

# The Strolling Astronomer

Volume 4, Number 12

December 1, 1950

ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS



Mailing Address

The Strolling Astronomer  
167 W. Lucero Street  
Las Cruces, New Mexico

SUBSCRIPTION RATES

1 Year.....\$3.00  
6 Months..... 1.50  
1 Issue..... .25

S T A F F

-Editor-

Walter H. Haas  
167 W. Lucero Street  
Las Cruces, New Mexico

-Counsellor-

Dr. Lincoln LaPaz, Head of Mathematics Department  
Director, Institute of Meteoritics  
University of New Mexico  
Albuquerque, New Mexico

-Acting Venus Recorder-

Thomas R. Cave, Jr.  
265 Roswell Avenue  
Long Beach 3, California

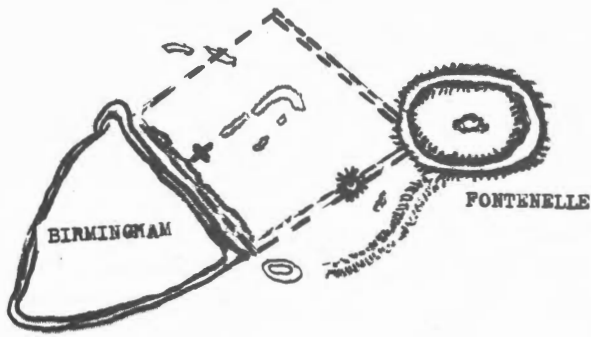
-Acting Jupiter Recorder-

Edwin E. Hare  
1621 Payne Avenue  
Owensboro, Kentucky

-Acting Mercury Recorder-

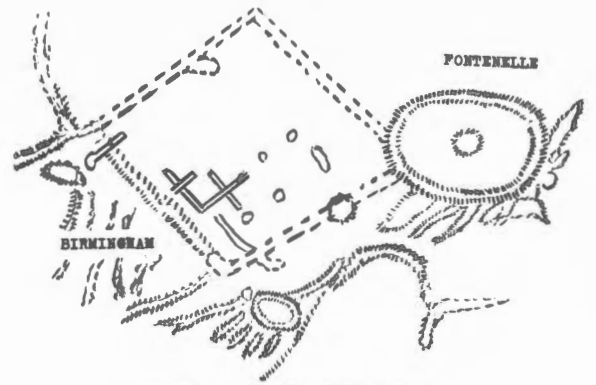
Donald O'Toole  
114 Claremont Avenue  
Vallejo, California

NOTICE: In order to facilitate the reproduction of drawings in future issues, readers are requested to exaggerate contrasts on drawings submitted. Extremely faint marks cannot be reproduced. Outlines of planetary discs should be made dark and distinct. It is not feasible to reproduce drawings made in colors. Following these precepts will permit better reproductions.



AFTER BEER AND MAEDLER - MAPPA SELENOGRAPHICA

Fig. 1 Maedler's Square and Vicinity as Mapped by Beer and Maedler.



"MAEDLER'S SQUARE" -AFTER NEISON

Fig. 2. Maedler's Square and vicinity as mapped by Neison.

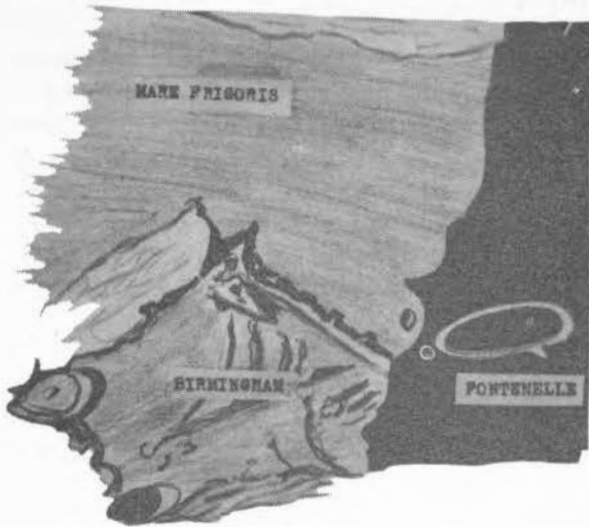


Fig. 3. Drawing of Maedler's Square and Vicinity by J.C. Bartlett, Jr., June 5, 1949 at 2h 37<sup>m</sup>, U.T. 3.5-in. refl. at 100X. Colongitude 149°7

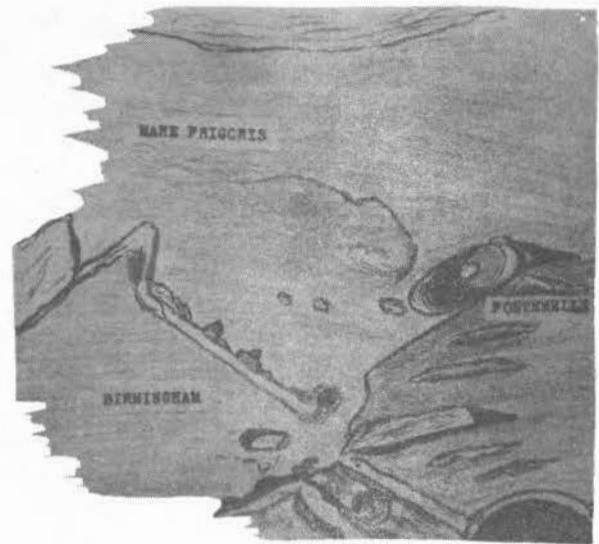


Fig. 4 Drawing of Maedler's Square and Vicinity by J. C. Bartlett, Jr. June 6, 1949, at 2h 25<sup>m</sup>, U.T. 3-5-in. refl. at 100X. Colongitude 269°8

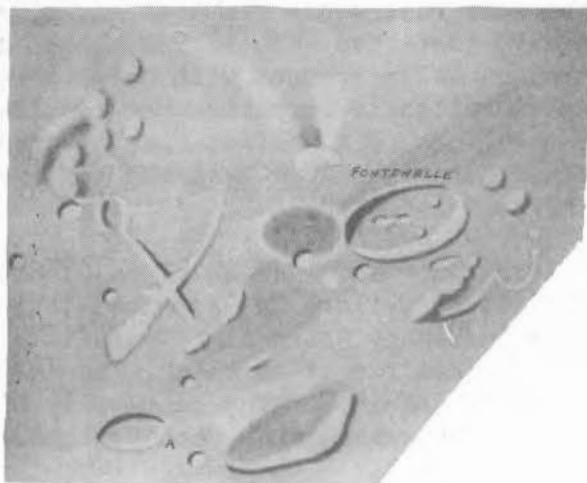


Fig. 5. Drawing of Maedler's Square and Vicinity by E. J. Reese. June 9, 1949, at 3h 15<sup>m</sup>, U.T. 6-inch refl. at 240X. Colongitude 63°9

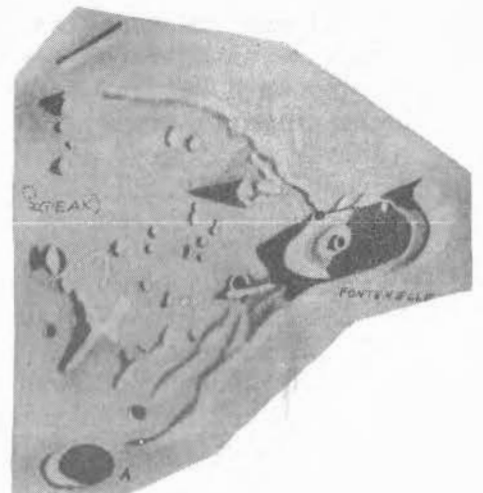


Fig. 6. Drawing of Maedler's Square and Vicinity by E. J. Reese, June 19, 1949, at 9h, U.T. 6-inch refl. at 240X. Colongitude 188°9

## SEASON'S GREETINGS

The editor and staff of The Strolling Astronomer take this opportunity to wish all our readers and friends a very Merry Christmas and a Happy and Prosperous New Year.

As a special feature of this issue we present an article by Dr. James C. Bartlett, Jr., written in his usual lively and entertaining style, about evidence for a major topographical change in a lunar formation. Our contributor's address is 300 North Eutaw Street, Baltimore 1, Maryland.

### MAEDLER'S SQUARE

A Study in Lunar Paradox

by James C. Bartlett, Jr.

Among the more scientific and less romantic of the 19th century observers Beer and Maedler hold high place. Certainly they were not given to the gaudy flights of fancy which so grieved the critics of Gruithusien; and where the latter saw lunar highways cutting through lunar forests, the former saw nothing but the stereotyped record of long-since stilled natural activities - and certainly nothing so outré as a lunar roads system. Indeed the appearance, in 1837, of Der Mond was a monumental testimony to the belief of its authors that as a world the moon was finished; and they entertained grave doubts if even in its heyday it had been a world anything like the earth.

We are therefore not quite prepared for the somewhat florid description in the same great work of a singular lunar formation discovered by Maedler and strangely left unnamed by him but to which the writer shall hereinafter refer as Maedler's Square.

This unusual object, located on the north shore of the Mare Frigoris between Fontenelle and Birmingham, so caught the fancy of the eminent Selenographers that Maedler was even led to speculate that the Square looked like an artificial construction. From Gruithusien such an announcement would have been a foregone conclusion; but coming from Maedler, it was as surprising as would be the rediscovery of Vespertilliohomo<sup>1</sup> by a modern observatory.

It must be admitted that the Square had some remarkable features. It was hardly a conventional formation and certainly justified its description by Maedler as a kind of fortress, with long straight walls crowned with objects resembling battlements. On the floor of this exceptional formation Maedler also discovered a very anomalous structure in the form of a perfect Latin cross (Figure 1 on pg. 1). According to the surprised authors of Der Mond the fortress-like ramparts "throw the observer into the highest astonishment".

Other observers seem to have been no less surprised. Webb often looked for the Latin cross but was never able to find it, a failure he ascribed to its position and quoted Beer and Maedler as saying that many years might pass before it could be seen to advantage. "I have often looked for it in vain", he tells us, but adds that "Birmingham has been more successful".<sup>2</sup> The regularity and massiveness of the battlements seem also to have impressed the good Prebendary

of Hereford Cathedral. Like Maedler he found them "so regular that it is scarcely possible to imagine them natural....." but concluded that the size (he gives the walls as 64 miles long, 250 to 3,200 feet high, and averaging a mile thick) indicated a natural formation.

Webb was not the only English observers to examine and speculate upon the nature of the Square. Neison, in his monumental work on the moon, devoted considerable space to a close description of its wonders and gave a detailed map which showed the fortress-like walls and on the floor not one cross but two. Like Beer and Maedler he was much struck by the singular character of the object. "It is", Neison tells us, "a very peculiar formation, from its regularity and perfect form one of those strange objects which seem as if they were the work of Selenites....". His description is quite specific: "This formation consists of a perfect square, enclosed by long straight walls about 65 miles in length and 1 in breadth and from 250 to 3000 feet in height." He then goes on to more minute details. "The highest side is the northwest, where Maedler estimates the walls as being 40° steep (nearer 20°), with two projecting peaks at both ends, and between them a row of smaller peaks like towers on a wall...and before the chief wall is a very regular cross....Within the quadrangle are two rows of low peaks and beside the cross south is a smaller one not mentioned by Maedler." He further adds that "The southeast wall is a very regular uniform straight wall of considerable steepness".<sup>3</sup> (Note Figure 2 from Neison's map of the moon.)

Neison, like Maedler, depicted this S.E. wall as remarkably straight and artificial looking and apparently butting directly against the S.W. glaciis of Fontenelle. The opposite N.E. wall of the Square similarly begins against the N.W. glaciis of Fontenelle so that the point at which the two walls would have joined would have lain within the floor of Fontenelle. Perhaps this unusual circumstance further suggested the appearance of artificiality, for it was difficult to understand how a disturbance capable of creating a crater the size of Fontenelle could have escaped demolishing these high, straight walls for a considerable distance on either side. On the other hand perhaps it was as difficult to conceive how such walls could have been thrown up naturally in such a position without, conversely, affecting Fontenelle.

Whatever the true nature of this somewhat amazing formation it is important for the moment to notice that three credible observers agree on its salient features. Also, it is clear that Maedler's Square must be listed among the most interesting of lunar objects.

But perhaps the most interesting fact is that it is no longer there.

Is this surprising? Then consider the following:

Apparently it was not there in 1874 either, and certainly it was not there in 1878 - notwithstanding the fact that at least one book published after this date referred to it.<sup>4</sup> Yet no one seems to have missed it until the night of June 5, 1949, when the writer accidentally discovered its absence.

The history of this accidental revelation is a curious one. In the summer of 1949, in the course of some correspondence with Mr. Elmer J. Reese, member of the Association of Lunar and Planetary Observers, the writer chanced to mention this formation as a good example of the more anomalous objects on the lunar surface, his information having been based upon eye-witness accounts in the literature. After posting the letter it occurred to the writer that he could not recall ever having actually seen such a formation, notwithstanding occasional

surveys of the Mare Frigoris in its immediate neighborhood. This seemed rather strange. Accordingly a night was selected which would favorably show the battlemented walls, the crosses on the floor, and all the other singular appointments of this most singular of lunar walled spaces.

So it was that on the evening of June 5, 1949, at 2<sup>h</sup> 37<sup>m</sup>, U.T., colongitude 1497, the writer examined this region minutely with 100X on a 3.5-inch reflector (Figure 3). As the terminator passed just west of Fontenelle, which was seen as an oval ring of light on the dark side, it is obvious that the famous walls of the Square - and especially the steep S.E. wall - should have been well seen in high relief. The night was a very fine one and the examination occupied a leisurely 1<sup>h</sup> 10<sup>m</sup> of time. When it was concluded the writer was somewhat staggered. One fact emerged with the impact of a hydrogen bomb: Notwithstanding the specific measurements, descriptions, and maps of it, no such formation existed between Birmingham and Fontenelle.

Another letter was immediately posted to Mr. Reese announcing the discovery, and asking silence until the writer had time further to evaluate the situation. It was also urged upon Mr. Reese to explore this whole region carefully with his 6-inch reflector. Mr. Reese, though naturally stirred, kept the secret faithfully and sent the writer two beautiful drawings of this area dated June 9 and June 19, 1949, at colongitudes 6399 and 18899 respectively - both with his 6-inch reflector at 240X (Figures 5 and 6). Allowing for the greater detail visible to the larger aperture, these confirmed what the writer had found with his smaller instrument. In the ensuing discussion, Mr. Reese agreed that this area did not conform in any way to its advertisements but cautioned that acceptance of this fact would very probably be refused on the grounds that maps of the pre-photographic area were not reliable.

At Baltimore, observations were continued through colongitude 6397.

At colongitude 2698 an excellent view was obtained of Fontenelle and its surroundings (Figure 4). An intact N.W. wall of Maedler's Square was seen, forming the present S.E. boundary of Birmingham. In general appearance it conformed well to the description of the N. W. wall of the Square as given by Maedler and Neison. Running N. W. from Fontenelle another straight wall was found; but if this represents the N.E. wall of the Square, it is presently in ruins. It does not connect with the existing N. W. wall but opens out at its northwestern extremity into a shallow valley. It seems therefore to have been partially destroyed. Very careful attention was devoted to the site of the S.E. wall, the steepness and regularity of which was commented upon by Neison; but examination in red, green, and yellow light as well as by direct vision failed to reveal any trace of it. Nor was there anything to show that such a wall had ever existed here. Whatever may be the explanation, at the present time there exists as the S.E. boundary of the Square nothing but a long, low, sinuous pressure ridge which begins near Fontenelle and runs S.W. into the open Mare. Its many curves insure that it would intersect at various points any straight S.E. wall running in the same direction. Moreover, near its western extremity, it curves back towards the north. It conforms in no particular to the description of the S.E. wall and obviously cannot be the same object. Far from being steep, it is very low with gentle slopes on the north side; and far from being straight, it is serpentine. It is connected by a thin spur to the south wall of Fontenelle, considerably to the east of the point of intersection with the missing S.E. wall as depicted by Maedler and Neison.

Some measurements were instructive. Allowing 22 miles as the diameter of Fontenelle<sup>5</sup> (Goodacre says "about 22 miles"), a straight S.W. line from Fontenelle projected over the eastern and western extremities of this ridge, comes to only 55 miles in length as measured on a section of the splendid Lick Photographic Atlas. The same line, measured on Goodacre's map, gives 53.4 miles which is in good agreement. Neison made the straight S.E. wall 65 miles long which is appreciably longer. On the other hand, if the curves in the ridge were straightened out, the total length would greatly exceed 65 miles. Both Maedler and Neison insist upon the great regularity of the walls, averaging no more than 1 mile thick. In its widest places this ridge is at least 11 miles thick; and far from being of very uniform breadth, it is just the opposite.

According to Maedler and Neison, the S.E. wall ran, straight and true, S.W. across the Mare to its juncture with the S.W. wall of the Square. The present ridge, with many fluctuations, runs generally S.W. to a point about midway between Fontenelle and the Mountainous ruins jutting into the Mare from Birmingham. From that point it then curves upon itself and runs Northwest to its terminus. The outer curves are more marked than the inner. If this is the object which Maedler and Neison saw and mapped as a straight, thin wall "of considerable steepness", then we must agree with Fauth that the older maps-including Schmidt's are not reliable in any detail.<sup>6</sup> But in that case what becomes of Selenology? Fortunately we are spared such a sweeping indictment; for Schmidt's map in particular, as we shall see later, is exceedingly accurate for this region.

It must be remembered that we do not depend upon maps alone but, especially in the case of Maedler's Square, equally upon detailed written descriptions - which also do not conform in any way to the present appearance of this pressure ridge. The writer therefore urges that this ridge is not the same object which Maedler and Neison saw as a very regular, straight wall and conversely that if any such wall ever existed, it is not there now. Neither Maedler nor Neison shows this serpentine ridge in his maps (Figures 1 and 2), nor do they mention it. Yet it lies athwart the line of their S.E. wall. How could they have missed it? If a S.E. wall was thought so remarkable in its features, what would have been thought of a ridge which intersected it at several points? One would suppose that this relationship alone would have seemed even more remarkable.

The present appearance of the Square presents us with another fact of significance. All of the observers of the original Square were especially impressed with the unnatural appearance of the walls and the general aspect of artificiality of the Square. This fact alone would forcibly suggest that the formation they saw is not the formation which exists today; for there is certainly nothing unnatural-looking about this area at the present time, nothing to excite speculations about the architectural works of Selenites. The area is, in fact, commonplace and in every respect similar to dozens of other ruins along the north shore of the Mare Frigoris.

We now come to another important object, a large, low mountain mass which forms part of the N.E. end of the pressure ridge. Reese observed this feature at colongitude 18899 and found it "prominent" (Figure 6). It certainly throws a conspicuous shadow at this time, and even at col. 2698 is easily seen with 3.5 inches of aperture (Figure 4). This object, like the ridge of which it is a part, is not shown in the maps of Maedler and Neison. Yet it is apparent that this mass, again like the ridge, must have intersected any S.E. wall running S.W. from Fontenelle. A straight wall running through a mountain would seem to be a remarkable feature - but we hear nothing of it. The cartographers saw the wall (Which we cannot find) but missed the intersecting mountain (which is very easy)!

The occurrence of this mass in a plane of intersection with the missing S.E. wall is at least suggestive. If it is in the nature of a stock, it is clear that in updoming the surface it would have completely destroyed any wall athwart its point of emergence or even near to it. If the rise of the stock were associated with extensive faulting and severe moonquakes, we would also have some explanation of the pressure ridge associated with it - unless this assumed pressure ridge really represents the debris of the missing wall, thrown down and distributed horizontally over the surface in curves corresponding to the seismic waves. If this is the true explanation for the disappearance of the S.E. wall, we have indisputable evidence of major lunar seismic movements within the past hundred years.

Let us now see if from the ruins of the Square we can gather any evidence bearing on the credibility of Maedler and Neison in relation to its appearance as they described it. According to both authorities the N.W. wall was the highest and contained many peaks and towers resembling battlements. Such a wall does exist today as the S. E. rampart of Birmingham and appears to be the only remaining wall of the Square still intact. A N.E. wall is described and figured as connecting with the N.W. wall. Portions of such a wall exist today, but it no longer connects with the N.W. wall. Maedler saw the S.W. wall as very low and hardly more than a white streak. Webb concurs, and Neison interprets it as a low ridge. At col. 40<sup>o</sup>.4 the writer found just such a streak running S.E. out into the Mare to a point where it must have intersected any S.E. wall running S.W. from Fontenelle. From what remains of Maedler's Square, we thus have excellent evidence that the earlier descriptions were faithful for three walls out of four. The question which immediately arises is this: would all have erred similarly in describing the fourth wall? But the fourth wall does not now exist.

Such is the problem of Maedler's Square. Its solution requires that we explain satisfactorily the following facts:

1. Maedler and Neison describe a complete Square of artificial-looking construction between Fontenelle and Birmingham. Only an incomplete and ruinous-looking Square exists there today, and it is in no way remarkable.
2. Maedler and Neison map and describe a straight, very uniform, and regular S.E. wall of their Square. No such wall exists today.
3. The present S.E. boundary of the Square is formed by a low, very irregular, serpentine ridge. This object would have intersected the S.E. wall of Neison and Maedler. It does not appear on their maps.
4. At the N.E. end of the ridge is a conspicuous mountain mass which must also have intersected a S.E. wall. This object does not appear on the maps of Maedler and Neison.

Both the problem and its associated facts would seem clear enough; but having in mind the acrimonious reaction to the reported change in Linne and realizing that an announcement so novel would probably meet with even greater resistance in the case of a major formation, the writer has sought evidence of a more conclusive kind than can be obtained from either texts or maps alone.

Fortunately the discovery and subsequent exploration of the Square fall partly within the photographic era. Hence there seemed to be reason to hope that some early photographs of the moon might actually show the Square intact.



For reasons which will appear presently, it seemed probable that the Square, if existing as described in 1837 (date of Der Mond), had already disappeared by 1874. The critical search, therefore, was conveniently narrowed to the period between 1840 (date of Draper's first moon picture) and 1874. The quest seemed favored by the following circumstances:

In 1840 J. W. Draper made the first photograph of the moon. His success immediately stimulated contemporaries so that between 1850 and 1857 particularly the Bonds, Secchi, Bertch, Arnauld, Phillips, Hartnup, Crookes, De la Rue, Fry, and Huggins were all taking lunar photos. In 1858 Rutherford began his notable series of lunar portraits perhaps unexcelled in America; and his work alone brings us up to the limiting date for the apparent change. It will be noticed that the first period, 1840-1857, lay within the period of Maedler's discovery of the Square and of Webb's frequent searches for the Latin cross. Furthermore, quarter-moon views were most favored in the early period so that the region of the Square must have been covered many times at colongitudes when shadows from the walls would have revealed them plainly.

Quite a number of photographs of this early period is said to be on file at Princeton. These pictures have not been examined by the writer, and so it is impossible to say whether they will supply the missing link in the chain of evidence - namely, a photographic view of the Square intact showing especially the missing S.E. wall. However, to judge from early material which the writer has examined it is to be feared, alas, that they will not.

Examination of such early pictures as the writer could find soon developed the disturbing fact that these primitives were scarcely more conclusive than the relevant maps. Of course, in respect of dimensions and positions, they are infinitely more accurate; but when one seeks to confirm obscure details of the surface there is little to choose between them and the maps - and perhaps the latter are more to be trusted. There are two principal reasons for this unfortunate state of affairs. In the first place the early photos were on too small a scale. In the second place, they were taken by the slow wet plate process. A long exposure was thereby necessitated, but even this was not long enough to register the dark maria as clearly as the bright highlands. Consequently the maria came out much darker in relation to the highlands than they do on modern fast plates, and as a result shadows on their surfaces are mostly lost. With the slow wet plate method it was not possible to continue the exposure long enough for details on the maria to register clearly, for then the bright highlands would have been overexposed.

Two early volumes in the writer's library contained two quarter-moon views by Draper, circa 1856.<sup>7-8</sup> In these the maria are black and near the terminator show practically no detail. The region of the Square is covered by them, but the Mare Frigoris is here so dark that north of Plato only some confused streaks are to be seen. Even Fontenelle cannot be made out with any certainty. Birmingham is only a jumble of unintelligible splotches. The still earlier Bond pictures, though they cover the very period in which the Square was being observed and commented upon, would appear to be no better - at least to judge from two recently published reproductions.<sup>9-10</sup> It seems probable that any other pictures of the period will be equally valueless; for what is needed is a quarter-moon view which will show especially the S.E. wall intact and in relief; and all such pictures will probably be found so dark at the terminator that the shadow of the wall-if existing-will be completely lost. In August, 1949, the writer's wife examined an original of one of the Draper photographs at the U.S.

Naval Observatory in Washington, where her researches were very kindly facilitated by Mr. Watts of the Observatory staff. Like its reproduction, the original was found to be so dark in the region of the Square that nothing could be made out. She did, however, perhaps make another and unrelated discovery at this time which subsequently may prove to be of some interest - but of that more at another date.

While in Washington, Mrs. Bartlett also called at the Library of Congress, where every assistance was likewise rendered, and there examined Schmidt's Charte Der Gebirge Des Mondes and the Kurze Erlauterung zu J. Schmidt's Mondcharte in 25 Sectionen, both dated 1878 and covering the observational years between 1840 and 1874. She made a copy of the appropriate section of the Mondcharte, which later proved to be of the very highest importance.

Meanwhile, in Baltimore, the writer had uncovered additional relevant photographic material, but unfortunately of a date posterior to the limiting date of the apparent change. This material did, however, enable him to set an unquestionably accurate upper limit.

In the second edition of Proctor's Moon, published in 1878, two excellent and very clear pictures by Rutherford are given.<sup>11</sup> They are not dated, unfortunately; but it is obvious that they were taken no later than 1878, which is the date of publication. Rutherford is known to have done most of his lunar work between 1864 and 1868, though he was still making an occasional picture as late as 1876 and possibly beyond. To judge from the quality of the photography, especially in relation to the tonal value of the maria, it is apparent that the photographs in Proctor's second edition of The Moon are late pictures, certainly not earlier than 1864 and probably much nearer to 1876. Both pictures are clear enough to withstand considerable magnification with a hand lens; and when they are so examined, it is apparent that the Square is not present. On the other hand the mountain mass west of Fontenelle and its associated ridge may be seen. In other words these Rutherford photos show the surface as it looks today.

We now return to the Mondcharte of Schmidt. The last observation upon which it was based is said to have been made in 1874. We should like very much to know the precise year in which the section containing Maedler's Square was mapped, for it is apparent from the Mondcharte that Schmidt saw the region as it is today. His map shows the mountain mass and the curving ridge, both missing from Beer and Maedler's map and from the map of Neison. We are thus able to say very definitely that the change-if there was one-took place at some time prior to 1874.

We now may be sure at least of the following facts:

1. In 1837 Beer and Maedler brought out their Mond with its great Mappa Selenographica. In the text is described, and in the map is figured, a geometrical Square bounded everywhere save on the S.W. by massive high, ramparted walls and situated on the Mare Frigoris between Fontenelle and Birmingham. Among the objects on the floor is mentioned a curious and very regular Latin cross close to the foot of the N.W. wall (Figure 1).

2. From 1847 to 1856 the Rev. T. W. Webb was making those observations upon which was based his famous Celestial Objects for Common Telescopes, first published in 1859. In those years he repeatedly observed the Square in his un-

successful search for the Latin cross, and mentions the "rampart-like boundaries" and their astonishing regularity which made it "scarcely possible to imagine them natural".

3. By 1874 at the very latest no such Square existed, as shown by Schmidt. His map (and the later Rutherford supporting photos) show an incomplete Square in which the N.E. wall is ruinous and a S.E. wall does not exist. In place of the S.E. wall is the familiar, sinuous ridge of today and the associated mountain mass. There is nothing resembling a Latin cross anywhere on the floor.

To sum up: The evidence for the existence of Maedler's Square rests in the first instance upon the text and map of its discoverer, Maedler himself, supported by the observations of Webb and by the text and map of Neison. Unless we are to suppose that their several descriptions referred to a non-existing object, we must allow that they saw a formation which does not exist today and which had ceased to exist by 1874 - and perhaps earlier.

And this brings us to what is perhaps the greatest paradox of all.

Der Mond, containing Maedler's description of the Square which he had discovered, appeared in 1837. In 1840, just three years later, Schmidt began his memorable work at Athens which was to culminate in the famous Mondcharte of 25 sections. Sometime between 1840 and 1874 he mapped the region of Maedler's Square - and we know that he compared his results to those of Beer and Maedler. Such a comparison led him in 1866 to make his famous announcement about Linné, which led in turn to a protracted and stormy controversy the echoes of which have not yet died away.

Mark this well. He detected a difference in appearance in what is one of the most insignificant craters on the moon and believed that this difference was positive evidence for a real change. When he came to survey the region of Maedler's Square, he saw it as it is today - which is not the way it is shown or described by Beer and Maedler. Here were differences of fundamental significance involving a formation of over 4,000 square miles in area - yet we hear nothing of them.

Here is perhaps an even greater mystery. Neison, who devoted so much space to describing the Square in detail and whose map shows it essentially as it appeared in the Mappa Selenographica, brought out The Moon in 1876, which is two years after the last observations of Schmidt. In the area in which Schmidt saw nothing of the kind, Neison describes, measures, and maps a perfect Square bounded by intact and artificial-looking walls. Yet this glaring inconsistency seems to have escaped notice, notwithstanding that the two works were contemporaneous.

Two years after Neison, Proctor brought out the second edition of his Moon; which contained among other things the Rutherford photographs showing the surface as it is today and by a particularly fine bit of irony containing a map by Webb, reduced from Beer and Maedler, showing the Square intact. Proctor tells us that "in the year 1869 I carefully examined every object included in Webb's map...",<sup>12</sup> but he does not seem to have noticed that the region of the Square in no way conformed to the figure given in the Mappa Selenographica. A comparison between the two photographs in his work and the reproduction of the Mappa would have shown as much, though of course he would have had no special reason to make

such a comparison. For this particular mystery, however, there is at least a plausible explanation. Beer and Maedler followed a system of nomenclature by which they gave names or designations only to formations which met certain requirements. Maedler's Square was not among this class, but rather belonged to that class of enclosed spaces which they customarily left unnamed. Webb, speaking of his reduction of the Mappa Selenographica, remarked that he had made a selection of the objects represented in the original, which selection included "every object distinguished by an independent name".<sup>13</sup> To these objects he affixed key numbers in his version of the Mappa. Both Birmingham and Fontenelle are thus numbered; but the Square, though drawn in, is left unnumbered because it was not one of those objects to which Beer and Maedler had given "an independent name". If we understand Proctor correctly, it seems most probable that "every object" in Webb's map means every numbered object. However, both Birmingham and Fontenelle were among the numbered objects; and it is difficult to understand how Proctor could have failed to see the singular formation between them. We must suppose that he did see it, however it may have appeared to him. Yet perhaps while seeing it he paid no particular attention to it because it was not among the class of objects he was checking, and so he noticed nothing amiss.

There is an alternate explanation. Proctor made his survey in 1869. If at that time the Square still existed intact his silence is natural. But if this is the correct explanation for his apparent failure to notice a fundamental alteration in the Square, then it becomes clear that Schmidt must have mapped this region after 1869 - for his map shows it as it is today. We are thus furnished a possible lower limit in time for the date of the apparent change.

But the strangest case of all would still seem to be that of Neison. We know indisputably that if ever it existed, Maedler's Square had already been partially destroyed by the time Neison's map and text came out in 1876. We do not know precisely in which year Neison examined and mapped the Square, which he saw complete and intact; and we may therefore allow that when his book was published he did not realize that The Moon contained a chart and a detailed description of an object which at that time had no existence. But we must ask: did he never again examine this region? That is possible, of course; but it does not seem very probable. Two forcible reasons suggest otherwise, quite apart from Neison's abiding interest in lunar observation. The contemporary appearance of Schmidt's Mondcharte must have stimulated anew the comparisons which every new map called forth. Moreover, the great Linné controversy was still being argued. Yet it seems clear that if Neison did examine the Square, subsequently to the appearance of Schmidt's map, he must have noticed at once not only that it did not conform to the map of Beer and Maedler but that it did not conform in any way to his own. In view of the uproar over Linné, a similar announcement regarding a major formation must, it would seem, have engendered an even greater controversy. Nor is it likely that such a report, coming at such a time and from an observer of Neison's stature, would have been quietly filed away to be forgotten - yet either that happened or Neison made no such report.

Not having examined the material in the files of the British Astronomical Association, covering the period under discussion, the writer is unable to state positively that no report was ever made to that Association of a change in Maedler's Square; but if so, it seems to have made no impression - which is inexplicable. One thing is certain. No suggestion or hint of an apparent change here ever got into the general literature. Practically every general text has something to say about Linné; and in many subject texts, e.g. Goodacre's Moon, the matter is discussed at length with sometimes lists of dozens of alleged or suspected changes. Fauth, who denied all change, gave quite a number of apparent changes which he used, paradoxically, to illustrate his thesis that no

change had ever taken place within historic times. Most of these alleged changes, as in the case of Linné, had to do with the apparent disappearances of minute craters, or the apparently new appearances of similar ones, or some subtle difference in minor detail. In Maedler's Square, on the other hand, we have an apparent change of overwhelming magnitude: the apparently complete disappearance of one section of a wall 65 miles long, the apparent subsequent new appearance of a low serpentine ridge in its place, a fundamental alteration in the appearance of a surviving wall, and the apparent disappearance of certain objects on the floor, to say nothing of the apparent appearance of a whole mountain - in short, fundamental alterations in a formation of over 4,000 square miles in area. Yet we hear nothing of it!

Bear in mind that it was not then thought a waste of time to spend considerable effort in comparing very minute differences in the various maps, both with each other and with the moon itself; e.g., in the horde of tiny crater pits west of Copernicus or in the existence of a delicate cleft in the Mare Humorum. Bear this in mind, I say; and it will be realized that the failure to report a major change in Maedler's Square becomes one of the greatest lunar paradoxes of all.

The writer regrets being unable to bring this matter to a decisive conclusion. It would have been gratifying to be able to report photographic evidence supporting Maedler's and Neison's maps and descriptions; but for reasons given above such has not been found, nor for those same reasons is it ever likely to be found. Yet, unless we are prepared to invalidate the work of eminent observers upon whom our entire record of the moon prior to photography depends, we cannot deny that Maedler and Neison must have seen and measured a large formation which no longer exists save as ruins and fragments.

One thing is absolutely established.

A major lunar formation, discovered, measured, and mapped within comparatively recent times, no longer conforms to its original description and that by very considerable differences; nor has it conformed since at least 1874. And the last is perhaps the greatest paradox in the mystery of Maedler's Square.

Finally, it may be asked whether the writer attempted to find evidence of the Square in maps prior to the Mappa Selenographica. Since Maedler is credited with having discovered the Square, it does not seem likely that it will be found in earlier maps. Still, a search was attempted with the materials available; these, unfortunately, did not include the sections by Lohrmann nor the charts and drawings of Schroeter. However, the maps of Tobias Mayer (1775), Riccioli (1651), and Hevelius (1647) were consulted with indifferent success. These early maps suffer from a common defect in regard to the limb regions; detail is largely wanting, and often the regions are either blank or simply shaded, testimony no doubt to the lack of defining power of the crude instruments employed when applied to oblique areas.

However, the great Selenographia of Hevelius proved more fruitful. This remarkable work contains not only full moon views, but a wonderful series of engraved phase views showing the moon at all ages from new to full. In one of these<sup>14</sup> a large, angular indentation is shown in the north shore of the Mare Frigoris in the approximate position of the Square. It resembles a right angle set on edge, but only the two sides of the angle are given and then merely as boundaries; there is no suggestion of walls. The whole of the strip of hyperboreal highland north of Frigoris to the north limb is devoid of any detail, being merely shaded.

The boundaries of this angular intrusion of the Mare Frigoris would correspond to the N.W. and N.E. walls of Maedler's Square, and we therefore have presumptive evidence that some sort of Square existed there in Hevelius' day. Neither the S.W. nor the S.E. walls are shown, it is true; but their absence in this case means little as the Mare is also devoid of detail. Apparently the primitive telescope of Hevelius was sufficient only to show the existence of an angular intrusion of Frigoris into the south shore of the northern highlands but incompetent to demonstrate any detail. It would certainly seem, however, that Hevelius partly discovered Maedler's Square.

The fact that it remained to Maedler, in the first third of the 19th century, to "discover" the complete formation probably means nothing more than an increase in defining power. The major problem would still seem to be to account for the fact that the present appearance of this object, which was also its appearance in or near 1874, is largely inconsistent with the description and delineation of Maedler and Neison.

#### References

1. Proctor, R.A.; Myths and Marvels of Astronomy; 1903; Longmans, Green and Co.; London; p. 258.
2. Webb, T.W.; Celestial Objects for Common Telescopes; 1917; Longmans, Green and Co., London; p. 130.
3. Neison, Edmund; The Moon; 1876; Longmans, Green and Co., London; p. 252.
4. Denning, W.F.; Telescopic Work for Starlight Evenings; 1891; Taylor and Francis, London; p. 134.
5. Goodacre, Walter; The Moon; 1931; Pardy and Son, Bournemouth; p. 241.
6. Fauth, Philipp; The Moon in Modern Astronomy; 1909; Van Nostrand, N.Y.; Chapter 6.
7. Newcomb, Simon; Popular Astronomy; 1878; Harper and Brothers, N.Y.; p. 319.
8. Warren, H.W.; Recreations in Astronomy; 1886; Chataqua Press, N.Y.; p. 154.
9. Campbell, Leon; The Great Refractor; in Sky and Telescope for June, 1947; Sky Publishing Corporation, Cambridge, Mass.; p. 4.
10. Hoffleit, Dorrit; The First Star Photograph; in Sky and Telescope for July, 1950; Sky Publishing Corporation, Cambridge, Mass.; p. 209.
11. Proctor, R.A.; The Moon; 1878; D. Appleton and Co., N.Y.; frontispiece and facing p. 157.
12. Ibid.; p. 147
13. Ibid.; p. 147
14. In Caput xx of the Selenographia; De Lunar Crescentis Phasi; Anno Christi, 1643; p. 344.

Postscript by Editor. A little after submitting the article above Dr. Bartlett communicated the following Addendum in a personal letter to the editor:

"On June 7, 1949, at col. 40°4 I found a very suggestive appearance. The ruined N.E. wall, the intact N.W. wall, and the S.W. streak were all visible. Connecting with the S.W. streak I found a narrow dusky streak which occupied the line of the missing S.E. wall. This streak, however, did not reach to Fontenelle, being intercepted midway by the presently existing, curving ridge.

"This streak is difficult and is nothing but a surface marking. Yet it is obvious that if it marks the course of the missing S.E. wall, the Square would be complete exactly as described by Maedler, Webb, and Neison. Of course, it is not in any sense a wall and thus answers in no particular - save position - to their descriptions of a steep wall in this place. The occurrence of such a streak, however, would lend support to the probability that a wall did exist at one time. By col. 51°4 it had become invisible. There was no trace of it at col. 26°8, when even a slight elevation would have cast a shadow.

"If this streak does represent the trace as it were of a former S.E. wall, then I am correct in my hypothesis that such a wall would have been intercepted by the present pressure ridge. It seems absolutely impossible that Maedler, Neison, et al, should have mistaken a mere streak for a mile-thick wall, said to have been notably steep, or that they should not have seen the ridge and mountain mass which intercept it. Their maps and descriptions, however, are quite specific on this point. The S.E. wall connected with Fontenelle - as this streak does not, thanks to the intervening ridge and mountain - and neither mountain nor ridge is shown or mentioned."

Dr. Bartlett has excellently presented the evidence for a change in Maedler's Square. At the same time the investigation should be continued. Those of our members who have access to pre-1880 maps and descriptions of this portion of the moon should certainly make a careful study of them. Most important of all, however, would be the careful scrutiny of the originals of early photographs of the moon, in particular those said to be on file at Princeton. No effort should be spared here.

As the evidence now stands, Dr. Bartlett has presented us with a clear alternative. We must either suppose that the Square has changed since it was observed by Maedler, Webb, and Neison; or we must suppose that all these observers made extremely gross errors in drawing and describing this portion of the moon and that they all made remarkably similar errors. To the editor at least, it appears more likely that Maedler's Square has changed.

#### LUNAR PROFILE MAP

by John E. Lankford

At the present time the U. S. Naval Observatory at Washington is engaged in a project which is of special interest to members of the A.L.P.O. By the most modern methods of photography and photo-electric measuring devices they are making a profile map of the libratory regions of the moon. The work is under the supervision of C. B. Watts, Director of the six-inch Transit Division and principal astronomer on the Astronomical Council. It may seem strange that the project was undertaken by a man whose principal work is in the field of meridian astronomy. Here is the explanation. The last survey of this type was made in

1910 by Dr. Hayn, a German astronomer. He took measurements of 10,000 points along the moon's circumference. Mr. Watts uses these corrections for his observation of the moon with the six-inch transit. With the new corrections, Mr. Watts will be able to arrive at the moon's position more accurately. Besides its benefits to the meridian astronomer the map will be a boon to the observer of occultations. It will afford corrections for the point where the star is occulted with respect to the mean edge of the moon.

The 500 photographs that are being measured come from the Yale station in South Africa, the Lowell Observatory, and the Naval Observatory.

For those interested in optics, I shall describe the telescope used by the Naval Observatory to photograph the moon. In 1870, the observatory purchased several five-inch photographic lenses from the Clarks of Boston. These lenses had a focal length of 40 feet and were used by the U.S. Transit of Venus Commission for photographing the transits of 1874 and 1882. When Watts started the new program, he used one of these lenses for his moon camera. The lens is mounted at one end of a 40 ft. tube along with a coelostat to reflect the moon's light. After being reflected from the coelostat, the light enters the lens and passes down the 40 ft. double walled tube. To keep the tube cool, Watts uses two fans at each end to draw out the warm air. The plate holder is geared to follow the diurnal motion of the earth. This is a novel concept because for the most part our telescopes are driven, not the plate. The exposure is about 3 seconds on Eastman O plate.

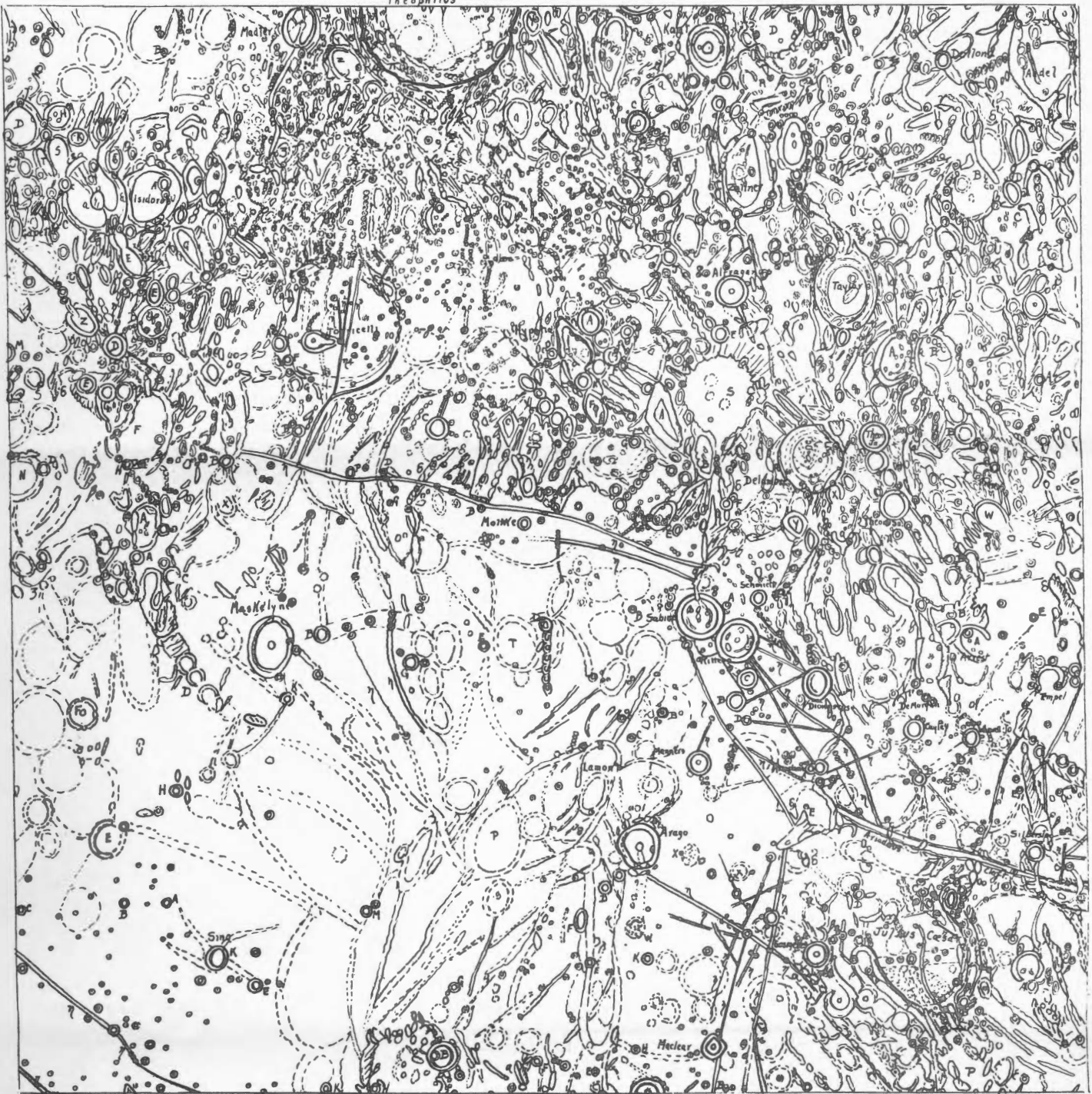
The plates are measured on a device which was developed by Watts and his colleague, A. N. Adams. It was constructed in the observatory shops. It is mounted so that all vibration is minimized, but Mr. Watts still does most of his measuring on Saturdays or in the evening. The plate is placed in the device and rotated at a rate of 3 degrees a minute. Three photo-cells are used to observe the plate. One cell scans the edge of the moon. The second receives light from just outside the edge; and the third receives light from 0.025 inches inside the limb, in order to measure the intensity of the image. It takes about two hours to measure one plate. Three pens are used to trace the results. One traces the profile; the second, the density of the image; and the third, the scale. The traced profiles have to be corrected for spindle errors, differential refraction, and eccentricity of the position of the plate on the mounting.

It is hoped that the work will be ready for publishing by about 1955.

Postscript by Editor. Mr. John E. Lankford is President of the Junior Members of the National Capitol Astronomers. This active junior auxiliary has been praised by the Astronomical League as a model which other societies could well imitate. Mr. Lankford's address is 3118 Central Ave., N.E. Washington 18, D. C. He is a member of the A.A.V.S.O. and of the A.L.P.O.

The Naval Observatory studies described above by Mr. Lankford are complementary to the mapping of the lunar limb-regions being carried out by Mr. H. P. Wilkins and his B.A.A. colleagues, who are interested chiefly in recording minute details with apertures up to 15 inches and high powers. Their preliminary results were published in our July, 1950, issue opposite pg. 12; they are continuing these studies.





100m. Reproduction. 300 inch MAP OF THE MOON. Section II

Drawn by H. Percy Wilkins, F.R.S. 1946

SECTION II  
 OF  
 H.P. WILKINS 300-INCH MAP OF THE MOON

Reproduced with the kind permission of Mr. Wilkins









FOR SALE: Photo-copies of Wilkins' 300-inch Map of the Moon. 22 sections size 8" x 8".

Set with plastic coverings, \$14.00; without covers, \$12.00.

Insurance and postage prepaid.

If order received before December 1, 1950, Special Libratory Section will be included at no extra cost. Write Editor.

TELESCOPE MAKING SUPPLIES of proven quality for the discerning builder. Everything from mirror kits and lens blanks to the finished instrument. Price list sent on request. For a Christmas gift of distinction our mounted, short focus, coated, achromatic Barlow lens is suggested. \$16.00, postpaid. Ready for use in standard 1-1/4" eyepiece holder. Many outstanding amateur observers praise the TELESCOPICS Barlow for its flat field and superb definition. TELESCOPICS, (H. L. Freeman), 853 1/2 W. 57th St., Los Angeles 37, Calif.

SPACE  
IS  
NOW  
AVAILABLE  
FOR  
ADVERTISING