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Photograph of Mars by Dr. Robert S. Richardson with the Mount Wilson 60-Inch Reflector on August 10, 1956 at 10 hrs., 27 mins., Universal Time. C. M.= 15° Presented to the A. L. P. O. by Dr. Richardson at the Fourth A. L. P. O. Convention.

In This Issue

ANNOUNCEMENTS

A Goal Achieved: A Complete Set of The Strolling Astronomer in a College Library. On pg. 1 of the January - March, 1958 issue we mentioned the desirability of having a complete file of this periodical in a library and the interest of Mr. Chester Linscheid, the Librarian of the New Mexico College of Agriculture and Mechanic Arts near Las Cruces, in acquiring such a set of our old issues. The response to this request has been much beyond our fondest hopes. Mr. Carl P. Richards of Salem, Oregon, a devoted friend of amateur science, a former officer of the Astronomical League, and a charter member of the A. L. P. O., has very generously donated a set of Volumes 1-10 to the Library of the New Mexico College of Agriculture and Mechanic Arts. The bound Volumes 1-2 were displayed by Mr. Richards at the A. L. P. O. Convention in Kansas City in 1957, where some of our members saw them. Complete sets of The Strolling Astronomer have already been a rarity for some time, almost a collector's item; and we are deeply appreciative of Mr. Richards' selfless and most helpful action. He has requested that these volumes do not be subject to loan outside of the library because of the risk of damage or loss. This request will be complied with. It is true that very few A. L. P. O. members can visit this library in person, but Mr. Linscheid has agreed that the library will make every reasonable effort to supply suitable copies of old issues and articles in them to A. L. P. O. members requesting such material.

Even so, it would be advantageous to have a second set of The Strolling Astronomer for circulation outside of the library and for borrowing through Inter-Library Loans. The kindness and generosity of our members has already made possible some progress in this direction. Mr. Elmer J. Reese of Uniontown, Penna. has donated to the library a complete set of Volumes 1 and 2; and Mr. P. Barnes in London, England has donated Volumes 6 and 7. Our thanks go to these gentlemen. In addition, another member made a somewhat duplicative offer of old issues; it was declined with thanks.

A. L. P. O. members desiring material in these old issues should write either to the Editor or else directly to Mr. Chester Linscheid, Librarian, New Mexico College of Agriculture and Mechanic Arts, Las Cruces, New Mexico.

A Suggestion about the Filing of Lunar and Planetary Observations. In a letter dated September 10, 1958 Mr. Elmer J. Reese offered the following idea: "Do you not think it desirable that the various A. L. P. O. Recorders, past and future, should eventually turn over the voluminous reports submitted by observers to the A. L. P. O. Library for safe keeping. Recorders come and go, and it would be a pity to lose these records for posterity. I was truly shocked to learn that neither Mr. Peek nor the B. A. A. Jupiter Director was able to locate T. E. R. Phillips' original records and notes for the apparition of 1919-20." We should be glad to hear what our readers think of this suggestion. Already some A. L. P. O. observational records have been lost as Recorders have changed.

In Memoriam. On August 13, 1958 Mr. Albert G. Ingalls died at the age of 70. He was one of the chief leaders of the modern telescope-making movement in the United States, and his three volumes on Amateur Telescope Making are a classic. It is indicative of the justly high esteem in which he was held that he was the very first person to receive both the Astronomical League Award (in 1951) and the G. Bruce Blair Award of the Western Amateur Astronomers (in 1954). "Unk", as he was affectionately called, was an early member of the A. L. P. O.; and his lively letters and postcards with their unique sense of humor were known to a number of our members. Several times he gave the A. L. P. O. favorable coverage in his column in Scientific American magazine, this help being much appreciated in our early, shoestring days.

Surprisingly little known because of his retiring and modest nature among the amateurs in New York City, Mr. Ingalls lived in Cranford, New Jersey. He was paralyzed by an automobile accident about a year before his death. His ashes lie in a little country cemetery in Glenora, New York. Few of us have served our fellow beings as well as Albert Ingalls or with less thought of return.

We also record with sorrow the passing of one of our youngest and newest members, 11 - year old Frank Wade Railsback of Azle, Texas. He was one of the most active members of Miss Charlie Noble's junior astronomers at the Fort Worth (Texas) Children's Museum. Wade was there a regular Moonwatch observer, had visited the McDonald Observatory, and had talked about his studies of the moon and the planets at the Convention of the Southwest Region of the Astronomical League at Kilgore, Texas on May 31, 1958. The Editor was at Kilgore then and was much impressed with little Wade's enthusiasm, intelligence, and promise. A few weeks later the boy was killed when struck by a passing automobile. What he might have been or might have contributed no one can know.

<u>On Radio Communication.</u> We are still desirous of employing amateur radio as an occasional rapid means of communication among A. L. P. O. members. One of the local "hams" is very interested in furthering this possibility, and it has been agreed that all A. R. R. L. nets as listed in the current QST magazine will be monitored daily for Las Cruces traffic. Anyone desiring special schedules may contact the Editor either by writing or through the above nets.

<u>Nationwide Amateur Astronomers Convention.</u> The Denver Astronomical Society is sponsoring the first convention of <u>all</u> amateurs in the United States at Denver, Colorado on August 28-31, 1959. The meeting will be on the campus of Denver University, with most of the activities in the Student Union Building. The A. L. P. O. will hold its Fifth Convention as part of the N. A. A. C.; the Astronomical League, the Western Amateur Astronomers, and the American Association of Variable Star Observers will also participate. Many amateurs not associated with any of these groups will presumably attend. Dormitory facilities for singles and families will be available on the campus of Denver University, and meals can be had in the cafeteria in the Student Union Building. There will be exhibits both by amateurs and by commercial firms. Advance publicity is already well planned. Other features of the N. A. A. C. include two banquets, at least two star parties, numerous papers by both amateur and professional speakers, and a possible field trip or two. The General Chairman is Kenneth Steinmetz, 1680 W. Hoye Place, Denver 23, Colorado. We understand that recent visitors to Denver have been much impressed with the scope of the plans for this meeting, the very first of its kind, and with the progress already made.

We are anxious, of course, that the A. L. P. O. should be well represented at this gathering. We hence urge all our members who can to plan their vacations so as to be in Denver next August. We shall need lunar and planetary papers, and we would like A. L. P. O. members who feel able and willing to present such papers to start thinking about possible subjects at once. We particularly want papers from people who expect to attend. It will be well to make housing plans early because 1959 will be Colorado Centennial Year.

<u>The Schiefspiegler.</u> Mr. F. Salomon, 3 Hechalutz Street, Haifa, Israel invites attention to the discussion of the "schiefspiegler", an off-axis reflecting telescope, in Sky and Telescope for August, 1958. Mr. Salomon says that a number of people have compared his 8-inch instrument of this design with his conventional 8-inch Newtonian and prefer the schiefspiegler, particularly as showing more contrast on lunar and planetary surfaces. Mr. Salomon will be very glad to give the help of his experience with this unusual optical system to anyone requesting it.

YOUR TELESCOPE AND MARS

By

Thomas R. Cave

(Paper read at the Fourth A. L. P. O. Convention at Pasadena, Calif., Aug. 14, 1958)

The planet Mars is about to favorably approach the Earth for its last good time late this autumn, and it will not be so well placed again until 1971. Actually, it will be only three short months before Mars will reach the closest approach and opposition, and your telescope will truly be a most valuable and important instrument during the next several months.

Nearly any telescope of reasonably good quality will reveal something on the disc of Mars. Indeed in late December and early January, 1956-57 I had the occasion to use a little 60 mm. refractor with a power of 150x on Mars, when the planet's disc was but 10" and less in diameter. One would expect such a small scope to reveal little, if anything, on the small reddish disc; however, not only was the South Polar Cap a very easy object, but all the main maria were quite distinctly and clearly seen. Perhaps much of this detail would have been missed by an absolute novice in the study of Mars and the use of the telescope on the planets; but to nearly any observer who has had experience with larger instruments much can surely be seen, even with considerably inferior means.

Small refractors are commonly found in the hands of a great many beginning telescopic observers, that is, refractors of about 2" to 4" aperture. Although these instruments will reveal most of the main Martian details to the experienced eye, they always fall considerably short of revealing the finer details which the serious student of the planets wishes to observe.

Refractors of 6" and larger aperture are almost nonexistent in the hands of even serious amateurs in this country; thus the amateur who wishes a larger telescope must turn to the reflector. In the refracting telescope nearly all are of the two lens Crown and Flint, Fraunhofer, or modified type; and a few, usually made in Europe, are of the Photo-Visual or Apochromatic three lens type, nearly all being smaller than 6".

The reflector unfortunately, and I say this without reservation, is to be found in at least three main forms: the Newtonian, The Cassegrainian, and the Gregorian. It is a pity that in the small sizes the last two forms are still to be found in use, since neither the Cassegrain nor the Gregorian actually performs as well as the extremely well-made and figured Newtonian.

It seems to me after nearly twenty-five years of observing through my own telescopes and literally hundreds of amateur and professionally built telescopes that only the conventional form of refractor and the Newtonian form of reflector render optimum performance when these scopes are of the best optical quality. The conventional refractor has seldom been amateur-made, at least so far as the optics are concerned. Since most refractors are from about 2" to 5" in the hands of the amateur they suffer much less than the reflector, which normally is 6" and larger, from the ill effects of unsteady air.

When comparisons are made between the refractor and the Newtonian reflector, nearly always a rather small refractor of good professional make has been put alongside a reflector of much larger aperture and most often the product of some amateur's work, in fact, frequently the first or second attempt of some amateur optician. It could hardly be more obvious, therefore, why the reflector and refractor when of about 6" aperture and larger have very nearly the same light gathering power and certainly, if of equal optics, the same resolving and defining quality. In light grasp the refractor of a 6" or 8" size has a small advantage, but a 10" reflector or larger begins to have the favorable edge.

In actual use probably both the conventional refractor and the Newtonian reflector, assuming both of equal and excellent optical quality, are about evenly useful, aperture for aperture. When "seeing" is poor to only fair the refractor may give slightly steadier star images and perhaps a bit sharper planetary definition, but certainly not so much true natural contrast as the reflector. Since contrast is undoubtedly, to some degree, associated with the actual color of the planetary detail, it is then obvious why the reflector here performs better.

Again, let us return to your telescope and its function and usefulness in observing Mars, and what can be done to improve your scope. Since refractors are normally professionally made and allow little freedom of modification, we shall consider only the reflector, that is, the conventional Newtonian reflecting telescope. Your telescope should be a conventional focal ratio, not shorter than an F/6 but better still at F/7 or F/8. There is certainly no need to go longer than F/8 in any case; and if the optics are extremely good, F/7 will certainly work as well. Where space is almost the prime consideration, as it was with me several years ago, a 12" may even be made at F/6; and if the optics are nearly perfect in correction, it could perform as well as an F/7 or F/8. Never buy an F/4 or F/5 or as George Calver used to call it, "A Dumpy", and expect to do good high power planetary work. There are just too many difficulties in the figuring and in the over-size diagonal diffraction plus off-axis coma ever to allow the very best such ratio to work well. The size of the diagonal is certainly important. It should never be a prism but should be of good flatness; however, its size should never exceed 1/5th that of the primary mirror.

It is usually found beneficial for the mirror cell to be open, allowing circulation of air through the telescope tube. The tube itself should be of non-metallic material, of the best insulation type material or wood. The diagonal holder, usually called a spider, should be strong and stiff with thin vanes. After several years of extensive experimenting, I have yet to find any other form of spider equal to a 4 vane straight line type. Other types made to spread out the diffraction do exactly that and give much more diffraction; however, it noticeably tends to lower planetary contrasts. These curved or circular forms of spiders perhaps have, in some cases, enabled observers to detect faint companion double stars somewhat better, but that is certainly all. Time can scarcely allow any analysis of mountings except to say that they should be as steady and as portable as weight will allow, and if permanent, the more massive, if well engineered, the better. A good clock drive is a tremendous help for any observer of Mars, since it will free the observer's hands when making notes and sketches; but even the drive is not an absolute necessity.

In closing it may be said that if the observer will follow a few simple rules as outlined above, equip himself with extremely good optics, and try to obtain at least an 8" or larger telescope, he will certainly have the basic instrumental ingredients for the successful observing of Mars. The rest is up to him; for it is really the person looking through the eyepiece that counts, as much or more than the telescope.

SOME CHANGING ASPECTS OF MARS IN 1956

By

Joel W. Goodman

(Paper read at the Third and Fourth A. L. P. O. Conventions in 1958)

Mars was widely observed by a great number of amateur planetarians during its favorable approach in 1956. While the apparition was somewhat of a disappointment from the viewpoint of the visual observer, owing to widespread obscurations that blanketed large areas of the planet, much was nevertheless seen. This paper is concerned with some of the features noted by one of this band of onlookers.

Before embarking on Mars proper, a few initial remarks describing the equipment employed in these studies might be appropriate. Two telescopes were used: an excellent 8-inch Cave reflector and to a lesser degree a 7-inch Fecker refractor; the larger reflector proved generally superior for planetary work.

Color filters, red proving most effective, were found useful to heighten contrasts between the dark maria and ochre deserts. The filters were particularly helpful when contrasts ebbed dishearteningly during late summer.

It was found that relatively high powers gave best results on Mars, 270X being used most frequently on the 8-inch telescope. This compromised the disturbing glare from the brilliant disk of the planet while permitting sufficiently steady views in reasonably good seeing. The disk of Mars is so fraught with delicate markings that the observer should waste none of his instrument's resolving capacity by using insufficient magnification. In passing, it might be noted that Martian features do not appear to fade with magnification as rapidly as do those of Jupiter, a fortunate circumstance in view of the former's smaller apparent size.

Observations were commenced early in July, by which time the Martian vernal equinox of the southern hemisphere was some two months past. Little was seen at the outset save for the prominent, expansive southern maria, the broad melt band girdling the south polar cap and, of course, the imposingly brilliant cap itself. With perseverance, however, finer detail gradually became distinguishable and when profitable observations were terminated late in November a total of about three dozen canals had been seen.

The most striking impression that one derives from serial observations of Mars is the sensation of metamorphosis transpiring on the planet. The most blatant example of this, of course, is the dwindling of the polar cap, but other more subtle changes can be readily discerned by the attentive observer. In what follows, emphasis has been placed on the changes noted during the five month period covered.

The south polar cap and its very dark melt band were unquestionably the most conspicuous surface features seen for the greater part of the apparition. The vast expanse of the cap during July and early August was a most noteworthy sight and the rapidity with which it melted, or sublimed, dramatically testified to its sparsity of substance. A very extensive dark rift was seen late in July (Figures 1 and 2). The earliest date on which the entire cap was seen was September 22. The cap disappeared during the first week in September but reappeared the following week. It was visible for the remainder of the period of observation. This curious behavior was presumably the consequence of an obscuring haze, although at least one authority proposed a theory of exhaustion and reformation of the cap.

As for the melt band, during Martian mid-spring this appeared to be the darkest area on the planet. It faded with diminution of the cap and by November, at which time the cap was quite miniscule in appearance, was scarcely seen at all. Prior to that time it was almost uniformly visible.

In retrospect, the rapid shrinking of the cap as the planet approached perihelion was perhaps the most striking aspect of the Martian panorama.

The great southern maria were ideally situated for careful scrutiny owing to the planet's southern inclination with respect to earth. Almost all showed internal variation in tone at some time during the apparition. Those displaying the greatest abundance of detail were Syrtis Major, Thaumasia, the Margaritifer Sinus-Aurorae Sinus area, and the Sabaeus Sinus-Meridiani Sinus region. Mare Sirenum and Mare Cimmerium were also well seen at times but were usually of a more uniform texture, at least in the moderate instruments used in these studies. Sequential seasonal changes manifested by a wave of darkening extending from the melting cap northward, so often described by observers in the past and now considered characteristic of Martian seasonal evolution, were not noticed; but this might well have been due to the fact that observations were not begun until well into Martian

Figure 1. Mars. Joel W. Goodman. 8-inch reflector. 270X. July 31, 1956. $6^h 20^m$, U.T. Seeing 5, Transparency 4. Wratten 25 red filter. C.M. = 47°

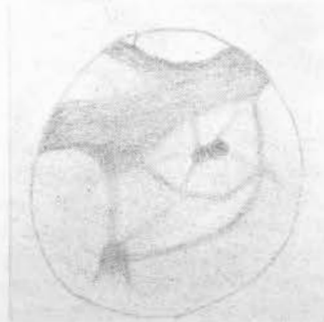

Figure 2. Mars. Joel W. Goodman. 8-inch reflector. 270X. July 31, 1956. $8^h 0^m$, U. T. Seeing 5, Transparency 4. Wratten 25 red filter. C.M. = 71°

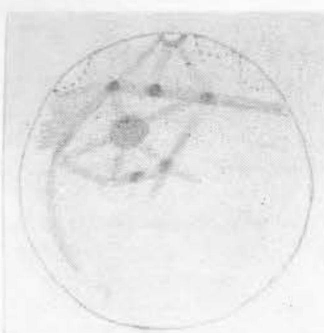

Figure 3. Mars. Joel W. Goodman. 8-inch reflector. 270X. August 28, 1956. $4^h 55^m$, U. T. Seeing 3, Transparency 3. Wratten 25 red filter. C. M. = 133°

Figure 4. Mars. Joel W. Goodman. 8-inch reflector. 225X, 270X. October 14, 1956. $0^h 0^m$, U.T. Seeing 4, Transparency 3. Wratten 8 yellow filter. C.M. = 2°

southern spring.

A striking alteration in the appearance of the Sabaeus Sinus-Meridiani Sinus area was noted on the fourteenth of October (Fig. 4) and again on the following night. So profound was this change that the once familiar formations were wholly unrecognizable. It was learned much later that this remarkable development was confirmed by observations made at McDonald Observatory with the 82-inch reflector. A massive deposition of material resulting from the widespread dust storms that prevailed around this period could conceivably be the responsible agent. If this be indeed the case, then the defacement should be of a transient nature. I look forward to observing this area during the present 1958 apparition with more than a little anticipation.

The oases, although a great number were located at latitudes too northerly to place them in favorable observing positions, proved to be highly interesting features. Since they form junctions for many of the canals, they became focal points for study of the latter as well.

The most prominent oasis was the Solis Lacus, which was surely visible in good telescopes of less than six inches aperture. It had a bilobed appearance when viewed under superior seeing conditions on July 31 (Figure 2); but on the night of August 28, at which time the best view of the Thaumasia area was had, it appeared very large and nearly spherical (Figure 3). On this latter night five conspicuous oases bordering Thaumasia were seen, three very dark prominent ones lying on the southern boundary. When reference was made to the ALPO map of Mars compiled from observations of the 1954 apparition, only two of these three could be identified. Unfortunately, subsequent views were less favorable and these oases could not be recovered.

The Lunae Lacus, while somewhat more difficult than the Solis Lacus, was also easily seen during late July (Figure 2). It appeared to fade in early August and never regained its former prominence. Several of the canals associated with it were relatively easy objects during the earlier period.

The Zea Lacus, which forms the center of the Hellas Cross, was seen on rare occasions as an extremely faint, diffuse spot. Fragments of the cross were also delineated at times, but the feature was never seen intact.

The Nubis Lacus area, which merits special attention due to its relatively recent generation, was not as conspicuous as might have been anticipated, owing perhaps to its northerly situation, but was nonetheless easily visible. It was rather uniform in appearance and nothing of unusual interest was detected.

The Trivium Charontis was well seen on several occasions and a number of its connecting canals were discerned. Other oases were prominent as well, but they can be bypassed as nothing save their existence was noted concerning them.

The enigmatic canals are perhaps the most stimulating and challenging of all planetary features to many amateur observers. These were avidly searched for during the earliest viewing but the disk seemed dismayingly devoid of them. As visual ability developed, however, they began to be recognized and a total of about three dozen were identified during the course of the apparition; many of these could be traced for only short distances. They were most easily detected near their points of departure from oases and maria and with a few noteworthy exceptions were best seen during the period encompassed by late July and August.

The most prominent canal was again the Thoth-Nepenthes. Its aspect was that of a broad streak. The Ganges was an easy feature at the end of July and on the night of July 31 was seen doubled (Figure 1), an aspect frequently noted by observers during previous apparitions. The Gehon, very difficult during July and August, appeared to intensify during the later months in contradistinction to most of the other canals.

Five of the canals radiating from the Solis Lacus were perceived, as were several connecting to the Trivium Charontis and Lunae Lacus, as previously mentioned. In one view of instantaneously perfect seeing, during one of those all too fleeting moments when the atmosphere seems to halt its relentless war against astronomers, at a magnification of 411X, three canals emanating from the Oxia Palus, at the northern tip of the Margaritifer Sinus, were distinctly seen with the 8-inch reflector. This was perhaps the most memorable single view of the entire apparition although its duration was but a fraction of a second. The three were identified as the Oxus, Indus, and Djihoun.

Several of the canals, such as the Thoth, Ganges, and Cerberus, appeared to have considerable breadth. One hypothesis of the nature of the canals is that they represent borders between areas of differing tone. If so, they should not be expected to have two distinct borders. In my opinion, the appearance of broad bands rather than fine lines undermines this theory somewhat, at least insofar as some canals are concerned.

Let us now leave the surface of the planet to review briefly the atmospheric phenomena noted. It must be admitted that for the most part little attention was paid to the Martian atmosphere. One could do little, however, to avoid awareness of the widespread obscurations that washed out surface contrasts during the period of closest approach of the planet. Discrete clouds, as opposed to this diffuse yellow veil, were seen rather infrequently, although an appreciable number were detected during late August and September (Figure 3). These appeared brighter than the background but not nearly so bright as the cap. A blue filter aided in their delineation and more would perhaps have been seen had this filter been employed in systematic studies.

The "blue clearing" was looked for near the time of opposition on September 10 but, although suspected, could not be determined with any degree of certainty. This failure was hardly surprising in view of the fact that surface contrasts were poor even with a red filter.

These, then, comprise the major impressions of one observer concerning Mars in 1956. It is hoped that they have been found to be of some interest and bear some resemblance to what others among you have seen.

LUNAR COLONGITUDE: WHY, WHAT, HOW, AND WHEN

by Walter H. Haas

(Paper read at the Third and Fourth A. L. P. O. Conventions in 1958)

The greenest novice among lunar observers quickly learns that the aspect of lunar features often changes very strikingly with the changing solar lighting. Thus the crater Eratosthenes at the southeast end of the Apennines when close to the terminator near First and Last Quarters exhibits terraced inner walls, several central peaks, and a floor of ordinary brightness. Near Full Moon, however, the floor and inner and outer walls of Eratosthenes are covered by a complex pattern of dark areas so that the outlines of the crater are hard to recognize. It is thus necessary in any careful observational study of the moon to have an adequate measure of the solar illumination because the appearance of a lunar formation is very definitely a function of the solar lighting. A lunar observation lacking a measure of the solar lighting is no more useful than a drawing of Mars without the central meridian of longitude.

This solar lighting has been measured in several different ways:

1. The age of the moon.

2. The position of the terminator, described by the observer.

3. The sun's selenographic colongitude.

4. The lunar azimuth and elevation of the sun at a specified point on the moon.

Readily found from the time of the observation, the age of the moon is such a crude measure of solar lighting that its continued use in some places must be considered most regrettable. In two observations at the very same age of the moon the position of the sun in the lunar sky of a given formation can vary through almost sixteen degrees. The chief reason for this variation is the moon's libration in longitude.

Descriptions of the position of the sunrise or sunset terminator in terms of lunar features on or very close to it at the time of observation are certainly preferable to using the age of the moon but are still somewhat approximative and may be vitiated by errors in identification. Moreover, it will mean little to the non-specialist to be told, for example, that the sunrise terminator passed through Reiner, Vieta, and Phocylides. Confusion will also result from the occasional re-naming of lunar craters.

The sun's selenographic colongitude is defined as the lunar eastern longitude of the sunrise terminator, measured always eastward along the moon's equator from zero at the center of the disc at mean libration. Colongitude is approximately equal to 0° at First Quarter, 90° at Full Moon, 180° at Last Quarter, and 270° at New Moon; but actual equality to these quantities at these phases is realized only when the libration in longitude is zero. In other words, colongitude measures the solar illumination of the moon with the earth left out of the picture.

Colongitude is easily found with the help of The American Ephemeris and Nautical Almanac, in which it is tabulated at 0 hours, Universal Time for each day of the year. These tables are on pages 384-391 of the 1958 Ephemeris. One may in addition use the fact that colongitude increases by a slightly variable rate of about $0\overset{\circ}{.}51$ per hour; for still greater accuracy, one may do a linear interpolation between successive dates.

Example 1. An observer at Ithaca, New York made a drawing of Plato at 3:24 A.M., E.S.T. on July 5, 1958. What is the colongitude?

Since Universal Time is 5 hours later than Eastern Standard Time, the corresponding U.T. is $8^h\ 24^m$ on July 5.

Colongitude at 0^h, U.T. on July 5, 1958, (A.E.N.A.)	$130\overset{\circ}{.}87$
Increase in $8^h\ 24^m$ = 8.4 hrs. x $0\overset{\circ}{.}51$	4.28
Colongitude at $8^h\ 24^m$, U.T., July 5, 1958	$135\overset{\circ}{.}15$

The result would usually be rounded to $135\overset{\circ}{.}2$.

Example 2. An observer in Pasadena, California, wishes to observe the O'Neill Bridge at colongitude $127\overset{\circ}{.}0$ in August, 1958. When should he look?

We require to find the last entry less than $127\overset{\circ}{.}0$ in the Ephemeris tables. It is $125\overset{\circ}{.}30$, the colongitude at 0^h, U.T. on August 3, 1958. The difference is $1\overset{\circ}{.}70$, $127\overset{\circ}{.}00-125\overset{\circ}{.}30$. Division of this difference by $0\overset{\circ}{.}51$ gives $3^h.33$ or $3^h\ 20^m$. Thus the required U.T. is $3^h\ 20^m$ on August 3. If the observer is on P.D.S.T., he should look at 8:20 P.M. on August 2 (his standard time is seven hours earlier than U.T.). Actually, he is here out of luck; for the moon would be below his horizon at that time.

We must finally realize that colongitude is not a perfect measure of solar lighting. For ultimate accuracy we must compute the azimuth and elevation of the sun in the lunar sky. The imperfections of colongitude are due to the fact that the sun may be as much as a degree and a half from the plane of the moon's equator. In other words, we have analogues of the terrestrial seasons. Colongitude has the advantage of simplicity: it depends only on the time of the observation, and at a given time it is the same for the whole moon. Its failings increase with increasing distance from the lunar equator on the part of both the sun and the lunar formation studied. For features very near the terminator in high lunar latitudes the height of the sun above the lunar horizon at a given colongitude is subject to great relative variations. For such features colongitude is an inadequate measure of the solar lighting, but it is otherwise usually very satisfactory.

The computation of the sun's lunar azimuth and elevation is a problem in spherical trigonometry, where the knowns are the sun's position and some specified position on the lunar surface. The sun's height may be found from a formula given on pg. 586 of the 1958 American Ephemeris and Nautical Almanac.

Colongitude is easy to determine and can make amateur lunar studies much more systematic and purposeful.

A NEW LUNAR CLEFT SYSTEM

By Alika K. Herring

(Paper read at the Fourth A. L. P. O. Convention in Pasadena, Calif. Aug. 14, 1958)

This paper will be a brief summary of observations I have made over the last several years of an apparently new and extensive system of lunar clefts lying west and southwest of Grimaldi. On August 12, 1954, shortly after sunrise on the area, I noticed a rather distinct cleft, designated as No. 1 on Figure 5, which began at the base of a small crater on the southwest wall and extended in a southwesterly direction therefrom. A routine examination of the excellent map of the area by Dr. Wilkins did not show the cleft; and a subsequent investigation revealed that this cleft had also apparently escaped the notice of Goodacre, Elger, and Schmidt.

Since it is a more or less well known fact that a great amount of lunar detail has not yet been placed upon any of the existing maps, no great emphasis was placed upon this discovery at this time. However, the area received somewhat more than casual attention during the next several lunations, with the result that a substantial number of other uncharted clefts were noted. As time passed, it became more and more apparent that here was a cleft system of major proportions which had apparently escaped the notice of previous selenographers.

That this could occur is almost entirely attributable to the very elusive character of these details. With the exception of cleft No. 1, which may be visible for as long as two or three days, most of the clefts in the system are not obvious details. They are, moreover, extremely sensitive to small changes in illumination. I have on occasion seen the entire system fade from a condition of fairly easy visibility into one of almost complete invisibility in a matter of only three or four hours. This fact would seem to indicate that these clefts are extremely shallow. It should also be noted that the visibility of detail so near the lunar limb will be profoundly affected by small variations in libration, particularly in longitude. For these several reasons, it will be seen that the system will be well placed for observation for only a few hours each month. Based on my own observations, this period of best visibility may be said to extend from sunrise on the area, which occurs at approximately 67 degrees colongitude, to about 73 degrees. This therefore sets a limit of about 12 hours per month when the system may be best seen; and because the daily rotational period of the earth is completely out of phase with the lunar cycle, these moments of most favorable apparition may well occur when the moon is below the horizon. For this reason it would be very difficult to observe the system except at random intervals from any given point on the surface of the earth. It should also be noted, that because of its location so near the east limb, it is doubtful whether the system could ever be satisfactorily observed under evening lighting.

It must be strongly emphasized that the accompanying chart (Figure 5) is very tentative and will probably be subjected to a great deal of revision in the light of future studies of the area. I myself have glimpsed other and as yet uncharted clefts lying along the northwest border of Grimaldi, and it now seems probable that

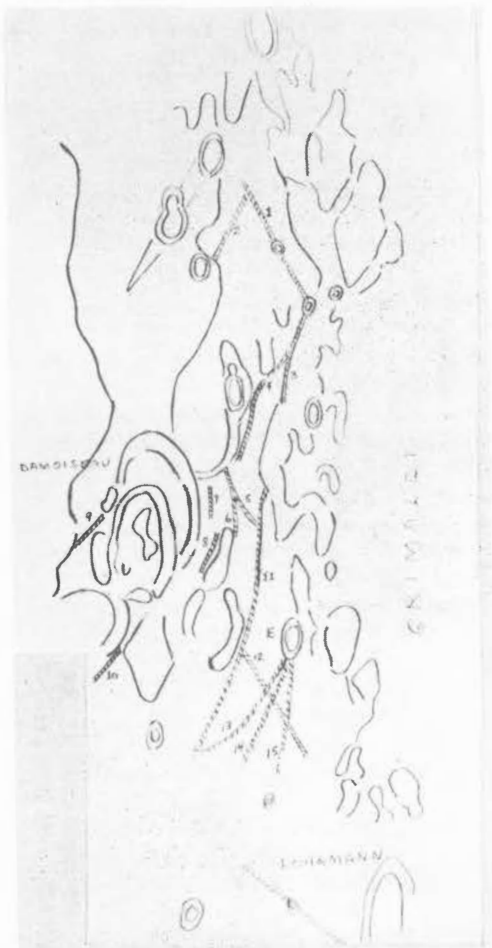

Figure 5. Tentative chart of Grimaldi cleft system by Alika K. Herring. Based on observations in 1954-58 with 8-inch and 12.5-inch reflectors and on a photograph by Lyle T. Johnson. Lunar south at top, lunar west at left.

this system will eventually be found to have a direct connection with the extensive neighboring systems of Lohrmann and Hevel. Certainly a great amount of further exploratory work is indicated, and I therefore cordially invite the attention of other interested lunarians to the area. Due to the exigencies of the situation, limitations in the time I have available for observation, and the extreme pressures of other lunar projects, I have personally been unable to give the area the attention that it deserves. Perhaps I cannot be held entirely blameless for this lack of activity on my part; I was once told that an "active" amateur was one who "attended all the meetings", so perhaps the solution after all lies in being more gregarious in the future than I have been in the past!

SOME SUGGESTIONS REGARDING LUNAR DOMES

By Patrick Moore, F.R.A.S.

(Paper read at the Third and Fourth A.L.P.O. Conventions in 1958)

I consider it a great honor to be asked to present another paper at the 1958

Convention, and once more my only regret is that I cannot read it personally!

During the past year I have tried to continue my studies of those interesting and curious features, the lunar domes. What I would like to do now is to summarize some of my results, and at the same time to put forward some new suggestions which are (as I am the first to admit) open to criticism. Of course, domes have been referred to quite often in various publications, and there are several astronomers - such as Dr. S. R. B. Cooke - who may be termed specialists in this field of research; there have been several papers in the Strolling Astronomer. But for the moment I want to deal with generalities rather than with individual cases.

The first problem concerns the form of the domes. It is misleading to speak of them as being "hemispherical"; and of course the actual heights are extremely difficult to measure, mainly because the gradients are slight. I have found that most domes have symmetrical bases, and though this is not an invariable rule (Arago X and W, for instance, show some irregularity) it is true in over 95 percent of the cases. Domes which are often described as irregular in outline are generally found to be made up of several domes close together. Of course, there are also domes which are obviously deformed by later activity; one near Menelaus is cut by a cleft, and there is always the large, complex feature inside Darwin. But the basic form of a dome, like that of a crater, is the circle.

Next we come to the question of what may be regarded as a "dome". It has been held that features of the dome type merge with rounded hills, and that indeed domes are merely "very rounded peaks". I used to think this myself; but I no longer do so, and I have come to the conclusion that there is a real and basic difference between the two classes of features. There is little superficial resemblance between (say) Lahire on the one hand, and the Milichius Dome on the other; neither do I think that there is any hidden close relationship. Domes are much more nearly related to central masses of the Alpetragius or Capella types; I will return to this point later.

Thirdly, it is a fact that many of the domes are crowned by summit craterlets. These crowned domes are often referred to as "volcanoes", and have always been regarded as rarities. I now want to put forward the suggestion that they are not rare at all - and that with domes, summit pits are the rule and not the exception. This will cause considerable dissent, but I am basing my suggestion on my own observations; the higher the power and the better the seeing, the more summit pits become visible. Often there is a "something" in the middle of a dome which it is only too easy to dismiss as a peak, but I believe that most of these "somethings" are craterlets. Most of the Arago domes are examples of this. This is a new idea, but I believe it to be the truth.

Significantly, some of the very rounded central peaks in craters - Alpetragius and Capella, for instance - are similarly crowned, and this fact is an extra reason for believing in a relationship.

With both the rounded central masses and with the domes, it often happens that there are two summit craterlets; but these craterlets are always symmetrical, and even if the dome-top is not perfectly regular, the symmetry of the craterlets is maintained. I believe that unsymmetrical summit craterlets upon features of this sort are vanishingly rare.

My main attention has been concentrated on the distribution of the domes; and here my work is in the preliminary stage, because I have not been able to survey the whole lunar surface closely enough to be sure of my ground - in fact it will take me another ten years at least, and probably more. However, it seems clear that although the domes are much more numerous than has been thought up to now, their distribution is not random. Consider, for example, the areas of Arago, Capuanus, and Prinz; all of these have numerous domes - yet other areas which seem superficially similar lack domes completely. It is a general rule that "where you find one dome, you will find more". Of course, crater distribution is not random either, and I am starting to think that when the domes are plotted in their correct positions we will find the same sort of alignment structure as with the walled formations, but further research is necessary before coming to any conclusions.

What, then, is the origin of a lunar dome?

It is not safe to speculate too far; before I do so, I want to know for certain whether I am right about the symmetry of form, the regular summit pit phenomenon, and the non-random distribution along characteristic lines of weakness. But I do think that the origin of the domes must be non-cataclysmic. I do not pretend to be unprejudiced, since I do not in any case believe in the meteoritic theory of crater formation (at least for the main features - there must naturally be some impact craters on the Moon, as on the Earth). However, I find it difficult to account for the domes by any meteoritic theory, and I prefer to fall back on the idea of igneous action. It may well be that a dome is "a crater which never properly developed"; and it is possible that apart from the rays, the domes are the most recent of all lunar formations.

Clearly more work is necessary. These suggestions of mine are preliminary only, but there seems a good chance that the domes are important from a selenological viewpoint, even though few of them are conspicuous features. Quite probably all my ideas will prove to be wrong, but in any event I do not regret putting them forward now; after all, one learns by mistakes!

Meanwhile, my very best wishes to you all, both personally and for the success of the 1958 Conventions.

INTENSITIES AND COLORS OF JOVIAN FEATURES

by

Phillip W. Budine

(Paper read at the Third and Fourth Conventions of the A. L. P. O. in 1958)

Sometimes the amateur astronomer equipped with a small telescope feels that serious work on Jupiter is limited because he lacks the large aperture for resolving the delicate features of this giant planet; but there is one field of Jupiter work that may be entered by those with small telescopes, small referring to the 3 to 4 inch aperture range. This research deals with the recording of intensities and colors on Jupiter's disk. Color determinations are made quite frequently but intensity estimates are made by only a few observers of the A. L. P. O.

During the four year period from October, 1953 to December, 1957 there have been observations made and these results have been printed in The Strolling Astronomer in table form. In this investigation I have used these estimates by other observers to compare with my own studies to obtain a better picture of Jupiter's colors and intensities. I hope this study which was made using a $3\frac{1}{2}$ inch reflector at 125X, and a 3 inch refractor at 133X will encourage other amateurs to record these types of observations.

In this systematic program I have used the following work prepared by the following observers covering the periods mentioned: Observations from October 1953-April 1954 by D. P. Avigliano and A. P. Lenham. Observations from 1954-1955 by Walter Haas and Elmer J. Reese. Observations from 1955-1956 by Walter Haas and Elmer J. Reese and observations from 1956-1957 by Walter H. Haas.

Color observations totalled 115 by the observers above; intensity estimates totalled 158 by the same observers.

My own program of observation includes all observations made of colors and intensities from October, 1953 to December, 1957, a total of 411 intensity estimates and 343 color observations.

To simplify this report I am recording the details in the following table. Please note the average estimate for each feature and notice how closely the estimates agree between the group (Avigliano, Lenham, Reese and Haas) and myself.

Intensities are on a scale of 0 (darkest) to 10 (brightest), where the belts are usually 2 to 4 and the zones are usually 5 or 6.

Color and Intensity Table

October 1953 - December 1957

			Intensity Estimate			Color Estimate		
Observer	Feature	No. of Est.	Lowest	Highest	Average	No. of Est.	Prominent Colors	Average Color
Group	S. S. Te. Z	7	4.9	5.6	5.2	5	Y. W	Y
Budine		21	5.0	6.5	5.0	15	Y. W	Y
Group	S. Te. Z.	9	5.0	5.9	5.4	7	Y. W	W
Budine		32	5.0	7.0	5.5	29	Y. W	Y
Group	S. Tr. Z.	9	5.0	6.3	5.6	7	Y. W	W
Budine		32	5.0	7.5	5.6	28	Y. W	W
Group	S. E. B. Z	7	4.0	6.4	5.2	7	Y, W, R-br	W
Budine		15	5.0	7.0	5.0	15	T, O, Bl	T
Group	E. Z.	9	5.5	8.0	7.0	7	W	W
Budine		31	5.8	9.5	7.0	28	W, Y	W
Group	N. Tr. Z.	9	5.3	6.8	5.9	7	W, Y	W
Budine		30	5.0	6.5	6.0	27	W. Y	W
Group	N. Te. Z.	9	4.9	5.7	5.3	7	W. Y	Y
Budine		30	5.0	6.0	5.1	28	W. Y	Y
Group	N. N. Te. Z	5	4.5	5.4	5.0	3	W. Y.	Y
Budine		9	5.0	6.0	5.0	9	Y	Y
Group	S. P. R.	8	2.2	5.1	4.2	5	G, P-g	G
Budine		29	2.0	3.8	3.5	9	G, Bl-g	G
Group	N. P. R.	8	3.0	5.2	4.0	5	G, P-g	G

Color and Intensity Table (continued)

			Intensity Estimate			Color Estimate		
Observer	Feature	No. of Est.	Lowest	Highest	Average	No. of Est.	Prominent Colors	Average Color
Budine	N. P. R.	29	2.0	4.0	3.3	9	G, Bl	G
Group	S. S. T. B.	7	3.0	3.7	3.6	5	Bl-g, G	G
Budine		10	2.1	5.5	4.0	11	Bl, G	G
Group	S. T. B.	9	2.0	4.4	3.3	7	R-br, Bl-g	R-br
Budine		30	2.0	4.0	3.3	27	Bl-g, G	G
Group	S. E. B.$_s$	8	2.5	4.3	3.5	7	R-br, R-bl	R-br
Budine		29	2.0	4.0	3.8	28	R-br, R-bl	R
Group	S. E. B.$_n$	9	2.5	3.5	3.3	7	R-br	R
Budine		32	2.0	4.0	2.7	32	R, R-br	R-bl
Group	E. B.	5	3.9	4.7	4.4	3	R-br, G	G
Budine		3	4.0	4.5	4.1	2	G	G
Group	N. E. B.	9	2.0	3.1	2.3	7	R-br	R-br
Budine		31	2.0	3.0	2.3	33	R-bl	R-br
Group	N. T. B.	9	2.7	4.5	3.2	7	R-br, G	R-br
Budine		14	2.0	4.0	2.9	12	Bl-g, G	G
Group	N. N. T. B.	6	3.2	4.6	3.6	4	R-br, Br	R-br
Budine		3	2.0	2.5	2.0	2	Bl, G	G

Conclusions: By studying the table we find the following information to be supported by the group and myself. From October, 1953 to December, 1957:

1. The N. P. R. was darker than the S. P. R.
2. N. E. B. was recorded usually as reddish brown.
3. E. Z. is brightest zone and N. E. B. darkest belt.
4. N. T. B. darker than S. T. B.
5. S. E. B.$_n$ darker than S. E. B.$_s$
6. N. Tr. Z. brighter than S. Tr. Z.
7. E. B. faintest belt observed on Jupiter.

I urge all A. L. P. O. members please to make some intensity and color estimates along with their sketches of Jupiter so more work will be done in this neglected field of Jupiter study.

JUPITER IN 1956 - 57, ADDENDUM

By Elmer J. Reese

Mr. Kazuyoshi Komoda has submitted a large notebook containing many drawings and notes pertaining to Jupiter made during the first half of 1957. Since these observations arrived too late to be included in our final report on the apparition (Str. A., Vol. 12, Pg. 37), a brief summary is given here.

From January 3 to August 2 Mr. Komoda employed an 8-inch reflector to make 72 full-disc drawings of Jupiter, numerous notes on the relative conspicuousness of the belts and zones, and frequent transit observations of the Red Spot.

The Red Spot

Mr. Komoda recorded 12 transits of the preceding end of the Red Spot, 1 transit of the center, and 13 transits of the following end. These transits reveal that the overall length of the Spot was about 20°, and that the longitude of the center of the Red Spot gradually increased in longitude (II) from 302° on March 12 to 312° on July 15. This amounts to a drift of +2°.4 in 30 days which corresponds to a rotation period of $9^h\ 55^m\ 43^s.8$. If Komoda's transits had been available when the table of rotation periods for the apparition was being prepared, the published longitudes for the preceding end, center and following end of the Red Spot would have been, respectively, 292°, 304° and 317° instead of 291°, 305° and 319°.

The color of the Red Spot, according to our Japanese colleague, was pale reddish-gray. The color and intensity was twice recorded as being uniform from the center to the outer edge of the Spot. It is interesting to recall that during March, April, and early May, A. P. Lenham found that the color of the Red Spot appeared to be orange with the 40-inch refractor at Yerkes, but primarily yellow with a 24-inch reflector (J. B. A. A., Vol. 68, Pg. 95).

Belts and Zones

A study of Komoda's estimates of the relative conspicuousness of the various belts and zones reveals no definite trends. The NEB and the STB were the only prominent belts on the planet. The SEB_n, though much inferior to the NEB or the STB, was almost always seen as a thin, faint belt. The other belts were usually very faint or invisible. The SSTB was quite dark near longitude (II) 220° during April. Komoda usually found the EZ somewhat duller than the tropical and temperate zones. This is contrary to the observations of Budine and Haas (Str. A., Vol. 11, Pg. 18), but not of Reese (see table below).

Order of Decreasing Conspicuousness of Belts and Zones

Feature	Komoda	Reese	
SSTB	5	5	gray
STB	2	2	brownish-gray
SEB_s	7	8	gray
SEB_n	3	3	gray
EB		7	gray
NEB	1	1	red-brown
NTB	4	6	gray
NNTB	6	4	brown
NNNTB		9	gray

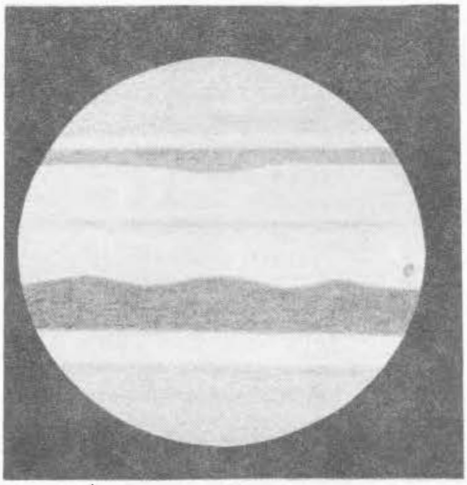

Figure 6. Jupiter. K. Komoda. 8-inch refl. 181X. March 18, 1957. $12^h\ 0^m$, U.T. Seeing 4-5.
C.M.$_1$ = 26° C.M.$_2$ = 92°.
STrZ Disturbance shown as a slight swelling on N. edge STB.

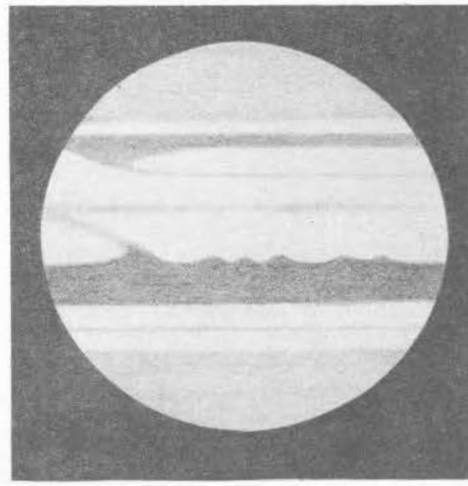

Figure 7. Jupiter. K. Komoda. 8-inch refl. 181X, 233X. April 13, 1957. $13^h\ 50^m$, U.T. Seeing 5-6.
C.M.$_1$ = 241°. C.M.$_2$ = 108°.
STrz Disturbance nearing west limb.

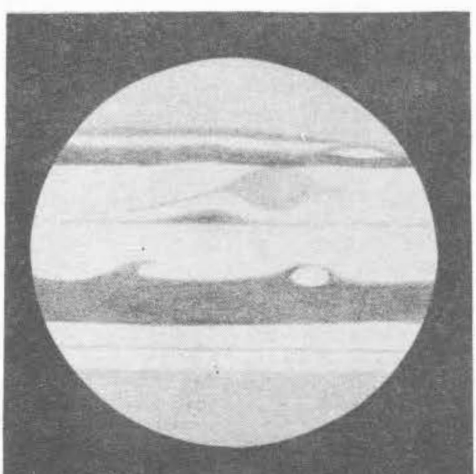

Figure 8. Jupiter. K. Komoda. 8-inch refl. 181X, 233X, 272X. May 23, 1957. $12^h\ 15^m$, U.T. Seeing 6-7.
C.M.$_1$ = 19°. C.M.$_2$ = 301°
Note pointed ends of Red Spot and dark hump on south edge SEB_n near preceding end RS.

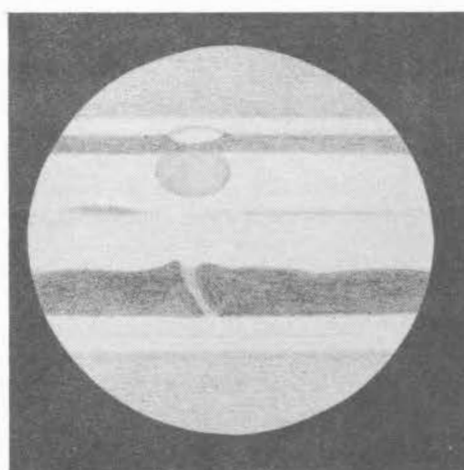

Figure 9. Jupiter. K. Komoda. 8-inch refl. 233X. June 9, 1957. $11^h\ 55^m$, U.T. Seeing 4-5.
C.M.$_1$ = 169°. C.M.$_2$ = 321°.
STeZ white spot, "DE", nearing conjunction with RS.

Order of Decreasing Conspicuousness of Belts and Zones (Continued)

Feature	Komoda	Reese	
RS			orange-ochre, 4.2
SRR			gray, 4.0
STeZ	2	5	white, 7.0
STrZ	3	1	white, 7.7
SEBZ		4	white, 7.0
EZ	5	5	white, 6.5
NTrZ	1	3	white, 7.3
NTeZ	4	2	white, 7.7
NNTeZ		7	yellow, 5.0
NPR			gray, 4.0

The table above is based on 47 sets of estimates from January 3 to August 2 by Komoda, and 10 sets of estimates from November 4, 1956 to April 29, 1957 by Reese.

On January 31 and again on March 19 Komoda found the NPR somewhat darker than the SPR.

PROGRESS REPORT OF THE A. L. P. O.

LUNAR METEOR SEARCH PROJECT, 1957-58

by Robert M. Adams

These are the results of our third year of observations, covering the period from August, 1957 through July, 1958. As was also true in the previous year, we encountered a very high incidence of inclement weather. We have also had great difficulty in formulating a time schedule by which we could insure the maximum amount of overlapping of observational time and at the same time could encourage observations of the moon several days before First Quarter, when the earthlit portion of the moon is more clearly visible.

The following people were engaged in the lunar meteor investigations from August, 1957 through July, 1958, submitting one or more reports each:

George Diedrich, Elyria, Ohio, 6-inch refl.

Observers in the Montreal Centre, Canada, using instruments varying in aperture from 3 inches through 12 inches and grouped together into a total of 12 observing stations located more than half a mile apart from each other. The principal observers are: Klaus Brasch, E. Danson, G. Gaherty, Jr., M. Greenspon, R. Le Marier, M. Mac Kenzie, T. Noseworthy, David Sands, Rosalind Sundell, Sidney Sundell, R. Venor, Fred Vickerson, W.A. Warren, I.K. Williamson, Dorothy Yane, I.M. Yome, and Dorothy Zorgo.

Observers in the Pittsburgh, Penna. area, divided into 4 observing stations and using instruments of through 6 inches in aperture. The observers are Fred Garland, Leonard Moore, Leo Scanlon, and 14 or 15 others.

Craig L. Johnson, Boulder, Colo., 4-inch refl.

G.H. Johnstone, Albuquerque, N. Mex., 6-inch refl.

Robert L. Miles, Woodland, Calif., 12.5 -inch refl.

Dennis Milon, Houston, Texas, 8-inch refl.

Observers from Manchester, Conn., divided into two stations: Eugene Spiess with a 5-inch refr. and Daniel and Doris Fraher with a 3-inch refl.

George Diedrich searched continuously for lunar meteors with negative results on March 24, 1958 from $0^h\ 30^m$ to $1^h\ 0^m$, U.T.

The Montreal group submitted by far the largest number of observations. On August 2, 1957 Dorothy Zorgo observed from $3^h\ 0^m$ to $3^h\ 25^m$ and from $3^h\ 30^m$ to $3^h\ 35^m$, U.T. with negative results. On the same date Sidney Sundell observed from $3^h\ 0^m$ to $3^h\ 10^m$ with negative results. Dorothy Yane observed from $3^h\ 0^m$ to $4^h\ 0^m$, U.T. She saw a golden red light crossing the moon from right to left and lasting a few seconds near $3^h\ 35^m$, U.T. On August 3 Mrs. Zorgo observed from $3^h\ 0^m$ to $3^h\ 25^m$ and from $3^h\ 35^m$ to $4^h\ 0^m$ with negative results. Mary MacKenzie observed on August 31 from $1^h\ 30^m$ to $1^h\ 38^m$ and from $1^h\ 44^m$ to $2^h\ 3^m$, U.T. The results were negative, and the seeing was very good. Mrs. Zorgo observed on the same night from $2^h\ 0^m$ to $2^h\ 38^m$, also with negative results. Miss I.K. Williamson and Mary MacKenzie observed on September 2 from $2^h\ 24^m$ to $3^h\ 0^m$, U.T. with negative results. W.A. Warren observed on September 29 from $2^h\ 10^m$ to $3^h\ 0^m$, U.T. with negative results. On this same date K. Zorgo, D. Yome, and R. Venor also had negative results, observing from $0^h\ 1^m$ to $1^h\ 0^m$. However, the team of S.M. Sundell and M. Mendelssohn saw two meteors across the moon at $0^h\ 35^m$ and at $0^h\ 50^m$ while observing from $0^h\ 5^m$ to $1^h\ 0^m$ on this same date. We thus have an example of two teams, one observing two meteor streaks and the other seeing nothing. These are obviously ordinary meteors in the earth's atmosphere. A third team composed of I. Williamson and M.C. Mac Kenzie also reported negative results while observing at the same time. Three teams observed on September 30 from 0^h to $1^h\ 0^m$, U.T. with negative results. S.M. and R.G. Sundell observed on October 26 from $23^h\ 0^m$ to $23^h\ 33^m$, U.T. with negative results. A little later on the same night, $0^h\ 0^m$ to $1^h\ 0^m$ on October 27, two teams observed and overlapped in time with negative results. Under hazy conditions on October 27, K. Zorgo observed from $23^h\ 2^m$ to $23^h\ 45^m$, and Williamson and Mac Kenzie observed from $23^h\ 13^m$ to $24^h\ 0^m$. Results were negative. Four teams observed on November 24, 1957 from $23^h\ 0^m$ to $23^h\ 17^m$ with negative results. Two of the teams, consisting of Williamson and Mac Kenzie and Mrs. D. Zorgo, observed for 7 or 8 minutes longer with completely negative results. A fifth team composed of the Sundells observed from $23^h\ 0^m$ to $23^h\ 25^m$. S.M. Sundell, who observed during the last 10 minutes, reports an unusual point of light in or near Aristarchus, "generally more brilliant than its surroundings and several times, for brief moments, becoming as bright as a small star nearby" (8th to 10th magnitude). Unfortunately she does not submit the exact time of its occurrence; but since neither of the two teams listed above saw the point of light, perhaps it was a phenomenon in our own atmosphere. [One might also suspect the brilliant central peak of Aristarchus, varying in visibility on the earthshine as the seeing fluctuated. - Editor.] Fully six teams observed on November 25: W.A. Warren from $23^h\ 32^m$ to $23^h\ 42^m$, Greenspon from $22^h\ 55^m$ to $23^h\ 10^m$, Williamson and MacKenzie from $23^h\ 0^m$ to $23^h\ 37^m$, D. Zorgo and G. Yome from $23^h\ 45^m$, Vickerson from $23^h\ 0^m$ to $23^h\ 35^m$, and the Sundells from $23^h\ 0^m$ to $23^h\ 40^m$. The Sundells again had positive results. S.M. Sundell at $23^h\ 7^m$ saw a "white flash, irregular shape, couple of minutes in diameter, center of dark area" and some 30 seconds later saw a thin streak near Tycho, about 15 seconds of arc. The evidence here is rather formidable that these phenomena are of earthly origin since the other teams did not see them. Five teams operated on November 26, all of them observing consistently from $23^h\ 0^m$ to $24^h\ 0^m$ and all reporting extremely good observing conditions. The only positive result is that of Greenspon, who at $23^h\ 10^m\ 30^s$ saw two bronze color "sparks" at the same time, one in the north part of the earthshine and the other in the south part but closer to the center. Again we have an almost overwhelming indication against a lunar origin. On Christmas night the intrepid Sundells and E. Danson braved the cold, observing from $23^h\ 5^m$ to $23^h\ 50^m$. Danson saw an instantaneous flash at $23^h\ 5^m\ 30^s$ of about the 9th stellar magnitude at longitude 20°W. and latitude 20°S. on the lunar surface. Four teams braved the bitter cold to observe on January 23 from $23^h\ 0^m$ to $24^h\ 0^m$; the transparency was very good, but there was some difficulty with the fogging of eyepieces. Results were negative. Three teams observed on January 24: T. Noseworthy from $23^h\ 25^m$ and from $23^h\ 35^m$ to $24^h\ 10^m$ (or $0^h\ 10^m$ on January 25), the last 15 minutes being hazy, Williamson from $23^h\ 13^m$ to $23^h\ 35^m$, conditions being poor and then very poor, and Gaherty from $23^h\ 0^m$ to $23^h\ 15^m$ and from $23^h\ 20^m$ to $23^h\ 35^m$, haze forcing him to stop observing. The results were negative. Five teams observed under excellent seeing conditions on February 22, four of them almost consistently from $23^h\ 0^m$ to $24^h\ 0^m$ with negative results. The fifth team, Greenspon, observed from $23^h\ 30^m$ on February 22 to $0^h\ 25^m$ on February 23, also with negative results. On April 23 the team of Williamson and Gaherty observed from $0^h\ 23^m$ to $0^h\ 30^m$ and from $1^h\ 1^m$ to $1^h\ 11^m$, U.T. with negative results. On May 21, 1958 Danson and S. M. Sundell observed from $2^h\ 4^m$ to $2^h\ 55^m$; Yane observed from $2^h\ 15^m$ to $3^h\ 0^m$; and Gaherty, Brasch, and Williamson observed with a 12-inch reflector from $2^h\ 25^m$ to $2^h\ 56^m$. All three teams had negative results. Incidentally, the seeing was reported as good. On May 24 three teams observed from $2^h\ 0^m$ to $3^h\ 0^m$, except that one team stopped at $2^h\ 50^m$. The first 3/4 hour of observation was under good seeing conditions; the last 1/4 hour was under hazy conditions. Again the results were negative. Five teams worked on June 23. Two of team, David Sands and G. Gaherty, M. I. Yane, and R. Le Marier observed from $2^h\ 30^m$ to $3^h\ 30^m$, U.T. with negative results. The other three teams also reported negative results in observations covering only part of the same time interval. On July 22 three teams reported negative results, Williamson from $2^h\ 0^m$ to $2^h\ 45^m$, D. Zorgo from $2^h\ 5^m$ to $3^h\ 0^m$, and Warren from $2^h\ 0^m$ to $2^h\ 36^m$.

The Montreal group was well organized, and certainly they obtained very significant results. They were guided by the strictest scientific motives.

Eighteen observers from the Pittsburgh area have only recently organized. There are teams from Washington, Sewickley, Springdale, and Pittsburgh, Penna. They have made several observations during the spring and summer of 1958 but have not turned in any reports because they have had only negative results. Under the leadership of Fred Garland, the teams are now planning to keep records even of negative results. They have been urged to do so because aggregate negative results are just as important as positive results. It is hoped that the Pittsburgh group will avail itself of the information above from the operations of the Montreal teams to guide its own work. The question of using a set time schedule has arisen. The Recorder urges that any group of teams set up its own schedule of observing hours after he approves its doing so. However, the use of a time schedule by any group of teams carries with it great responsibility for retaining high scientific standards. The leader of any such group should see to it that each team of observers remains independent and reports only to him. Meticulous records should be kept of all observations, both positive and negative; and these should be duly reported to the Recorder.

Using very modest equipment consisting of a 4-inch reflector, Craig L. Johnson has submitted several reports, first from Wichita, Kansas and then later from Boulder, Colo. He reports positive results for all but one of 7 observing-sessions. On December 27 he recorded a streak at $0^h\ 53^m.4$, U.T., originating near Mare Veris and travelling to Mare Aestatis with short duration. The interval of observation is not given. He states that the streak was very unexpected and that he had never before seen a meteor which may not have been in the earth's atmosphere in five years of observations. On March 28 Mr. Johnson observed from $1^h\ 54^m$ to $2^h\ 1^m$ and from $2^h\ 4^m$ to $2^h\ 14^m$ and reported the following: at $1^h\ 55^m$ a flash of about stellar magnitude 7 and approximately 10 miles in north-south "length" in the Cordilleras, a second flash about 15 miles south of this one, a flash at $2^h\ 1^m$ interpreted as a "telescopic meteor" of magnitude 8.5 with a 12-minute trail, another object at $2^h\ 9^m$ of approximately 9 magnitude on the limb near Grimaldi, and still anotherat $2^h\ 13^m$ 10 minutes of arc away and with a 5-minute trail.

The seeing was reported as 6-7, and the transparency as 4.5. Observing on June 22 from 2^h 58^m to 3^h 2^m (only four minutes), he recorded a bluish white flash of stellar magnitude 6 in Oceanus Procellarum. On June 23 Mr. Johnson observed from 2^h 34^m to 2^h 50^m, U.T. and suspected a flash on the earthshine in the Carpathians near T. Mayer. On June 24 Mr. Johnson worked from 2^h 45^m to 3^h 38^m, reporting no less than seven events. He states that it was about the clearest night in Kansas which he has ever seen. He also says that he saw 60 meteors off the moon during the observing-period. The moon was almost at First Quarter. At 2^h 49^m he remarked a streak, gold in color, with a strangely diffused head, duration 0.9 seconds and approximately magnitude 6. It moved from Lalande to Flamsteed. [An object near the lunar surface moving from Lalande to Flamsteed in 0.9 seconds would have a velocity of more than 600 miles per second. This streak can hardly have been a lunar meteor. - Editor.] Two flashes were seen at 2^h 53^m in Oceanus Procellarum, both strong gold in color and 5 or 6 seconds of arc apart (65X). There was a brilliant white flash near the position of Aristarchus. It lasted about a quarter of a second. At 3^h 10^m there was a blue-white seventh magnitude flash on the limb beyond Lichtenberg. At 3^h 22^m a meteor began at the limb just south of Lichtenberg, going 3 minutes of arc with a magnitude of 6.5. At 3^h 25^m a gold colored meteor of magnitude 6 was seen just off the limb just south of Grimaldi. During the morning of July 12 Mr. Johnson observed from 10^h 5^m to 10^h 15^m and from 10^h 25^m to 10^h 35^m, U.T. The results were negative. He was at Boulder, Colo. on this date. On July 23 he observed during these intervals: 3^h 10^m - 3^h 16^m, 3^h 22^m - 3^h 29^m, 3^h 36^m - 3^h 47^m, and 3^h 56^m - 4^h 4^m. This night, also at Boulder, was again one of the clearest nights Mr. Johnson has worked in. He reports no less than seven events seen on the lunar surface. He sawa flash near Grimaldi at 3^h 10^m, white and 7.2 magnitude. At 3^h 26^m there was a flash in Oceanus Procellarum near Seleucus, very brief, white, and approximately 7.7 magnitude. At 3^h 28^m there was a "meteor" near Copernicus with a 10-minute trail, going N.W. to S.E. Another flash was seen at the same position as the 3^h 26^m flash at 3^h 33^m, being slightly brighter and 6.9 magnitude. At $3h$ 40^m there was a white streak from about Bullialdus to about Schickard. It was travelling so swiftly that Mr. Johnson couldn't tell in which direction it was moving. At 3^h $46m$ there was a white streak 6 minutes long near Zupus with magnitude 5.1. At 3^h 57^m a flash was seen near Mare Imbrium, white in color, 6.9 magnitude, and 0.5 seconds duration. Mr. Johnson adds that he saw many more objects than were recorded and continues: "It is obvious that the moon was on a meteor stream... All in all exactly 100 meteors were seen besides those mentioned specifically above".

Robert Miles observed on two different occasions with negative results. He employed a 12.5-inch reflector on November 17 and an 8-inch reflector on another occasion.

Using a 6-inch reflector, G.H. Johnstone observed from 1^h 0^m to 2^h 0^m, U.T. on September 29. He suspected a pinpoint of light in the region of Aristarchus, no trail and of extremely short duration. He had negative results on November 26 and 27, observing for an hour each night.

Mr. Milon observed on February 3, 1958 and saw a meteor in front of the moon but attributes it to our atmosphere. It was seen at 4^h 20^m, U.T.; it covered about half the field of an 8-inch reflector at 336X, travelling about 3 minutes of arc. It was around the 6th magnitude. He observed on March 24 from 0^h 45^m to 1^h 45^m with negative results.

The teams from Manchester, Conn. achieved a few overlapping observations. Mr. Spiess and his son observed for several months before the Frahers started. The Spiesses had negative results on August 2 from 2^h 10^m to 3^h 20^m, on September 29 from 0^h 5^m to 1^h 40^m, and on September 30 from 1^h 10^m to 2^h 20^m. On October 26 observations were from 22^h 59^m to 23^h 49^m, U.T. At 22^h 49^m an object was seen to pass across the dark portion of the lunar surface. It was almost a tenth of the diameter of the moon. It was shaped somewhat like a tear drop and went across in some 2 seconds. This Recorder suggested that it looked like a runaway weather balloon somewhere up in the jet stream. Mr. Spiess concurs. On November 26-27 (date changed during observations) Mr. Spiess watched from $23^h\ 13^m$ to $1^h\ 40^m$, U.T. with good skies but negative results. He spent Christmas night out among the stars, observing from $22^h\ 58^m$ to $23^h\ 42^m$, U.T. - with negative results. The seeing was poor on this night. The Spiesses observed from $23^h\ 0^m$ to $23^h\ 26^m$, U.T., on January 23 with negative results. Overlapping somewhat in time, the Frahers looked from $22^h\ 30^m$ to $23^h\ 30^m$, also with negative results. The Spiesses watched on February 21 from $23^h\ 0^m$ to $24^h\ 0^m$, with a few minutes off and with negative results. The Frahers observed from $23^h\ 5^m$ to $23^h\ 30^m$ with negative results. On April 24 from $0^h\ 8^m$ to $0^h\ 34^m$, on April 25 from $0^h\ 4^m$ to $0^h\ 52^m$, and on April 26 from $1^h\ 58^m$ to $3^h\ 58^m$ the Spiesses observed with negative results. Both the Frahers and the Spiesses were rained out in May and June. On July 20 from $0^h\ 30^m$ to $1^h\ 9^m$ and from $1^h\ 11^m$ to $1^h\ 30^m$, U.T. the Frahers looked without results. The Spiesses watched from $0^h 52^m$ to $1^h\ 24^m$ on July 21 but with negative results, and the Frahers looked from $0^h\ 40^m$ to $1^h\ 30^m$ on the same night but again with negative results.

All of the above are interesting. We find that, generally speaking, we have negative results with the notable exception of Mr. Johnson, whose reports are replete with discoveries. The Recorder thanks all those who observed so faithfully, and we should not be discouraged just because there were no positive results. What means a great deal is the fact that evidence is beginning to pile up questioning the validity of the existence of flashes or light streaks on the lunar surface. Once more there is not a single instance of verification.

The Recorder would welcome suggestions as to time schedules. He will try to pick out a simple schedule. In the meantime please observe when you can but preferably during the 3rd, 4th, and 5th days after new moon just after twilight. Any groups wishing to make out their own time schedules should please obtain permission from this Recorder.

Good observing!

A VARIABLE RATE TELESCOPE DRIVE

by Carlos M. Jensen

The primary reason for constructing a variable rate drive is, of course, to provide a convenient and accurate means for changing the tracking speed of a telescope, thus allowing it to follow different celestial objects. The details of the construction and the adjustment of such a drive would require considerably more information than it is feasible to give here, but I shall be happy to furnish this information to anyone interested in constructing the apparatus.

The speed of a synchronous motor, of course, is dependent upon the frequency of the voltage supplied to it. By varying the oscillator frequency, the speed of the drive can be changed. In addition to the oscillator, a power supply and a power amplifier are required. Both can be constructed very easily. The oscillator schematic alone is shown in Figure 10. The circuit used is a Wien-Bridge oscillator. It is simple to build and requires no odd, or difficult to obtain, parts.

The power supply should be able to deliver about 250 to 300 volts D.C. at 150 Ma., depending upon the size of the power amplifier used, plus filament voltages. The size of power amplifier to build depends upon the power required by the drive motor being used. The proper type of output transformer must be used on the power amplifier so that it will provide the standard 115 volts along with sufficient current at the output terminals of the amplifier. Of course, the amplifier will have an

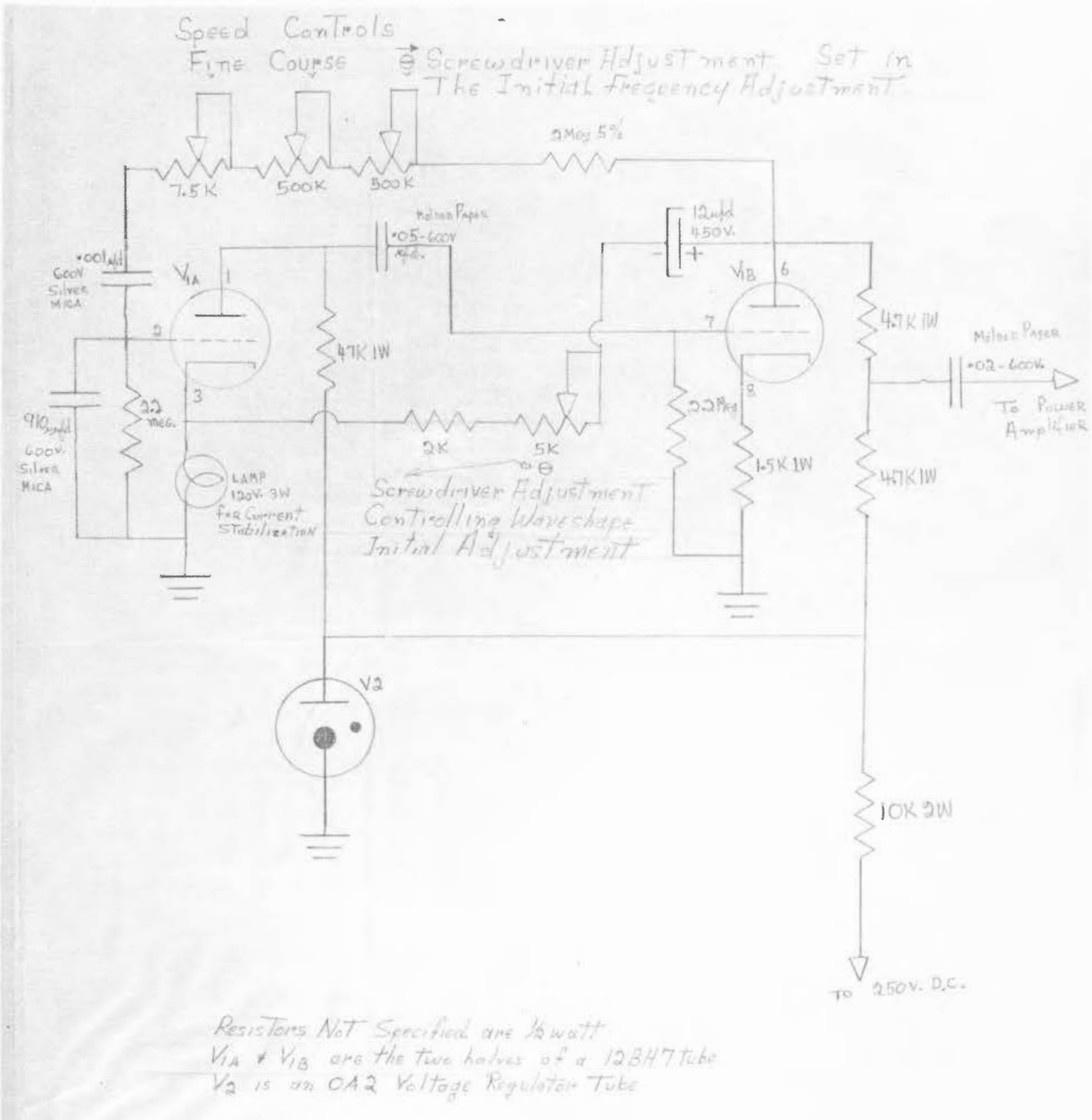

Figure 10. Schematic of an oscillator circuit for a variable rate telescope drive. Refer to article by Carlos M. Jensen in this issue.

amplitude control to adjust the output voltage to the proper level.

The motor on my drive is an 8 watt synchronous unit. The amplifier used here is a war surplus servo amplifier, which fills the bill very well. It is always wise to have an amplifier that can deliver the needed amount plus about 50 %. The complete unit, including power supply and amplifier, can be built for the price of a good 12 watt Hi Fi amplifier system.

I have found it quite an advantage to be able to set my drive to the proper speed when tracking different objects, for example the moon, Mars, and a star. Adjusting the unit to the proper speed on each object for the first time is quite a little task; but once it is done, the controls can be set in a second to the previously recorded position for whatever object is to be observed.

Postscript by Editor. Mr. Jensen's address is 1432 West 4th South, Salt Lake City 4, Utah.

It would seem to the Editor that the rate could be set to the known motion in right ascension of the moon or a planet, easily extracted from the Ephemeris for the date of observation. A variable rate drive of sufficient range might also assist in the telescopic tracking of artificial satellites.

AN ATLAS OF LUNAR DOMES

by

Leonard B. Abbey, Jr., and Ernst E. Both

Although known for almost 100 years, lunar domes have until recently received very little systematic attention. From the point of view of the selenologist these curious formations are of great importance, since they are commonly regarded as representing one of the final stages of selenic activity. A number of students of the Moon have paid considerable attention to domes in selected areas of the lunar surface, but since there seems to be some disagreement as to what features belong to the category of "true domes" (1), - assuming that this term can be applied to a distinct group of objects - , and since no effort has hitherto been made to represent these features in specially prepared maps, it was thought to be of interest and value to provide the student of selenography with selected maps of interesting areas, indicating all domes which can be observed both photographically and visually. In so doing, the authors hope to offer some basis for further, more detailed investigations, and to add a small fraction to our knowledge of the Moon.

History

In the recent literature dealing with the Moon one can frequently read statements to the effect that the earlier selenographers paid no attention to domes, indeed that they missed them entirely, and that consequently these objects do not appear on their maps. Such statements are, of course, only partly true. Generally speaking, the domes appear, more often than not, as low, round, and ill-defined hills, and as such they were undoubtedly considered and some of them even charted both by Lohrmann and Maedler; for example, Lohrmann shows the well-known domes near Arago as low hills on section II of his map (2), and Maedler, likewise, records the dome east of the same crater in a similar manner (3). Since both selenographers were, however, mainly concerned with the general mapping of the lunar surface, thereby breaking new ground, it is hardly surprising that they did not pay any closer attention to what was to them only "minor detail". Schmidt, on the other hand, actually knew that "domes" (in the sense of our usage of the term) exist on the Moon, calling them "Beulen" (literally "boils" or "swellings"), and measuring the heights of some of them (4). On section II of his great map Schmidt shows the objects near Arago as "domes", drawing them in a manner distinctly different from his representation of hills or isolated peaks. Before the publication of Schmidt's work, Nasmyth and Carpenter had maintained that "nothing of the kind" existed (5), even though they reproduced the prominent dome at the northern end of the Birt-rill (6). Neison (7), basing his work primarily on that of Maedler, does not mention domes at all.

In 1903 Shaler classified domes as "a third group of lunar elevations, possibly akin to the long ridges" (8). He remarked that "in number they rival the crateriform structures" and suggested that "certain, perhaps all of them, may be incipient craters" (9). Shaler was also perhaps the first selenologist to interpret these domes as inflation mounds (to borrow Spurr's term) due to internal gas-pressure, and he stated that "the distribution of the exceedingly small bleb-like domes on the lunar surface suggests that they are the first stage in the development of craters, the imprisoned vapors serving to lift the surface although it was not broken through" (10). He also linked the domes to the isolated peaks on the one hand, and to certain central mountains on the other. Shortly after Shaler published his investigation, Puiseux came to similar conclusions and, perhaps for the first time, photographed some domes (11).

Already before Shaler, Krieger had charted a large number of domes, but his premature death prevented him from carrying out his plans. Some of the excellent charts of Krieger, published in 1912 by Rudolf Koenig, contain a great number of domes (12). At the same time Fauth had already begun some preliminary work on his great topographical map (scale 1:1, 000, 000), and his many drawings and charts indicate that he knew quite a great number of domes. In his major work, Unser Mond (1936), he mentions domes frequently (using Schmidt's term "Beulen"), but he did not believe that they were "inflation mounds", to put it simply, and he made no attempt to explain them (13).

In 1932 Barker had published a report on the prominent dome inside of Darwin, describing it as "a huge cinder-heap, a lunarian dust-heap which bristles with roughness - like a selenite slag-heap" (14). Two years later Chemla-Lamech drew attention to several domes and charted some of them (15), and by 1936 Karl Mueller was able to write that "hundreds of domes of all sizes exist on the lunar surface, most of them with a hole on top" (16). After this, little progress was made until 1945 when Spurr began to publish his Geology Applied to Selenology. In the four volumes Spurr pays considerable attention to "domes", "domical uplifts", and "inflation mounds", explaining them somewhat along the lines of Shaler's theory. Cooke did not essentially depart from either Shaler or Spurr's explanations (17), but he did observe "that the domes are invisible when the solar altitude is more than ten or fifteen degrees. Under a low sun they appear darker than the surrounding mare, blending into the maria as the lunar day progresses". This observation was explained by the assumption (probably correct in most cases) "that their surfaces are scoriaceous and seamed with minute fissures, which being shadow-filled under a low sun appear darker than the smoother surface of the maria" (18).

In the years following Cooke's investigation a number of observers studied selected areas, drawing attention to a number of objects which were formerly not recognized as being domes. However, no systematic study appeared until 1957 when Moore and Cattermole began to publish the first part of "A Catalogue of Lunar Domes" (19). In the same year an important article by Dinsmore Alter appeared, in which the author pointed to the seemingly close relationship between "the typical rounded mare type of isolated craterlets" and the domes, suggesting that the former might be "the result of collapse or bursting of domes" (20).

Types of Domes

The term "dome" is currently applied by investigators to a variety of objects which, to some extent, have certain characteristics in common: they are usually circular in outline and throw a regular shadow; they are somewhat convex, low, ill-defined, darker under low sun but brightening as the sun's altitude increases; their size varies from one mile or less to 40 miles or more; many of them exhibit a central craterlet or "blow-hole"; they occur in all regions of the lunar surface,

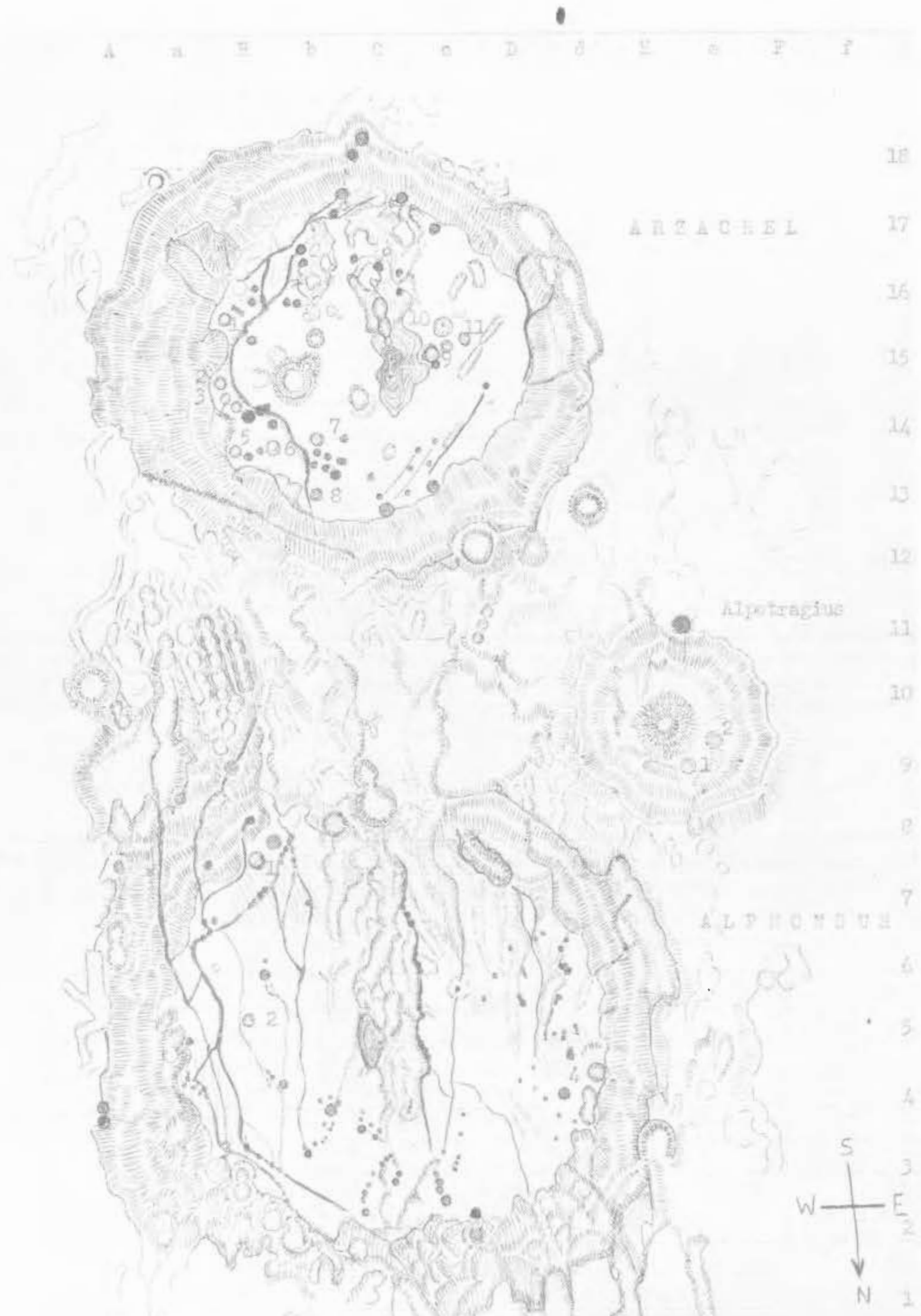

Figure 11. Special lunar map by Ernst E. Both of lunar domes in the ring-plains Arzachel, Alpetragius, and Alphonsus.

although they seem to frequent the maria more, but this may be due to the fact that they are easier to detect there; generally they resemble low, rounded hills, and certain authors have indeed not attempted to make any distinction between "rounded hills" and "domes" (Fauth, Dinsmore Alter), while others have maintained that a distinction exists (Moore). Of course it is difficult, if not impossible, to recognize any difference between rounded hills and domes in many cases, although the latter seem to be more symmetrical and "softer" in outline. Moreover, in some cases it would be premature to make a clear-cut distinction between the one and the other.

Within the group of objects now collectively termed "domes" it is possible to distinguish between a few more or less distinct types. For working purposes only the authors therefore have adopted the following classification:

Type I: small domes, diameter less than 10 miles, usually around 1 or 2 miles, corresponding in size to the small, mare type craterlets; outline very regular, central craterlet very difficult to detect owing to the extremely small size of "blow-hole" type. The domes inside of Alphonsus and Arzachel are good examples.

Type II: common domes, or domical uplifts; relatively lower than type I domes, and surface consequently less convex; diameter generally between 10 and 20 miles, outline circular or elliptical; a central craterlet can be observed in many cases. Prototypes are the domes near Arago, Prinz, and Krieger.

Type III: large domes, or inflation mounds; diameter over 20 miles, often in the neighborhood of 40 miles. The outline is not too regular, frequently departing somewhat from circularity, often exhibiting more than one craterlet on the surface, at times even ridges and crater chains. The large object inside of Darwin is a good example.

Type IV: domical hills, or objects which do not seem to be true domes. This type embraces all rounded hills, the exact nature of which seems to be doubtful at the present time.

Naturally this classification is not a rigid one, and in many cases it will be impossible to decide which type to assign to an object, but it is hoped that students will find it convenient for purposes of simple description.

Section I: Alphonsus, Alpetragius, and Arzachel

The map offered here (Figure 11) shows the region of Alphonsus, Alpetragius, and Arzachel. It was prepared from the best available photographs and confirmed or checked by the authors with the aid of an 8-inch reflector (Abbey), and an 8-inch refractor (Both). In drawing the map particular attention has been paid to floor detail, the surrounding areas being only indicated, while the wall-detail is somewhat generalized.

Alphonsus: The floor exhibits an amazing number of very small craterlets (represented as black dots) and an intricate system of rills, of which those near the western wall are the most prominent. A ruggedly twisted mountain-ridge runs from the southern wall towards the north, rising abruptly in the approximate center of the floor to a height of some 4,400 ft.(Schmidt). Similar, but lower and shorter, ridges occur particularly in the south-eastern quadrant of the floor. Associated with the craterlets on the one hand, and the rills (which are in part crater-chains) on the other are four domes: No. 1 (B-7.7), diameter about 2.5 miles, type I; No. 2 (B-5.3), diameter about 2 miles, type I; No. 3 (a-3.0), diameter over 3 miles, probably of type IV; and No. 4 (D-4.5), diameter 3 miles, also of type IV. All four domes are somewhat difficult objects, but Nos. 1 and 2 are well-shown on photographs.

Alpetragius: The floor of this crater is lacking in detail, being almost completely filled by the central mountain which towers to a height of some 5,700 ft. (according to Schroeter 6,636 ft., but as Schmidt correctly indicated this must be due to a mistake). This mountain is in itself a domical object, being perhaps unique on the lunar surface. At the north-eastern base of the mountain are two domes of type I or type IV (Schmidt drew them as rounded hills): No. 1 (E-9.1) and No. 2 (e-9.5), both about 2.5 miles in diameter.

Arzachel: In some ways this crater is a smaller edition of Alphonsus. The floor is covered with minute craterlets, some of which align themselves in pairs and very short chains. A very prominent rill runs along the western wall, actually breaking the floor so that the extreme western part is somewhat lower. Similar to Alphonsus, the eastern floor is lacking somewhat in detail. A twisted ridge runs almost meridionally from south to north, rising in the shape of the central mountain to a height of about 5,700 ft. (Schmidt). This mountain has two peaks, of which the lower, southern peak measures only some 3,500 ft. in height. A number of small domes "hug" the western wall, following the curvature of the rill: No. 1 (a-15.7), No. 2 (a-14.8), No. 3 (a-14.6), No. 4 (a-14.5), No. 5 (a-13.7), No. 6 (B-13.9), No. 7 (b-14.0), and No. 8 (b-13.2), all of which probably belong to type I, are about 2 miles in diameter, and some of them are decidedly conical in shape. East of the central mountain are three domes, all of type IV: No. 9 (C-15.3), No. 10 (c-15.6) with central pit?, and No. 11 (c-15.5).

It is planned to publish other sections of our special maps at regular intervals. Among these are: Copernicus, Aristarchus, Diophantus, Arago, Birt, Hoerbiger, and others. All investigators interested in the project are invited to submit their observations to the authors.

(The authors wish to express their gratitude to the staff of Lockwood Memorial Library of the University of Buffalo for the use of their inter-library loan system, but especially to Professor Emeritus Charles Willard Griswold for placing at their disposal his admirable collection of selenographical material.)

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20. Alter, Dinsmore, "The Nature of the Domes and small Craters of the Moon", Publ. of the Astronomical Society of the Pacific, vol. 69, No. 408 (June 1957), p. 250.

BOOK REVIEWS

Introduction to the Moon

By Dr. Dinsmore Alter. Griffith Observatory, 1958. 108 pages. 69 Illustrations. Price $1.50.

Reviewed by Alika K. Herring

Dr. Alter, who served as Director of the Griffith Observatory in Los Angeles for 23 years, is one of the few career astronomers who has made an extensive study of selenology. He has made many important contributions to the science; readers will probably recall his outstanding photographic work on the Alphonus-Arzachel region where he obtained strong evidence for some type of probable atmospheric obscuration in those craters.

Dr. Alter has published many papers on the moon in both The Griffith Observer and The Publications of the Astronomical Society of the Pacific. Introduction to the Moon is a collection of several of these articles. Of these, several consist of a speculative history of lunar observation, from the days of prehistoric man until the time when man actually reaches the moon and establishes his observatories there.

For the most part, however, the book is concerned chiefly with the genesis of the lunar surface. While admitting the possibility of "trigger" impacts, the author still makes it very clear that the meteoritic theory should receive but little consideration, and that the large majority of the lunar features can only be the result of diastrophic forces. The arguments are presented in a very lucid and convincing manner, and the book is profusely illustrated with many of the excellent Lick and Mount Wilson photographs which effectively demonstrate each point. These were carefully handled by the engraver; but as one who has seen many of the originals, this reviewer can only deplore the inadequacies of the half tone plate. The author closes the book with some verses which are thoughtful and timely.

Introduction to the Moon is well worth the attention of every lunar student.

The Planet Jupiter, by B.M. Peek. The Macmillan Co., New York, 1958. 283 pages. XVI plates and 14 diagrams. Price $8.50.

Reviewed by Walter H. Haas

What Dr. Gerard de Vaucouleurs has so splendidly achieved for the Red Planet in his Physics of the Planet Mars, Mr. Bertrand M. Peek, for many years the Director of the Jupiter Section of the British Astronomical Association, has now accomplished for the Giant Planet. The Planet Jupiter will surely be a classic for many years to come and is indispensable to any professional or amateur astronomer having any serious observational or theoretical interest in Jupiter. Mr. Peek has compiled between two covers a great amount of valuable material previously scattered through various journals, many of them hard to find. The text is reliable and remarkably free of errors, and the style of writing is clear and easy to follow for any attentive reader without being "popular" in the trivial sense. The illustrations and diagrams are well chosen to assist the textual presentation and are of good quality, some dozens of drawings of part or all of the planet by skillful members of the B. A. A. Jupiter Section being included.

After several introductory chapters, the author describes visual methods of studying Jupiter: drawings, color estimates, latitude measurements, and central meridian transits. There follows a description of the different known latitudinal currents, beginning with the north limb and running to the south limb. Mr. Peek then discusses various features of special interest. It is here curious that the Great Red Spot, the South Tropical Disturbance of 1901-40, the major outbreaks of activity in the South Equatorial Belt, the Circulating Current in the South Tropical Zone, two oscillating spots in the same zone in 1940 and in 1941-2, the dark South Tropical Streaks of 1941-2 and 1946-7 (also of 1955-7), the long-lasting dark and light portions of the South Temperate Zone observed from 1940 to the present time, and the apparent sources of radio emission right now under study all lie in a restricted range of Jovian latitudes - from 5° S. to 35° S. There is nothing comparable in the northern hemisphere. The final chapters present some stimulating theoretical considerations and a description of the satellites and the phenomena of the four bright ones.

Most of the book is based upon results from the method of visual central meridian transits of surface markings. As Mr. Peek emphasizes several times, these form a quantitative method of investigation and do not rest upon the subjective interpretation of planetary detail near the limit of visibility. Surely these transits have been more fruitful in studying Jupiter than the interminable controversy about whether the canals of Mars are Lowellian lines, Antoniadian splotches, or something intermediate has been in increasing knowledge of that planet. The method of central meridian transits deserves to be pursued much more earnestly by American amateur observers. The equipment required is only a telescope and a watch; and some results can be obtained with as little as three or four inches of aperture, though a much larger instrument will be better because it will reveal many more markings. One simply records, to the nearest minute, the moment at which the rotation of Jupiter carries each surface feature past the meridian of longitude through the center of the disc, in other words, when the spot watched is midway between the east and west limbs. An experienced observer can apparently usually record this time with an error of only two or three minutes; and if the feature can be kept under observation for a month, the rotation-period can be deduced with an error of only a few seconds at most. The reduction of the observations involves the computing of the longitude of each feature from suitable tables, the graphing of longitudes of markings as a function of time (date), and the drawing of drift-curves on this graph. The latter process can be a little tricky when a region is very active and subject to rapid changes.

Mr. Peek seems rather skeptical of the value of color estimates and explains how atmospheric dispersion can induce false colors on a belted planet, with a possible periodicity of 12 years for Jupiter when the observations are all from one hemisphere of the earth-unfortunately thus masking any existing Jovian seasonal effects. Perhaps the point is labored too heavily; for atmospheric dispersion will be acting along the vertical circle in the sky through the position of Jupiter (with occasional exceptions very near the horizon), and this circle can be very far from being normal to the belts, as it must be approximately to produce the spurious colors, when the planet is not close to the observer's meridian.

The major criticism of the book must be that it is excessively pre-occupied with the Jovian studies of the British Astronomical Association. If a book on Jupiter is to have a bias, there can surely be no better one; we must all hold the work of the B. A. A. Jupiter Section since its formation in the highest esteem. Nevertheless, Continental work on Jupiter is ignored; and very few American amateur observers of the planet are even mentioned. The ideal Jupiter Observing Group of the future should be worldwide, thus international and perhaps similar to the I. G. Y. world-centers. Only by this wide distribution of observers can we obtain effective coverage of all longitudes of the Giant Planet, a remark especially true when Jupiter is close to conjunction and can only be usefully observed at a given place for an hour or two. Radio communication among active observers in different countries would here seem essential. If such a scheme can be set up, the gaps in our records of important Jovian spots often mentioned by Mr. Peek as the result of prolonged bad weather in the British Isles would be avoided.

Four appendices give a method of reducing latitude measurements, a formula for computing the central meridian transit of a shadow, the tabulated amount of rotation as a function of time in the two systems of longitude employed, and tables of rotation-periods in these two systems as a function of change of longitude (with sign) in 30 days.

A classic book, very highly recommended.

THE A. L. P. O. LUNAR MISSILE SURVEY: A STATUS REPORT

by Walter H. Haas

On pp. 56-57 of our April - June, 1958 issue we invited interested readers to join us in a cooperative effort to patrol the lunar surface in a systematic watch for moon rockets and their after-effects. Since then the U. S. Air Force's "Pioneer" of October 11 - 13, 1958, has penetrated space to a distance of almost 80, 000 miles from the earth; and far more exciting events may have transpired before these lines are read. The procedure is to assign each observer who registers in the project one of the sections of the Wilkins map of the moon for his special study. (However, the four very small corner sections are each combined with an adjacent section, leaving the moon divided into 21 parts.) It is then the observer's job to learn his assigned section as well as he can as soon as he can and to become as familiar as possible with its aspect under all solar illuminations. This assignment is not a trivial or easy one; and if we had enough observers, sections far smaller than those of the Wilkins map would be preferable. Our goal is to establish a worldwide team of observers having a detailed knowledge of the moon and able to keep it under constant examination.

The response to our request has been most gratifying. At this writing (November 6, 1958) there are 43 "observers" registered in the project. Some of the "observers" are actually groups of from two to about 20 people, the last number referring to the Skyscrapers, Inc. at Providence, Rhode Island under the leadership of Mr. J. Frank Morrissey. There are two husband - and - wife teams, Daniel and Doris Fraher at Manchester, Conn. and Charles and Virginia Capen at the Baker-Nunn Satellite Tracking Station at Shiraz, Iran. The largest telescopes available in the project are Paul R. Engle's 17-inch reflector at Pan-American College, Edinburg, Texas and Lyle T. Johnson's 16-inch reflector at Blossom Point, Maryland. A number of the Lunar Missile Survey people have already been active in other A. L. P. O. projects; such names as Phillip Budine, Eugene Spiess, Patrick Moore, and Jack Eastman will be familiar to our readers. It is unfortunate for lunar coverage in time, however, that only four of the 43 observers live outside of the continental United States.

Let us attempt a hurried review of what we may hope to observe when lunar probes are launched. Those living close enough to Cape Canaveral, Florida, the launching-site, may actually be able to see the launching stages with eye or binoculars as they climb upward. (Refer to the observations by Mr. and Mrs. G. R. Wright and Mr. Robert McCracken, Sky and Telescope for November, 1958, pp. 5-6 of Special Supplement.) As it recedes from the earth, the lunar probe will become so faint and so slowly moving that its telescopic detection would quickly be a matter of extreme difficulty, and the fact that its direction must become similar to that of the moon means that at many lunar phases the probe would suffer from the additional disadvantages of a much brightened sky background. Photographic procedures would seem more hopeful than visual ones but are probably beyond most amateur astronomers. Mr. Clyde Tombaugh has computed that a German V-2 rocket, painted white and seen broadside, would be of stellar magnitude fifteen at the distance of the moon. These early moon rockets are apt to be some stellar magnitudes dimmer than that. For a rocket sharing the moon's orbital motion, the angular drift among the stars is only 30 seconds of arc per minute of time. If retro-rockets are employed to modify the orbit of a moon rocket, their flame would be much brighter than the vehicle itself and perhaps can be observed in the larger amateur telescopes *if* one knows rather accurately when and where to look. It would presumably be of value thus to obtain optical positional data from the retro-rockets. (Of course, the flame would look star-like at the moon's distance.)

A missile which strikes the lunar surface will produce an impact-flash. A reasonable guess would be that the first missiles will cause impact-flashes between stellar magnitudes ten and fifteen. There is hardly the slightest chance of observing such flashes in the sunlit part of the moon; it may be well to remark that the average stellar magnitude of a square second of arc of the full moon is about plus four. The best circumstances for witnessing missile impact-flashes are, outside of the rare event of lunar eclipses, on the earthlit hemisphere some days both before and after new moon. These missile-impacts may be very interesting from another point of view, that of what they reveal about the layer of dust often assumed to cover the lunar surface. The impact could throw this dust to great heights above the surface, but in the essential vacuum there tiny dust particles fall just as rapidly as cannon balls. Elevated dust would be back to the surface from a height of 10, 000 feet in about a minute and from a height of 40, 000 feet in about two minutes. Impact-raised dust-clouds would thus be brief affairs and could presumably be detected only on the sunlit hemisphere.

Impact-craters, artificial stains, etc. can naturally be observed if large enough. In view of all the concern about extreme surgical cleanliness with the recent Pioneer (Sky and Telescope for November, 1958, pg. 7 of Special Supplement), perhaps only craters deserve our immediate attention. There are few places on the moon where a new crater of ordinary appearance as much as a mile in diameter could be recognized as new, so incomplete is our knowledge. If, however, the impact formed a crater much brighter or much darker than its surroundings, then a far smaller object could be identified by an attentive observer. The student of Mars will think of the black Fons Juventae, prominent under favorable conditions although well below the Dawes Limit of ordinary telescopes. Dr. Dinsmore Alter has estimated that a very bright lunar spot only 100 feet across on a dark mare floor can even be photographed. (Proceedings of Lunar and Planetary Exploration Colloquium, Vol. 1, No. 1, pg. 14. May 13, 1958.)

If this evaluation of our prospects in this study seems a little pessimistic, perhaps we may do well to compare the expectations about artificial satellites in the summer of 1957 with the reality that soon afterwards came to pass.

Several practice-sessions have been held in order to test and improve our procedures. The first two such sessions were held on September 27, 1958, 1^h to 6^h, U.T. and on September 29, 1958, 1^h to 6^h, U.T. Perhaps a report of results will be of value to suggest how effective our coverage would now be on an actual moon rocket. The moon was full on September 27 near 22^h, U.T.; and the brightness of the moon was thus a serious handicap to the observers, especially on September 27. We shall not include in this summary observers who were unable to work for clouds or other reasons.

Jack A. Borde, Clarion Cochran, and David Steinmetz. Concord, Calif. Section I. 3.5-inch refl., 6-inch refl., and 8-inch refr. Observed from 1^h to 6^h on September 27 and from 3^h to 6^h on September 29.

Neil Meik. Greggton, Texas. Section II. 10-inch refl. Observed from 2^h 30^m to 5^h 30^m on September 29.

Frank Rosemeck. Berkley, Mich. Section II. 8-inch refl. Observed from 3^h 0^m to 3^h 45^m and from 4^h 30^m to 5^h 45^m on September 29. U.T., as usual.

Paul R. Engle and others. Edinburg, Texas. Section III. 17-inch refl., 6-inch refr., and 5-inch refr. Observed 1^h 0^m - 4^h 30^m and 5^h 30^m - 6^h 0^m on September 27 and 2^h 30^m - 5^h 30^m on September 29.

Paul J. Nemecek. Whittier, Calif. Section IV. 12.5-inch refl. Apparently observed from 3^h to 6^h on September 27.

Carlos E. Rost. Santurce, Puerto Rico. Section IV. 6-inch refl. Observed from 0^h 0^m to 1^h 15^m on September 29.

Lewis Dewart. Sunbury, Penna. Section V. 6-inch refl. Observed from 1^h to 3^h on September 29.

Carlos M. Jensen. Salt Lake City, Utah. Section V. 3 1/4 - inch refr. Observed from 3^h 15^m to 5^h 30^m, U.T. on September 29.

Eugene Spiess. Manchester, Conn. Section VI. 5-inch refr. and 3-inch refr. Observed 1^h 8^m - 1^h 52^m and 2^h 3^m - 3^h 42^m on September 29.

Phillip W. Budine and others. Binghamton, New York. Section VII. 4-inch refr., 3-inch refr., 2-inch refr., and 6-inch refl. Observed from 0^h 30^m to 3^h 15^m on September 27.

Beaufort S. Ragland and F.S. Clark. Richmond, Virginia. Section VIII. 4.5-inch refr. Observed, with a few breaks, from 1^h 0^m to 4^h 20^m on September 27 and from 1^h 15^m to 6^h on September 29.

Charles M. Cyrus. Baltimore, Md. Section IX. 10-inch refl. 1^h 0^m to

$3^h\ 0^m$ on September 27 and $1^h\ 55^m$ to $3^h\ 20^m$ on September 29.

Craig L. Johnson. Boulder, Colo. Section XI. 4-inch refl. $1^h\ 0^m$ - $2^h\ 0^m$ and $2^h\ 50^m$ - $4^h\ 30^m$ on September 27 and $2^h\ 2^m$ - $5^h\ 20^m$ on September 29.

Philip R. Glaser. Menomonee Falls, Wisc. Sections XII and XIII. 6-inch refl. Observed from $4^h\ 15^m$ to $6^h\ 0^m$ on September 27 and from $1^h\ 50^m$ to $6^h\ 0^m$ on September 29.

D.D. Werdick. Bloomington, Minn. Sections XII and XIII. 6-inch refl. 2^h - 4^h on September 27 and $1^h\ 45^m$ - 3^h and 4^h - $5^h\ 10^m$ on September 29.

Edwin B. Edwards. Manhattan Beach, Calif. Section XIV. 4 1/4 - inch refl. Observed from $3^h\ 0^m$ to $5^h\ 0^m$ on September 27 and from $4^h\ 0^m$ to $6^h\ 0^m$ on September 29.

Minick Rushton. Atlanta, Georgia. Section XIV. 6-inch refl. 3^h - 6^h on September 27 and 3^h - 6^h on September 29.

Dorothy E. Pickering. Reeds Ferry, New Hampshire. Section XIV. 8-inch refl. 1^h - 3^h, U.T. on September 29.

Michael Ward. Houston, Texas. Section XV. 4 1/4 - inch refl. 3^h to 7^h on September 29.

Stephen Sinotte. Keokuk, Iowa, Section XV. 10-inch refl. 2^h to 5^h on September 29.

Jack Eastman. Manhattan Beach, Calif. Section XV. 12.5-inch refl. and 2.5-inch refr. $4^h\ 7^m$ - $4^h\ 35^m$ on September 27 and $4^h\ 10^m$ - $5^h\ 40^m$ on September 29.

Tom Krohley. Huntington Station, New York. Sections XVI and XVII. 6-inch refl. $0^h\ 45^m$ - $3^h\ 0^m$ (with a few breaks) on September 27 and $1^h\ 0^m$ - $2^h\ 45^m$ on September 29.

Charles H. Frerichs, III. Teaneck, New Jersey. Section XVIII. 6-inch refl. 1^h to 2^h on September 29.

Frederick W. Jaeger. Hammond, Indiana. Section XIX. 6-inch refl. 4^h to 6^h, with a few breaks, on September 27. $3^h\ 15^m$ to $5^h\ 30^m$ on September 29.

Fred Wyburn. Red Bluff, Calif. Section XIX. 4-inch refr. Observed for 32 minutes on September 27 and for 48 minutes on September 29.

Daniel and Doris Fraher. Manchester, Conn. Sections XX and XXI. 3-inch refl. 2^h to $2^h\ 30^m$ on September 29.

Lyle T. Johnson. Blossom Point, Md. Section XXII. 16-inch refl. Observed and photographed from $1^h\ 50^m$ to $3^h\ 10^m$ on September 27 and from $2^h\ 50^m$ to $5^h\ 5^m$ on September 29.

Gerard J. Logan. Fort Lee, New Jersey. Section XXIII. 6-inch refl. 1^h to $4^h\ 45^m$, with breaks, on September 29.

Robert Leasure. Galloway, Ohio. Sections XXIV and XXV. 8-inch refl. 4^h to 5^h, U.T. on September 29.

Nothing unusual was seen by any of the observers, nor was anything unusual expected.

Perhaps the most evident conclusion from the above is the need for more observers. Even in what was intended to be 10 hours of intensive group-effort Section X was not observed at all; and Sections XVIII, XX - XXI, and XXIV - XXV were each not observed for more than an hour altogether by all observers on both dates, what with bad weather and some other handicaps. We hence again invite all interested members who think that they can give at least a few hours a week to learning the features within a Wilkins map section well to join this project. We especially need the help of:

1. Observers already having a good knowledge of the moon, or at least well acquainted with a particular portion thereof, and hence able to learn some one Wilkins Section more quickly.

2. Observers outside of the continental United States.

3. Observers able to observe after midnight and hence able to take assignments in the moon's eastern hemisphere, where lunar sunset does not occur until after Last Quarter.

4. Observers set up to take lunar photographs of really good quality to secure an eventually valuable permanent record of our studies in this project. Ordinarily, 12 inches of aperture and more will be needed to obtain sufficiently good photographs.

5. Observers owning fairly large telescopes or having access to them, say above 12 inches in aperture. These will be more effective in searches for impact-flares on the earthshine and also, in general, in ordinary studies of the finer lunar detail.

We have been very glad to learn that Mr. John D. Bestwick has been organizing a lunar missile survey effort similar to ours in the British Isles. The observers, we understand, are trained lunarians of the British Astronomical Association and the International Lunar Society. We plan to work closely with Mr. Bestwick and his colleagues. It would be excellent if similar efforts can be organized in additional countries, but meanwhile we invite our astronomical friends in other lands to join the A. L.P. O. Lunar Missile Survey. It may well grow into an important aspect of the dawning Space Age.

THE FOURTH CONVENTION OF THE A. L. P. O.

by Walter H. Haas

On August 14, 1958 the Association of Lunar and Planetary Observers held its Fourth Convention on the campus of the California Institute of Technology at Pasadena, California. The meeting was immediately followed by the Tenth Annual Convention of the Western Amateur Astronomers. Mr. Alan McClure has already described the joint meetings in "Convention in Pasadena" in Sky and Telescope for October, 1958, pp. 629-30; and I shall here limit attention to matters which may be presumed to be of special interest to members of the A. L. P. O. There were 73 registrants for the A. L. P. O. Convention. Our program of papers was as follows:

1. Your Telescope and Mars, by Thomas R. Cave, Jr.

2. Some Changing Aspects of Mars in 1956, by Joel W. Goodman. Read by Eugene Larr.

3. An Achromatic Lens Designed for Testing with the Knife-Edge - A Progress Report, by Arthur Leonard.

4. Amateur Studies of the Planet Jupiter, by Henry P. Squyres.

5. Intensities and Colors of Jovian Features, by Phillip W. Budine. Read by Leif J. Robinson.

6. Report of the A. L. P. O. Mercury Section, by Owen C. Ranck. Read by Homer King.

7. Lunar and Planetary Investigations with Very Small Apertures, by Timothy Wyngaard. Read by Natalie Leonard.

8. The A. L. P. O. Comets Section and the Amateur Observer, by David Meisel. Read by Thomas Cragg.

9. Banded Craters, by Joseph Miller.

10. A New Lunar Cleft System, by Alika K. Herring.

11. The French Selenographer C.M. Gaudibert, by A. C. Larrieu. Read by David P. Barcroft.

12. Some Suggestions Regarding Lunar Domes, by Patrick Moore. Read by Gary Steelman.

13. Lunar Colongitude: Why, What, How, and When, by Walter H. Haas.

14. A Suggested Program of Lunar Research, by John E. Westfall. Read by Jack Eastman.

15. Morrison Lecture by Dr. Dinsmore Alter, Director Emeritus of the Griffith Observatory. Subject: The Surface of the Moon.

16. On the Phase Anomalies of Mercury and Venus, by Roy Wright.

17. Some informal remarks about current Martian research by Dr. Robert S. Richardson, Assistant Director of the Griffith Observatory.

18. Progress Report on the A. L. P. O., by Walter H. Haas.

Some of these papers are published in this issue, and others will appear in future issues. We were especially glad to listen to Dr. Alter's Morrison Lecture about his thought-provoking lunar photographic research. We express our deep appreciation to the Astronomical Society of the Pacific, the sponsors of all Morrison Lectures, for this important contribution to the program.

An A. L. P. O. Award Pin was presented to Mr. Thomas Cragg for his many contributions to almost all of our observational programs and in particular for his services as Saturn Recorder.

The photograph of Mars which adorns the front cover of this issue was generously presented to the A. L. P. O. at Pasadena by Dr. Richardson. It is a composite built up by Mr. Paul Roques of the Griffith Observatory from a number of the original images. The amount of detail on this photograph is truly remarkable; except in the south polar cap, which is necessarily overexposed, the photograph actually shows more detail than a simultaneous drawing of good quality made by Mr. Alika Herring, an experienced and able observer, with a 12.5-inch reflector! We would invite attention on the photograph to the internal structure of the maria and to the variations in tone in the northern and equatorial deserts, both perhaps trademarks of the Antoniadian shcool of Martian observers. A number of the canals can be recognized. Physical data on Mars at the time of this photograph are: $D = 21''.9$, $D_{\oplus} = -19^{\circ}.5$, $D_{\odot} = -20^{\circ}.6$, $\odot = 240^{\circ}$ $CM = 15^{\circ}.3$.

One of the highlights of this A. L. P. O. Convention was certainly the extensive exhibit of drawings and photographs assembled by Alika Herring. He gave us a detailed and instructive cross-section of the current and recent work of the A. L. P. O. Contributors of material to the exhibit were Dinsmore Alter, James C. Bartlett, Jr., Phillip W. Budine, Charles F. Capen, Thomas A. Cragg, Dale P. Cruikshank, Kenneth Delano, John Farrell, Joel W. Goodman, Walter H. Haas, William K. Hartmann, Alika K. Herring, K. Komoda, Alan McClure, Richard McLaughlin, Robert McLaughlin, David Meisel, Patrick Moore, James Nigh, T. Osawa, Hans Pfleumer, Owen C. Ranck, Elmer J. Reese, Bradford A. Smith, Chester J. Smith, J. Russell Smith, Frank Vaughn, Fredric Villinger, Brian Warner, and Tim Wyngaard. Special thanks should go to Dr. Alter for his many fine lunar photographs, to Alan McClure for his splendid comet photographs, and to David Meisel for considerable material forwarded from the Third A. L. P. O. Convention Exhibit at Ithaca, New York.

Many things go into making an amateur astronomical meeting a success. For this gathering I wish especially to thank the Western Amateur Astronomers and their hard-working committees, who made it all possible, and in particular Mr. George Perkins, the Convention Chairman, and Mrs. Ruby Perkins and Mrs. George Carroll, who took charge of registration.

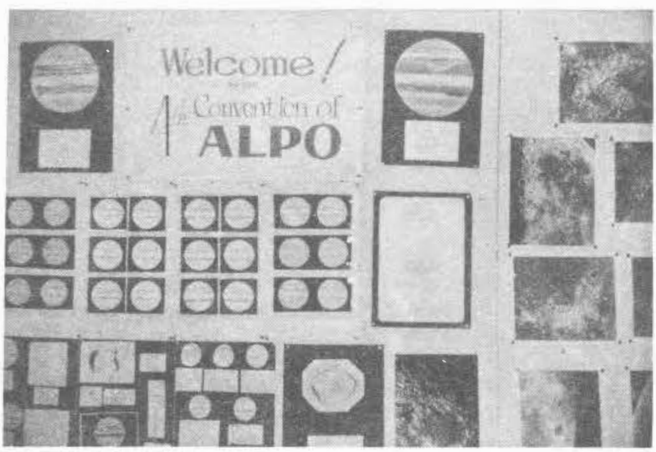

Figure 12. Part of A. L. P. O. Fourth Convention Exhibit at Pasadena, Calif. Photograph by James Bukowski.

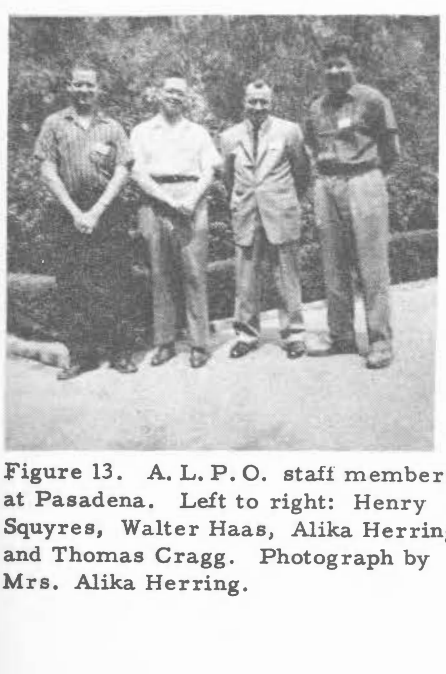

Figure 13. A. L. P. O. staff members at Pasadena. Left to right: Henry Squyres, Walter Haas, Alika Herring, and Thomas Cragg. Photograph by Mrs. Alika Herring.

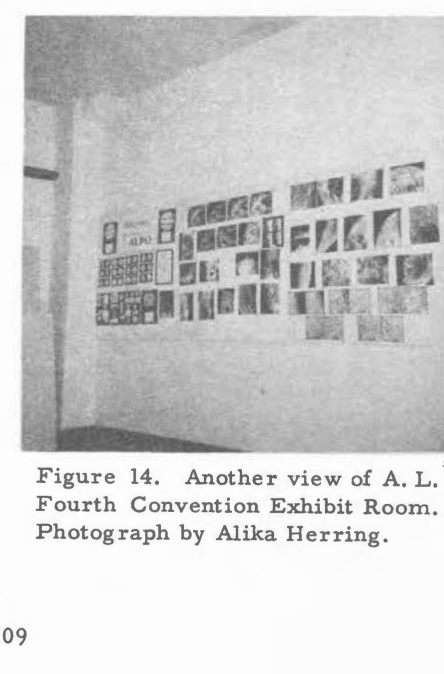

Figure 14. Another view of A. L. P. O. Fourth Convention Exhibit Room. Photograph by Alika Herring.

Figure 15. Presentation of the 1958 G. Bruce Blair Award of the Western Amateur Astronomers to Dr. Dinsmore Alter by George Perkins. Photograph by Jack Eastman.

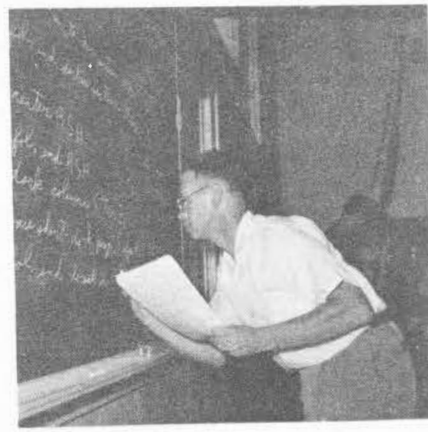

Figure 16. Walter Haas preparing to present paper to Convention of Western Amateur Astronomers at Pasadena. Photograph by Arthur Kaufman.

NEW BOOKS IN THE A. L. P. O. LIBRARY

The following books have been added to the Library of the Association of Lunar and Planetary Observers:

Title	Author	Publisher	Date
Making Your Own Telescope*	Allyn Thompson	Sky Publishing Co.	1954
Mathematics in Western Culture*	Morris Kline	Oxford University Press	1953
Danger in the Air	Oliver Stewart	Philosophical Library	1958
The Exploration of Time	R. N. C. Bowen	Philosophical Library	1958
Earth, Sky, and Sea**	Auguste Picard	Oxford University Press	1956
The Mysterious Universe**	Sir James Jeans	Macmillan Co.	1934
A General Index to Volumes 1-25 of the Publications of the Astronomical Society of the Pacific**			
Index to Vols. 26-50 of P. A. S. P. **			

Title	Author	Publisher	Date
Index to Vols. 51-65 of P. A. S. P. **			
Index to Leaflets 1-300, Volumes I-VI of A. S. P. **			1954
The Open Mind**	J. Robert Oppenheimer	Simon and Schuster, Inc.	1955
Amateur Telescope Making**	Albert G. Ingalls	Scientific American Publishing Co.	1928
The Human Use of Human Beings**	Norbert Wiener	Riverside Press	1950
Life on Other Worlds**	H. Spencer Jones	Macmillan Co.	1940

*Donated to the A. L. P. O. Library by Mr. Les Foster.

** Donated to the A. L. P. O. Library by Mr. Milton Rosenkotter.

We are indeed indebted to Messrs. Rosenkotter and Foster for their generosity in giving us these fine books. Amateur Telescope Making, Making Your Own Telescope, Life on Other Worlds, and The Mysterious Universe have long been justly regarded as classics. Such writers as Dr. Picard and Dr. Oppenheimer are surely worth our further acquaintance. The indices of the Publications and of the Leaflets of the Astronomical Society of the Pacific constitute valuable material for reference work. Other books in the A. L. P. O. Library are listed on pp. 139-140 of our November-December, 1957 issue and on pp. 31-32 of our January-March, 1958 issue. Surely every reader can easily find at least one book in these lists which he would enjoy borrowing and reading.

Our Librarian is E. Downey Funck, 256 N. E. 11th St., Delray Beach, Fla.; and all requests to borrow books should be addressed to him. The loaning of books is restricted to A. L. P. O. members in the United States, and the time limit on loans is 30 days. There is a charge of 50 cents for borrowing a book, and the borrower must also pay return mailing costs.

OBSERVATIONS AND COMMENTS

Changes in Staff Members. We announce with regret that Mr. Henry Squyres and Mr. Chester Smith find themselves unable to continue to direct the Jupiter work of the A. L. P. O. We express our considerable appreciation to our two colleagues, both of them very keen observers of the Giant Planet, for their efforts to advance our work on Jupiter. Except for Mars close to a favorable opposition, no planet is observed so much as is Jupiter, and very properly so; but the ensuing demands on the time of the Jupiter Recorder are often very great. Many thanks, Henry and Chet!

The new Jupiter Recorder is:

Phillip W. Budine
1435 Upper Front Street
Binghamton, New York;

and the new Assistant Jupiter Recorder is:

Elmer J. Reese
R.D. 2, Box 396
Uniontown, Penna.

Mr. Budine is among our most active young members, and his name will be well known already to readers of this periodical. He met many of our members at the Conventions at Kansas City in 1957 and at Ithaca in 1958. There is even less need to introduce Mr. Reese to readers of these pages or to comment on his singularly excellent and long-continued observational work on Jupiter.

It has been arranged that Mr. Reese will work up A. L. P. O. data on the very active and important 1958 apparition. Any observations of Jupiter in 1958 not yet reported should be mailed to Mr. Reese at the above address as soon as possible.

Mr. Ernst E. Both, our Foreign Language Coordinator, has changed his address and is now at 815 Bella Lane, St. Louis 37, Missouri. He recently joined the faculty of George Washington University.

Palisa and Davy. Mr. Alika K. Herring supplies the following description of his drawing of Palisa and Davy on pg. 72 of our April-June, 1958 issue. The drawing was made with a 12.5-inch reflector at 228X-310X on May 27, 1958 at 4^h 15^m, U.T., colongitude = $16\overset{\circ}{.}7$, seeing 3-4 and transparency 4:

"I have been interested in this area for a long time because of the odd shape of the formation which lies between these two craters. It is very obviously a walled plain, but what is more obvious, a rectangular one. It is perhaps a rather well known fact that few of the walled plains are truly circular in shape, being more or less polygonal in some degree; but nowhere on the lunar surface, with the possible exception of a few indefinite structures near the north polar regions, is this departure in shape so pronounced.

"This drawing was not only made in an effort to bring out the shape of this interesting formation, but to bring out the details of the chain of small craterlets which crosses the floor in an east and west direction. Beginning at the small craterlet just outside the west wall, I counted a total of 14 in the chain which extends to the west wall of Davy. Those craters near the eastern end of the chain appeared to be quite shallow, perhaps but little deeper than some of the so-called 'saucers'. Both Goodacre and Wilkins describe this crater chain as a 'cleft interspersed with craters', but I have not yet noted any resemblance to this type of feature. The craterlets seem to pursue their course across the plain independent of any apparent connection with a cleft-like valley. These little craters are certainly evidence for a later volcanic activity along a line of fault in the lunar crust, and it would be most difficult to believe that they can have a meteoritic origin.

"The floor of this peculiar formation, in common with most of the walled plains, contains a great amount of fine detail, small hillocks, domes, and craterlets, which will be visible only under the best seeing conditions. Few of them were drawn on this occasion for that reason."

A Lunar Anomaly Which Wasn't. On May 23, 1958 near 2^h, U.T., colongitude about 327°, Mr. James R. Lehr of Florence, Alabama remarked on the earthshine a little northeast of Timocharis an outstanding bright spot a few seconds of arc in diameter. He was using a 6-inch reflector at 91X. The spot was observed almost continuously for 75 minutes. At Mr. Lehr's request two other observers verified the appearance. However, the place in question is bright on photographs of the full moon; and its prominence by earthshine is hence presumably completely normal, though the apparent conspicuousness surprises the Editor. The careful and completely scientific character of Mr. Lehr's report have made possible this explanation.

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