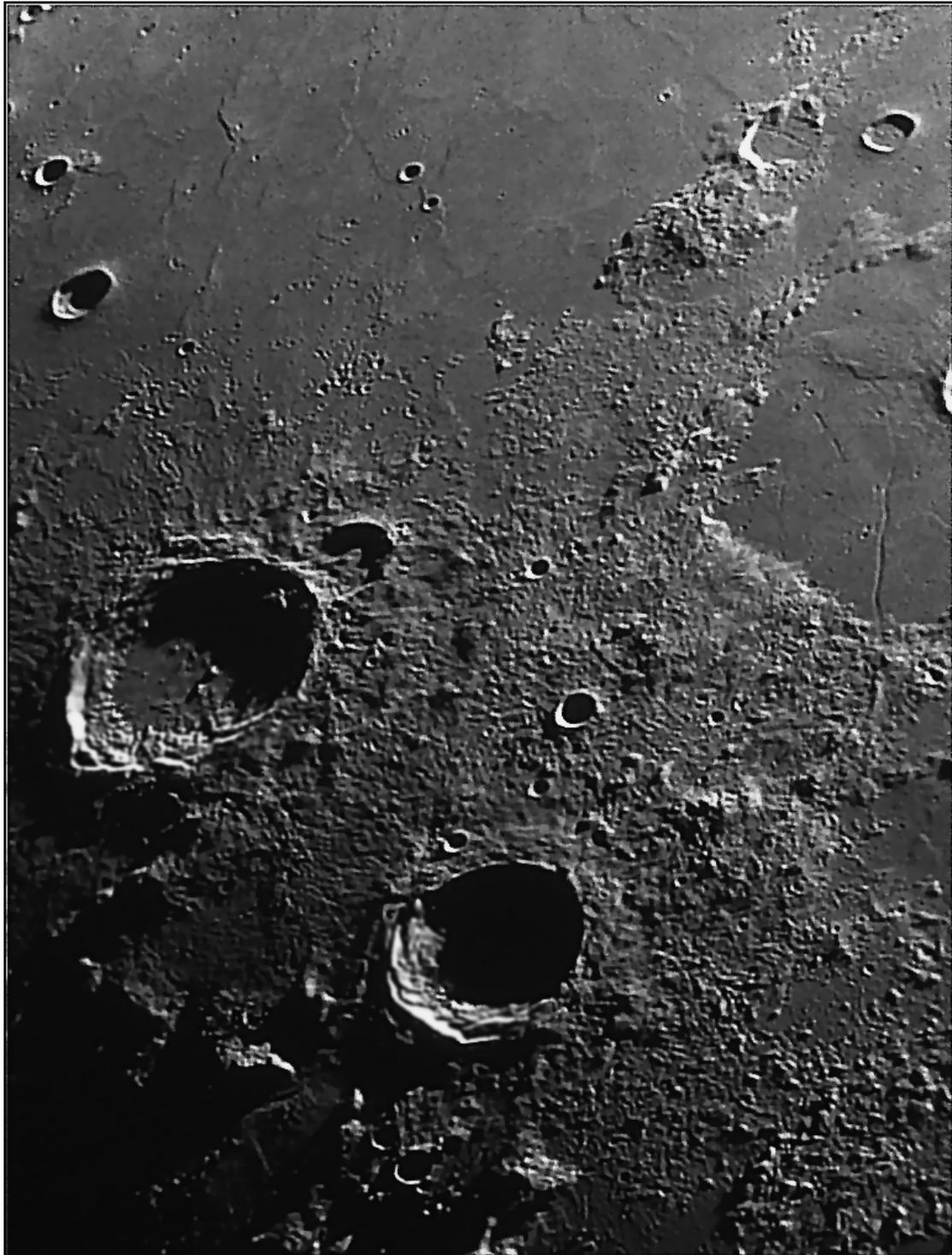


Figure 3; An extract from the Quickmap lunar mapping web site, generated using the 3D visualisation tool - a view along the valley, Burckhardt I, from the south eastern end of the valley towards the south eastern ramparts of Geminus.

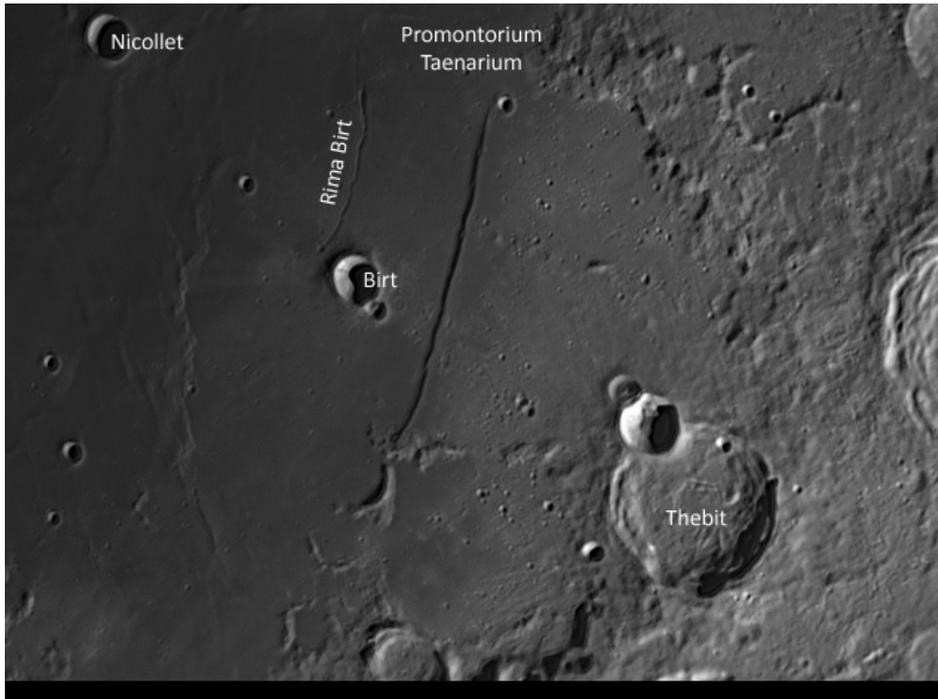
I leave it up to members to decide if these questions are worthy of further investigation. In the meantime if we can be drawn away from the more majestic formations, along the terminators southern section around this time, the area around Geminus and Burckhardt clearly presents fine hunting grounds for those of us who enjoy exploring the lesser known regions of the lunar surface.

A selection of mages submitted by members:
(with apologies to those work is not represented this month)





ARISTOTELES and EUDOXUS 18.10 U.T. 26 January 2015
10 inch F9.4 Long Focus Newtonian, AE Apo. Barlow working at F14
ZWO ASI 120MM mono video camera, Hoya 830nm IR filter
24ms exposure, 20 fps, Gain 55%, 150 frames out of 1000
Altitude 47 degrees, Seeing 3/10, Transparency 10/10 processed in Registax 5
Mike Brown, Huntington, York U.K. 53.59.12 North, 1.03.20 West



Rupes Recta - The Straight Wall
30 December 2014 2145Z
14" f8.8 Newtonian and ASI120MM

Yew Tree Observatory
Mark Radice



Vendelinus 9.11.14, 05.46 UT, S Col. 114.1°, seeing 4/10 transparency fair.

305mm Meade LX200 ACF, f 25, ZWO ASI 120MM camera, Baader IR pass filter

640 frames processed in Registax 6 and Paintshop Pro 8.

Dave Finnigan, Halesowen

Observations from the following observers were received in December: Paul Abel observed Earthshine (Leicester, UK - BAA), Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Copernicus, Grimaldi, Kepler, Mons Lahire, Oceanus Procellarum, Plato, Proclus, Promatorium Laplace, and Sinus Iridum. Maurice Collins (New Zealand, RASNZ) observed several features. Anthony Cook (Newtown & Mundesley, UK – BAA) imaged several features and observed Earthshine. Marie Cook (Mundesley, UK – BAA) observed Aristarchus and Plato. Chris Garrison (near Granada, Spain) imaged and visually observed Earthshine. Brian Halls (Lancing, UK - BAA) imaged the Cepheus A area. Collin Henshaw (Saudi Arabia – BAA) imaged Earthshine. George Ionas (New Zealand – NZ Astronomers) imaged several features. Martin Homan (Grand Rapids, MI, USA) imaged the whole lunar disk. Brent Russell (New Zealand – NZ Astronomers) imaged Mare Nectaris. David Scanlan (Romsey, UK - BAA) imaged Plato. Brendan Shaw (UK – BAA) imaged Alpetragius, Alphonsus, Censorinus, Eimmart, Linne, Pico B, Pitiscus, Plato, Posidonius, Proclus, Purbach, Ross D, Swift, Theophilus, and Tycho. He also observed Earthshine through binoculars. Franco Taccogna (Italy – UAI) imaged Plato. Ivor Waltom (Cranbrook - CADSAS) imaged Plato, and several other features.

News: Nothing much to report in the way of news over the last month. I am still working my way through Prof Arlin Crotts' book and have reached the start of the TLP chapter. Please do not regard my slow progress as reflecting upon the content of the book – it is just that the last few months have been rather hectic, with not much time available to sit down and read!

TLP Reports: Professor Crotts, of Columbia University (USA), alerted me to an observation of Aristarchus by Martin Homan from 2014 Dec 04 UT 03:14-03:15. This showed some colour forming on the exterior area of Aristarchus crater. The images were taken with a Nikon P520 camera operating with a 42x optical zoom! Although I cannot be 100% sure, I think that I can see examples of other colours elsewhere on the terminator area of the Moon – perhaps typical of what one expects with MPEG compressed images in the darker parts of images. But just in case, I would like to request that if anybody else was imaging the Moon at this time, that they please send any captured images to me so that I can check these out.

On 2014 Dec 05 UT 20:20-21:32 David Scanlan (LX90, 76x-222x, Seeing III-IV, transparency Good) noticed that the NE wall of Plato appeared contorted and had a dusky shading. This effect was not seen in other craters, nor could it be found in on-line images of Plato, or the Virtual Moon Atlas, that he consulted afterwards. The effect was present when checked with a blue (#82A) filter. But David comments that the blurred appearance effect was not visible when viewed with his 26mm eyepiece (x76), whereas all higher power eyepieces did reveal the effect. This effect was still present at 21:32. I put out a limited alert to some of our European observers, and here are the results: 20:57-20:58 UT - Ivor Walton imaged the crater in colour. 21:49-00:09 UT - Brendan Shaw imaged the crater periodically. 22:55-23:00 UT - Marie Cook did not see anything unusual, from 22:55-23:00UT, but her transparency conditions were terrible. 23:30-23:44, 23:47-00:02UT - I imaged the Moon (from Newtown, UK) with a 20cm Dobsonian, but observing conditions were appalling. Thierry Speth (France) was clouded out. UAI observers were clouded out too.

Now if this were a TLP, then the appearance should have changed over time. Fig 1. shows a sequence of images, one from Ivor Walton and the rest from Brendan Shaw. Although they show the NW wall to be less distinct than the others in appearance, there is no change, beyond the limits of image resolution and seeing, which were much worse earlier in the evening. I also found an appearance identical to

Ivor Walton's image in one of my own CCD images that I captured nearly 14 years earlier on 1990 Dec 31 UT 22:21. A follow up image, taken almost a day later by Franco Taccogna (UAI), on 2015 Dec 06 UT 20:02 also revealed the NE rim to be less distinct than elsewhere. The fact that David found the NE rim clearer at lower power possibly has something to do with image contrast being better – scenes often look sharper when they are nice and bright and contrasty. Therefore we can safely say that this was the normal appearance of the crater and that this was not a TLP. David Scanlan did the correct thing though in alerting us to this appearance, and he followed standard practice in changing eyepieces, and he did check other craters. Lastly this was good practice to test out our little used TLP alert system – most alerts these days are raised many hours, or days, after images have been taken because it takes a while for observers to process and study images. In a way visual observers have the edge over CCD astrophotographers, when detecting TLP. Though it should be said that CCD images are always better from an analytical point of view, if available!

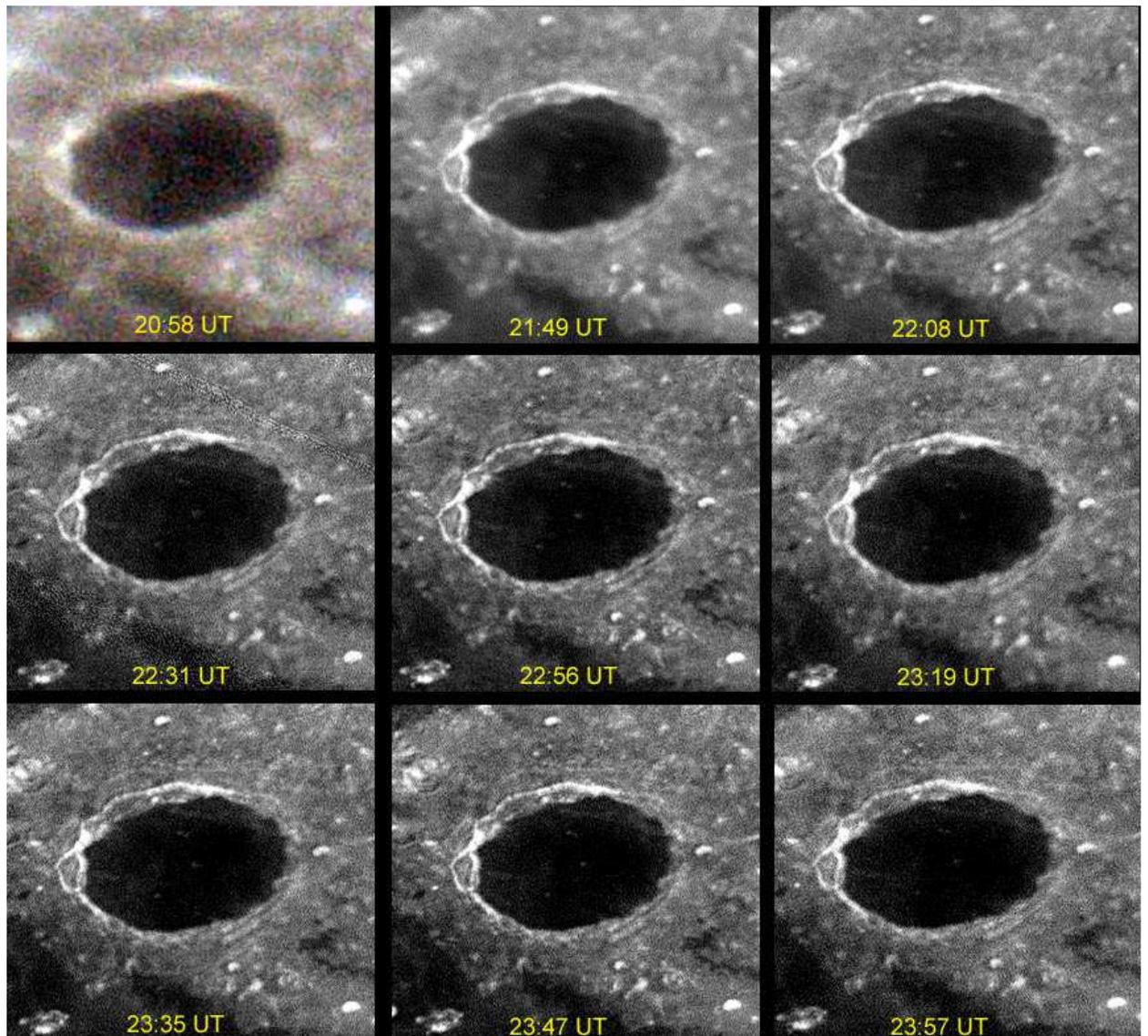


Figure 1. 2014 Dec 05 CCD images of Plato orientated with north towards the top. All images have been high pass filtered, and contrast stretched. The 20:58 UT image

is by Ivor Walton (CADSAS). The remaining images: 21:49-23:57UT, are by Brendan Shaw (BAA) and were taken through a green filter..

Routine Reports: Below is a selection of reports received for December that can help to re-assess five past TLP observations.

Aristarchus: On 2014 Dec 05 UT 18:45-18:50 visual observations by Marie Cook, using a 3.5" Questar telescope (seeing III, transparency poor), matched the illumination conditions, to within $\pm 0.5^\circ$ to the following past TLP:

Aristarchus 1959 Jan 23 UT 06:20 - Observer: Alter (Mt Wilson, CA, 60" reflector x700) "Brilliant blue in interior later turning white. Photos obtained. (MBMW has this entry twice for diff. dates because source gave UT date as 23rd.)" NASA catalog weight=5. NASA catalog ID = #712. ALPO/BAA weight=4.

Aristarchus-Herodotus 1964 Sep 20 UT 04:15-04:50 - Observers: Crowe & Cross (Whittier, CA, USA, 19" reflector x390) "Several red spots in area between the 2 craters. No change in phenom. so stopped observing" NASA catalog weight=5. NASA catalog ID #849. ALPO/BAA weight=3.

On 1965 Sep 09 at UT 13:20 Presson observed an orange-red strip on the floor of Aristarchus. Cameron says that this was confirmed later by Bartlett? The Cameron 1978 catalog ID=892 and weight=2. The ALPO/BAA weight=2.

On 1979 Oct 04 at UT 21:05-23:40 P.W. Foley (Kent, UK, 12" reflector, x360, seeing=II) detected colour in Aristarchus (and also in Bullialdus - there was a TLP alert at this time for Bullialdus, but nowhere else on the Moon. Aristarchus had a CED brightness value of 3.8 at 21:05 (though at this time no colour) and 3.4 at 23:40 and the floor was now slate blue/gray in colour. Other features remained constant in brightness. The Cameron 2006 catalog ID=72 and the weight=0. The ALPO/BAA weight=1.

Near Aristarchus 1788 Apr 19 UT 20:00? Observed by Schroter (Lilienthal, Germany) NASA Catalog Event #44, NASA Weight=4. Event described as: "Small area very brilliant & other bright spots". No additional references given. ALPO/BAA weight=1.

Marie saw no red spots in the area between Herodotus and Aristarchus, and no sign of any atmospheric spectral dispersion either. She saw no sign of blue in Aristarchus. For now, and in view of the observing conditions, it is probably best to leave the weights of the above TLP as they are

Plato: On 2014 Dec 05 UT 20:20-00:09 visual observations by David Scanlan (BAA), and CCD imagery by Ivor Walton (CADSAS – colour imagery) and Brendan Shaw (BAA – monochrome imagery) – see Fig 1, were at the same illumination to the following two TLP:

Plato 1938 Feb 14 UT 00:25 Observed by Fox (Newark, England, 6.5" reflector, x240) "Prominent gold-brown spot on E. wall with yellow glow without definite boundary, spreading over floor." NASA catalog weight=3. NASA catalog ID #431. ALPO/BAA weight=3.

Plato 2013 Jan 25 UT 19:05-19:15 R.Braga (Milan, Italy, 115mm refractor, x267, seeing III, transparency average) observed that Plato in general was normal in appearance, but the east rim was showing a remarkable golden (yellow-golden) hue. This was a repeat illumination observation for a W.E. Fox TLP observation from 1938 Feb 14. The observer was wondering whether they were in some way biased after reading the original report description - so uncertain over this being a TLP. In view of uncertainty ALPO/BAA weight=1.

It is interesting to note that with these 1938 and 2005 observations, that neither observer comments about the NE wall being less distinct, but perhaps their seeing and image contrast were sufficient on these occasions? Ivor Walton's image shows no sign of any yellow or golden colour on the NE rim. Therefore the weight of these observations will remain at 3 and 1 respectively.

Grimaldi: On 2014 Dec 16 UT 10:05-10:20 Jay Albert (ALPO) using a Nexstar 6" SCT at x214 (Seeing 7-8/10 and transparency 4th magnitude) observed this crater under the same illumination, to within +/-0.5° to a TLP seen by Jorgensen in 1971:

Grimaldi 1971 Jun 18 UT 02:12-02:31 Observed by Jorgensen (Denmark, 36" refractor, 60, 200x) "Dark reddish spot in SW part of crater. At 60x. Became clearer at 200x & seen in midwest also. At 0331h phenom. clearest in west, while S. region had faded. Air turb. & dawn ended obs. at 0331h. Seen best in yellow filter, well in red, invis. in green & blue." NASA catalog weight=3. NASA catalog ID #1298. ALPO/BAA weight=3.

Jay comments that the crater was fully sunlit and the floor was dark, with an especially dark patch on the SW floor. That dark patch probably relates to the "dark reddish spot" in the TLP description from 1971, however, he saw no red, or any other color. Also, unlike the TLP description, there was little or no atmospheric turbulence during his observation. Jay wonders whether the turbulence experienced by Jorgensen, was the cause of the color he saw – however after examining the report on p70 of the BAA Lunar Section Circular from 1971, I see that the observer notes that the seeing started off good, but worsened. Now the altitude of the Moon at the time of the 1971 TLP was between 20° and 23° above the horizon which is starting to get a bit on the low side. Also although a large telescope of 36" diameter was used, it was a refractor and these do suffer from chromatic aberration. Nevertheless Jorgensen utilized use a yellow filter, which is a standard way of minimizing such effects. For now I will leave this TLP at a weight of 3, though it would be useful if I could have found additional write ups of this report, and leant for example if the observer checked for spectral dispersion on other lunar features?

Aristarchus: On 2014 Dec 24 UT the topocentric libration of the Moon, and the illumination (phase) were exactly the same as they were for a Sir William Herschel TLP from 1783 May 04 UT ~20:00. Herschel observed several occurrences of what he referred to as volcanoes (which of course they weren't) and these have become the stuff of legends. The following description, from the Cameron catalog, is perhaps not one of the most famous of his observations, but nonetheless we have effectively a time machine tool to go back and see what the Moon should have looked like on that night:

William Herschel and Mrs Lind saw a red, 4th magnitude brightness, less than 3 arc sec in diameter. Herschel believed that he was seeing a lunar volcano in eruption. NASA catalog weight=5, catalog ID=26. ALPO/BAA weight=3.



Figure 2 Earthshine images orientated with north towards the top right. Both images have been sharpened, and contrast stretched. **(Left)** 2014 Dec 24 UT 16:41 by Nigel Henshaw. **(Right)** 2014 Dec 24 UT 17:59 by Christopher Garrison.

A number of observations were made under these repeat conditions, and when you read them you get the impression of how local observing conditions, and instruments being used can affect the appearance of Earthshine. I will list the reports, in sequence, according to their UT, and discuss them later:

16:19 UT Tony Cook started to attempt to observe Earthshine, looking through a 24mm eyepiece on a Questar 3.5" telescope at Mundesley. But twilight was too bright to see anything. Seeing IV.

16:21 UT Tony Cook noticed that Earthshine was just starting to become visible, but no sign or recognizable features on the lunar disk.

16:32 UT Tony Cook commented that the Earthshine visibility was noticeably better.

16:34 UT Tony Cook could now see that the SW limb was bright, but the Moon was setting behind a tree, and so the telescope had to be relocated.

16:38-16:48 UT Tony Cook resumed observations. At 16:43 Aristarchus was at last located, but only just! Grimaldi was visible. Image quality was improved by switching to a 15mm eyepiece. Aristarchus was definitely not as bright as a star to the SW of the Moon, and it was clear that Aristarchus was not especially bright. The Moon was finally blocked by trees at 16:48 UT.

16:41 UT Nigel Henshaw managed to snap the image in Fig 2 (Left). This has been enhanced, sharpened and contrast stretched, But I think you can clearly see that Aristarchus is not exceptionally bright. If anything, Copernicus is the brighter and more noticeable of the usual three Earthshine features: Aristarchus, Kepler and Copernicus.

17:20 UT Paul Abel made a visual observation under and commented "*The Earthshine tonight is quite fantastic- quite possibly the strongest I've ever seen. I observed the Moon at 67x on my 203mm Newtonian reflector with some interesting results*"

17:26 UT Paul Abel (at 67x), examined the lunar surface and noted that all of the lunar 'seas' on the unilluminated side were visible. Aristarchus was clearly visible, although it's light was somewhat 'ghostly' in appearance.

17:28 UT Paul Abel commented that the effect seemed to be even more pronounced. Aristarchus appeared to have a dull/soft yellowish glow - it was now even visible in the 10x50 finder and was the most obvious feature in Earthshine. He had never seen the crater so bright on the dark side of the Moon, but added that Tycho was probably slightly brighter, but the colour in Aristarchus was to his eyes more prominent.

17:30 UT Paul Abel ceased observing because the Moon was now below the observatory wall.

17:59 UT Christopher Garrison (Near Granada, Spain) imaged Earthshine but was hindered by sky conditions and the optics that he was using did not result in quite the same resolution that Collin Henshaw obtained (See Fig 2 Right).

~18:00 UT Brendan Shaw (Southern England) could not acquire the Moon with his telescope, so had to resort to binoculars. He reported that he could not see any craters whatsoever in Earthshine.

Before discussing these modern day observations, it is perhaps worth investigating, in a little more detail, the accounts of what Herschel saw in 1783, rather than relying upon the description in italics above, from the Cameron catalog. Corliss states: "*William Herschel saw what he believed was a lunar volcano in eruption*". Some digging around on the Internet came up with the following additional descriptions:

Firstly here is a 2nd hand account published in 1881 in: Sir William Herschel: His Life and Works, by Edward S. Holden - Chapter III – Life at Datchet, Clay Hall, and Slough; 1782-1822, p69.....

In 1787 Herschel wrote his paper "On three Volcanoes in the Moon," which he had observed in April of that year. In this he mentions previous observations of the same sort. I do not remember that the following account of these has ever been put on record in English. Baron von Zach writes from London to Bode:[1]

"Probably you have heard also of the volcanoes in the moon, which Herschel has observed. ... I will give you an account of it as I heard it from his own lips. Dr. Lind, a worthy physician in Windsor, who has made himself known through his two journeys in China, and who is a friend of our Herschel's, was with his wife one evening on a visit to Herschel in Datchet [1783, May 4]. On this evening there was to be an occultation of a star at the moon's dark limb. This was observed by Herschel and Doctor Lind. Mrs. Lind wished also to see what was occurring, and placed herself at a telescope and watched attentively.

"Scarcely had the star disappeared before Mrs. Lind thought she saw it again, and exclaimed that the star had gone in front of, and not behind the moon. This provoked a short astronomical lecture on the question, but still she would not credit it, because she saw differently. Finally Herschel stepped to the telescope, and in fact he saw a bright point on the dark disc of the moon, which he followed attentively. It gradually became fainter and finally vanished."

An alternative 2nd hand account can be found in the Royal Society Transactions from 1912.....

“.... Though Herschel in his short account of what he saw in 1787 promised to communicate his observation of 1783 to the Royal Society, he never did so, and it will perhaps be well to give here his own account of it, from a letter to his Portuguese acquaintance, Magellan, who had asked for it:- “

“May 4, 1783. I perceived in the dark part of the moon a luminous spot. It had the appearance of a red star of about the 4th magnitude. It was situated in the place of Havelii Mons Porphyrites, the instrument with which I saw it was a 10 feet Newtonian Reflector of 9” aperture. Dr Lind’s lady who looked in the telescope immediately saw it, tho’ no person had mentioned it, and compared it to a star. Dr Lind tried to see it in an achromatic of 3 ½ feet of Dolland’s but could not perceive it, tho’ he easily saw it in my reflector. However, I could also tho’ with difficulty perceive it in the refractor.”

The Royal Society version of events mentions an occultation, and a simulation using the World Wide Telescope software, came up with the following for the Herschel’s Slough location in the UK:

19:29 UT Sunset
19:53 UT Occultation of the star near the Moon’s equator
20:00 UT Moon at 26° altitude above the horizon.
20:08 UT Civil twilight ends
20:18 UT Earthshine should start to become visible (rule of thumb 10 min after end of civil twilight).
20:36 UT HR1750 to N of Moon and mag 7.4
20:56 UT Occultation on SW limb of Moon
22:48 UT Bright occultation at lunar equator
23:23 UT Moonset

So depending upon what their local horizon was like, the events reported could have taken place at around 19:53, 20:56 or 22:48 UT. It is disturbing though that the two accounts differ. The first has a mention of a star like point that fades over time – the Cameron catalog even quotes a diameter of < 3” or < 6 km on the lunar surface. Now the second account is of a red 4th magnitude equivalent star like point that was not well visible in a smaller aperture instrument. It gives a name to the location: “Mons Porphyrites”, or a name that Hevelius gave to what we refer to now as Aristarchus crater. This clearly identifies the crater – but we are left with a puzzle, the first account states the area affected was < 6 km across, but Aristarchus is 40 km in diameter. So what are we to make of this? Was this the central peak area? There is no way to know? Did Herschel’s memory of this event merge with recollections of other events he had seen in Earthshine, and that is where the “red” effect came from? Was the fade caused by the Moon getting closer to the horizon and more light being absorbed, making the feature fade from view, or was it simply that the cloud cover of the Earth changed, thus affecting the contrast of the lunar night side visible from Earth and making Aristarchus and all less bright features fade from view? The long focal length telescopes of that era were not small f/No ratio scopes, which we would traditionally use for looking at wide area regions of the sky, so they were not really suitable for Earthshine observing. So in practice, only the brightest features would normally show up in Earthshine, and light levels would probably be too faint to activate the colour sensitive cones in the eye. If Aristarchus were bright enough, and

the Moon was low enough, leading to reddening of light during passage through our atmosphere, then this might activate the cone colour receptors in our eyes, and make it look red, where as all other features might be too dim to be seen in colour? Fig 2 suggests though that Aristarchus was not especially bright at this libration.

Then we have the visual accounts of the 2014 repeat illumination/libration views from myself, Paul Abel and Brendan Shaw. Both Brendan, and myself, were using relatively small aperture instruments, and did not see much in Earthshine. Paul had a larger instrument, probably better sky conditions, and did see Aristarchus had some colour: yellow, but not red. He says that Aristarchus was quite bright, but that Tycho was brighter. I wonder if image scale has something to do with it. Although Fig 2 is illustrative, the image scale is not sufficient to resolve inside Aristarchus, and that is maybe where Herschel's and Paul Abel's observations differ to others. It is difficult to come to any conclusion over the different 2nd hand historical accounts, but at the same time, Herschel was quite adamant over what he had seen and had clearly described to other astronomers that it was not just ordinary Earthshine he was seeing – though he did quieten down talking about his volcanoes on the night side in later years. The fact that the effect described was possibly seen by three observers, would normally lead to a weight of 4 or 5, but the current weight of 3 for one experienced observer seems about right in view of the discrepancies in the 2nd hand reports. Anyway we should actively seek to observe the Earthshine again in future if any of his other sightings repeat in illumination and topocentric libration, as there is much to learn, especially from his better reported first hand accounts.

Cepheus A: On 2014 Dec27 Brian Halls and myself (BAA) observed Cepheus A close to the same illumination, and topcentric libration to a rather interesting TLP report from Maurice Collins from the year 2000:

Cepheus A 2000 Oct 04 UT 08:15-08:50 Observer: Maurice Collins (New Zealand, 90cm ETX, seeing 3) - observer noted that crater was extremely bright - wasn't sure if this was normal and at the time rated it as the brightest (contrasty?) crater that he had ever seen on the Moon. ALPO/BAA weight=2.

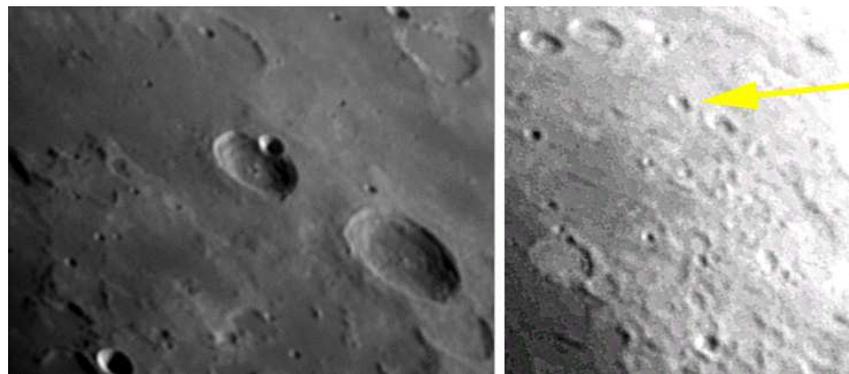


Figure 3. Cepheus A craterlet perched on the NW rim of Cepheus. Images taken on 2014 Dec 27 and orientated with north towards the top. **(Left)** Image by Brian Halls (BAA) from 16:38UT. **(Right)** Much lower resolution, and under very poor seeing conditions, wider angle context image by Tony Cook (BAA) from 21:36UT.

I remember this report arriving in my email inbox in 2000, and it has always fascinated me looking out for repeat illumination observations (all of which did not

show this effect), and then finally after a long wait we now have a detailed image from Brian Halls, just before the $\pm 1^\circ$ repeat illumination/libration window of 18:49-22:41, and a much lower resolution image of my own - affected by poor seeing in the latter half of this window. As you can clearly see in both the high and low resolution views in Fig 3, Cepheus A does not look like the brightest crater, nor extremely bright either. The weight of the original observation was 2, so I sent the images off to Maurice Collins for his opinion. He checked his original report and sent me a transcription from his notebook: "*Noticed a bright hump on crater wall of Censorinus (mispelt and crossed out) Cepheus (a crater not far from Atlas and Hercules). It was shining very brightly in the sun light. Couldn't tell if it was a crater on the wall or what (yes). Will have to investigate. As far as eyepieces are concerned, the 4mm works best.*"

Commenting on his report, from some 14 years later, with hindsight Maurice then goes on to add: "*(1) The seeing would have been poor. I rate it as 3, but it could have been worse at times due to Cumulonimbus (CB) clouds around that I noted. So the air being unstable has the effect of temporarily magnifying bright points of light on the Moon to flash like stars very brightly as I have noticed since, with that telescope especially. (2). The date and time are correct as the age of the Moon matches, and that is the time I would have been out observing around 8:15-8:50pm. (3). I was using a small telescope, the ETX-90 at high magnification, not a good combination! (4). The crater may have been mis-identified as I crossed out Censorinus (misspelled in my notes) and put in Cepheus after looking it up inside and noted it was a crater by Atlas and Hercules. I am not familiar with Chevalier A (can't find it on my charts even now) but perhaps it could have been? (5). In conclusion, since your testing over the years has shown Cepheus to be normal looking at similar lighting,....I tend to think it was just the poor seeing, perhaps some other crater, high magnification and a small telescope, and novice (at that time) observer. - So maybe it can be removed from the list or lowered in weight as there is not enough hard data to support it being unusual? A pity, but it is just too long ago and we can't get any repeat lightings that show anything so I think my report is unreliable.*"

I will follow Maurice's line of thoughts and reduce the weight from 2 to 1, but think that it is still worth keeping on the list, but perhaps only for repeat illumination/libration. My reasoning is as follows – if it was an extremely bright point source, poor seeing, and or a small telescope, would blur this, making it fainter, or making it flash in turbulence. Maurice did not report any flashing aspect to this spot, only that it was very bright. The fact that no brilliant point of light can be seen in Brian's high resolution image, suggests the atmospheric blurring explanation might not be tenable. Maurice's mis-identification theory maybe possible though, as you can see in my rather blurry context image (Fig 3 – Right), there are plenty of other bright areas, but not as bright as the eastern limb. So this just leaves two alternatives, either a mis-identification, or something happened on the Moon. The former is the more preferable theory, but it would be helpful to have some additional high resolution images at closer repeat illumination/librations to Maurice's 2000 report.

Alphonsus: On 2014 Dec 29 at 08:32 George Ionas (NZ Astronomers) imaged the Alphonsus area within ± 0.5 of the following TLP:

On 1993 Mar 30 at UT19:35-21:15 J. Knott (England, UK, 8.5" reflector, x180 and x216, seeing=II and Transparency=good) observed at 19:35 the central

peak of Alphonsus appeared to be extra bright although was normal later, however the observer suspects that this was a contrast related and was not confident to send out a TLP alert. The Cameron 2006 catalog ID=458a and 458b and weights=0. The ALPO/BAA weight=1.

George's image (see Fig 4) is clearly before the emergence of the central peak, and the predictions are produced to within $\pm 0.5^\circ$ of the same illumination as the original TLP. So it is a useful context image and provides a time stamp, namely that the central peak is not expected to appear until the colongitude exceeds 2.97° . The weight of the 1993 report will remain at 1 for now, at least until we can obtain a sequence of slightly later colongitude images.



Figure 4. Ptolemaeus and Alphonsus with north towards the top as imaged by George Ionas (NZ Astronomers) on 2014 Dec 29 UT 06:32. Image extracted from a larger supplied image and contrast stretched. Although not related to the material in this section of the newsletter, please note the interesting finger print like texture at this sun angle e.g. between Gylden and Hipparchus, and other fine scale parallel ridge/groove like structures. Such structures can be seen elsewhere on the Moon under shallow lighting conditions e.g. near the outskirts of Theophilus and in the highland areas north and south of Vallis Alpes.

Suggested Features to observe in February-March: For those of you without access to the Internet (in the UK), below is a list of repeat conditions for when a feature will exhibit the same illumination and libration as was seen for a historical TLP observation from the past. By re-observing and submitting your observations, we will get a clear understanding of what the feature ought to have looked like at the time. Only this way can we really fully analyze past TLP reports. N.B. Warning – some of these may be at extremely low altitudes, but have been included because the chances of getting both repeat illumination and repeat libration are so very rare, that we must make the most of any opportunity that arises.

2015-Feb-01 UT 04:21-05:07 Ill=92% Picard – observed by Moore on 1948 Aug 16 – *Can you see any cloud like patches east of Picard? Please supply images, sketches or descriptions of these.*

2015-Feb-01 UT 04:36-05:07 Ill=92% Alphonsus – observed by ASTRONET on 1966 Aug 28 – *Monitor how dark the dark patches on the floor of the crater are, over time.*

2015-Feb-02/03 UT 22:23-00:18 Ill=96% Aristarchus-Prinz – observed by Darling on 1979 Dec 02 – *Are there any bright craterlets, between these two craters, that under the right atmospheric seeing conditions could scintillate in brightness?*

2015-Feb-02 UT 03:54-05:46 Ill=97% Briggs – observed by Grego on 2010 Apr 27 – *Please image or sketch this crater and the surrounds, especially any lineaments or wrinkle ridges visible.*

2015-Feb-03 UT 00:46-04:38 Ill=99% Plato observed by Fox on 1938 Mar 14 – *Can you see visually, or image, any colour on the E. wall?*

2015-Feb-03 UT 03:34-06:21 Ill=99% Aristarchus – observed by Bartlett on 1950 Jun 29 – *Any colour visible on E-SE rim area?*

2015-Feb-03 UT 17:37-19:11 Ill=100% Plato – observed by Kelsey on 1966 Aug 1 – *How sharp is the wall from the S to the NNE? How many craterlets can you count on the floor of the crater?*

2015-Feb-04 UT 18:39-20:54 Ill=99% Vallis Schroteri – observed by Pickering on 1891 Sep 18 – *Please image or sketch.*

2015-Feb-06 UT 06:56-07:40 Ill=95% Aristarchus – observed by Bartlett on 1964 Oct 23 – *Can you see any texture on the south floor area, and is there any colour here or elsewhere?*

2015-Feb-09 UT 01:51-04:48 Ill=78% Unknown – observed by Von Speissen on 1888 Nov 23 – *Please image the Moon – The location of this TLP is unknown, but we are particularly interested in anything that could be described as a “triangular patch of light” at this phase.*

2015-Feb-26/27 UT 22:49-02:16 Ill=62% Mons Pico – observed by Schneller on 1961 Jan 25 – *Please describe, sketch or image the central peak area, especially looking for colour and sharpness of detail.*

2015-Feb-27 UT 02:04-02:16 Ill=64% Mare Frigorus – observed by Pratt on 1871 Nov 20 – *Any fuzziness visible in this region, especially around the NE(?) shore of Plato?*

2015-Feb-27 UT 17:37-19:41 Ill=70% Mare Crisium – observed by Westfall on 1991 Jun 21 – *This was not a TLP, but any images of the bright spot on the NW shoreline would be welcome.*

2015-Feb-27 UT 20:13-23:57 Ill=71% Pico B – observed by Sartory on 1966 Sep 23 – *Any colour visible here?*

2015-Feb-27/28 UT 21:35-00:24 Ill=71% **Earthshine** – observed by Kolovos on 1992 Jun 9 – *Please image the terminator region in colour, over exposing slightly to see if you can detect detail in adjacent Earthshine.*

2015-Feb-28 UT 17:39-18:28 Ill=79% **Plato** – observed by Bartlett on 1968 Oct 1 – *How sharp is the detail on the walls of this crater? How much detail (count craterlets) can you see on the floor?*

2015-Feb-28/Mar-01 UT 20:46-23:37 Ill=80% **Tycho** – observed by Braga on 1998 Feb 6 – *How dark is the floor, especially towards the NW as viewed in red and blue light?*

2015-Mar-01 UT 17:41-19:31 Ill=86% **Archimedes** – observed by Pasternak on 1973 Jun 11 – *Any colour seen? Please use a refractor if you have one.*

2015-Mar-01 UT 17:41-20:43 Ill=86% **Gassendi** – observed by Cook on 1979 Dec 29 – *Any colour seen?*

2015-Mar-01 UT 17:41-18:20 Ill=86% **Plato** – observed by Crick on 1979 Dec 29 – *Is there a coloured spot on the NW wall? Can you see much detail on the northern half of the floor?*

2015-Mar-01 UT 19:18-22:05 Ill=87% **Alphonsus** – observed by Harris on 1966 Aug 27 – *Can you see any variations in the dark halo patches, especially the W one?*

2015-Mar-01 UT 19:18-22:05 Ill=87% **Ross D** – observed by Harris on 1966 Aug 27 – *How would you describe the E wall of this crater? Is there a bright area E of this crater?*

2015-Mar-01/02 UT 22:14-03:42 Ill=87% **Gassendi** – observed by Moore on 1966 Sep 25 – *Any colour visible?*

2015-Mar-02 UT 17:53-19:21 Ill=92% **Gassendi** – observed by Baumeister on 1973 Jun 12 – *Is there a bright point at the NNE slope of the central peak?*

2015-Mar-02 UT 19:04-21:48 Ill=92% **Picard** – observed by Moore on 1948 Aug 16 – *Can you see some cloud like (featureless) patches E. or Picard?*

2015-Mar-02 UT 19:20-20:43 Ill=93% **Alphonsus** – observed by ASTRONET on 1966 Aug 28 – *Do any of the dark halo patches appear to change in brightness?*

2015-Mar-02 UT 20:33-22:45 Ill=93% **Herodotus** – observed by Lena on 2002 Sep 18 – *Can you see 2 pseudo-peak like hills? One on the S floor, and one to the NW of the centre?*

2015-Mar-02 UT 22:50-01:19 Ill=93% **Aristarchus** – observed by Ventzke on 1972 Apr 25 – *Any brightening or colour on the inner N wall? Refractors welcome?*

2015-Mar-22 UT 18:19-20:45 Ill=8% **Promontorium Agarum** – observed by Jackson on 1882 May 20 – *Please image or sketch.*

2015-Mar-27 UT 18:27-21:18 Ill=55% **Torricelli** – observed by Cook on 2003 Nov 01 – *Please image or sketch this area, in particular noting the amount of shadow present in this shallow crater in comparison to other nearby craters.*

2015-Mar-28 UT 18:29-20:41 Ill=64% **Aristarchus** – observed by Emmett on 1824 Jul 04 – *Can you see any star-like points on the rim of this crater in Earthshine?*

2015-Mar-28 UT 18:29-18:59 Ill=64% **Mare Frigoris** – observed by Pratt on 1871 Nov 20 – *Please image or sketch, in particular can you see a haze like effect around the Mare Frigoris shoreline with Plato?*

2015-Mar-29 UT 18:31-20:04 Ill=73% **Proclus** – observed by Blair on 1980 Jan 26 – *Is there a bright spot on the north rim, and how does it appear through different coloured filters if observing visually – else please provide a colour image.*

For repeat illumination (only) TLP predictions for the coming month, these can be found on the following web site: <http://users.aber.ac.uk/atc/tlp/tlp.htm>. For members who do not have access to the Internet, please drop me a line and I will post predictions to you. If you would like to join the TLP telephone alert team, please let me know your phone No. and how late you wish to be contacted. If in the unlikely event you see a TLP, firstly read the TLP checklist on <http://users.aber.ac.uk/atc/alpo/ltp.htm>, and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter TLP alerts can be accessed on <http://twitter.com/lunarnaut>.

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We regret that we are unable this month to provide the usual lunation, libration and occultation data.

Material for the March Circular should be submitted in the normal way to both Peter Grego and the Director.

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