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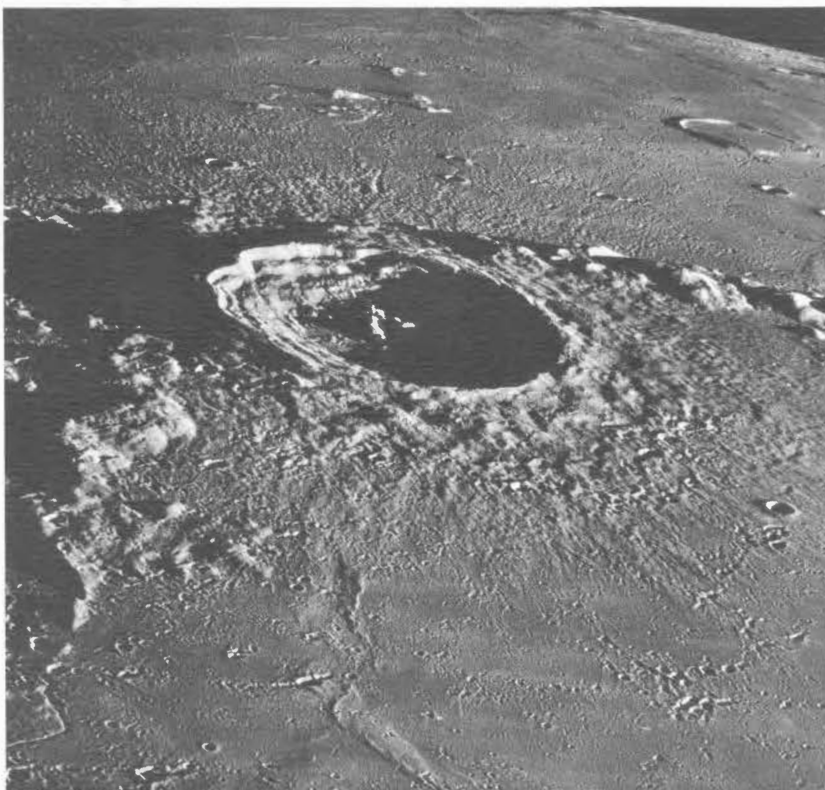

A Space Age view of a scene familiar to amateur lunar observers. Apollo-12 photograph AS 12-50-7433, looking northward from Sinus Aestuum (foreground) to Mare Imbrium (background). At the center is Eratosthenes, 53 kms. across and 3,700 meters deep. In the upper right is the crater-ring Wallace. The whole area is littered with secondary craters associated with Eratosthenes and Copernicus.

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PHOTOMETRY METHODS AND THE TOTAL LUNAR ECLIPSE OF JANUARY 30, 1972

By: John E. Westfall, A.L.P.O. Lunar Recorder

General

During the total lunar eclipse on January 30, 1972, the Moon will be well-placed for most observers in North America (with the exception of those in the eastern portion of the continent, who will be unable to see the final phases). Accordingly, A.L.P.O. members are encouraged to make and submit observations of this event, preferably on the recently-expanded "ALPO Lunar Eclipse Observation Forms", which are now available from the writer. The eclipse schedule is given below.

Lunar Eclipse Schedule: January 30, 1972

(Note: All times have been converted from E.T. to U.T. For all time zones shown, the eclipse will occur on the morning of Sunday, January 30th. Parentheses indicate that an eclipse phase will not be visible for most observers in a particular time zone.)

Phase	U.T.	EST	CST	MST	PST
Moon enters Penumbra	(08:01.6)	03:01.6	02:01.6	01:01.6	00:01.6
Moon enters Umbra (1st Contact)	(09:11.3)	04:11.3	03:11.3	02:11.3	01:11.3
Total Eclipse Begins (2nd Contact)	(10:35.1)	05:35.1	04:35.1	03:35.1	02:35.1
Middle of Eclipse	(10:53.4)	05:53.4	04:53.4	03:53.4	02:53.4
Total Eclipse Ends (3rd Contact)	(11:11.5)	06:11.5	05:11.5	04:11.5	03:11.5
Moon leaves Umbra (4th Contact)	(12:35.3)	(07:35.3)	06:35.3	05:35.3	04:35.3
Moon leaves Penumbra	(13:45.2)	(08:45.2)	(07:45.2)	06:45.2	05:45.2

The position angles of umbral contacts (cardinal directions in Old, or pre-IAU, System) are: 1st at 86° E. of N. Point, 4th at 44° W. of N. Point.

The magnitude of the eclipse is : 1.054 (1.000 or above indicates a total eclipse).

Types of Eclipse Observations

A number of types of useful observations of lunar eclipses may be made with a small telescope, binoculars, or even the naked eye. The value of such observations is enhanced if they are recorded on the special observing forms mentioned above. Techniques of lunar eclipse observation are described on pp. 22-24 of the ALPO Lunar Observer's Manual (available from Lunar Recorder Charles Ricker). The following types of observation are suggested and, with the exception of number 4, should be submitted to the ALPO Editor, Walter H. Haas. Following the descriptions of the types of observation are parenthetical notes on desirable instruments and magnifications.

1. General descriptions, sketches, and photographs of umbral and penumbral shading, color, and visibility, including descriptions of the sharpness and form of the edge of the umbra. The Danjon scale is recommended for describing eclipse luminosity. (Observe with any magnification low enough conveniently to show the entire Moon--say, a telescope with magnification 75X or less, or binoculars.)

2. Drawing and/or photographing selected lunar features, both immediately before and immediately after the umbra passes over them in order to detect possible eclipse-induced lunar changes and possible Transient Lunar Phenomena (TLP's). Observations through selected color filters are particularly valuable. Outline charts of some selected areas may be obtained from Lunar Recorders Harry Jamieson or Christopher Vaucher. (At least a 6-inch telescope is desirable.)

3. Timing, to ± 0.1 minute accuracy, umbral contact 1 through contact 4. (Instrumental requirements as in 1, above.)

4. Timing, again to ± 0.1 minute accuracy, umbral contacts of lunar craters. For both immersion (disappearance) and emersion (reappearance), a crater timing should be the average of the two times when the umbral edge first touches and last touches the crater rim. Observers should restrict timings to the fifteen craters numbered on the reference map on the "ALPO Lunar Eclipse Observation Forms." Completed observations of crater tim-

ings should be detached from the rest of the forms and mailed to: Sky and Telescope, 49-50-51 Bay State Road, Cambridge, Mass. 02138. (Magnifications in the range 60-150X have been found convenient by the author.)

5. Estimating the apparent stellar magnitude of the Moon at a number of different times during the eclipse, particularly during totality. Three methods for doing this are described below. (Use naked eye or binoculars.)

It is doubtful whether any one observer can accurately make all the observations described above during a single eclipse; there just is not enough time. Obviously, each observer should then restrict himself to those eclipse observations he is best suited to do, based on his interests, experience, and equipment. Organized observing teams are also recommended.

Lunar Eclipse Photometry

Introduction.--The Moon's brightness varies considerably from eclipse to eclipse so that it is desirable to have objective magnitude measures throughout the various phases of each eclipse, and particularly during totality. The methods described below are those of "total photometry", where the brightness (apparent visual magnitude) of the entire lunar disc is measured (i.e., as opposed to more difficult, but also more sensitive, measures of the brightness of particular lunar areas). In each of the three methods described below, the image of the moon is compared with that of a star (or planet). Each method differs in the manner by which the images of the Moon and the star are made comparable in apparent size and brightness. Because the Moon's brightness often varies by a factor of 100,000 or more during an eclipse, no single method can be used for all phases of an eclipse.

Extinction Correction.--Usually, the Moon and the comparison star are at different altitudes above the horizon during the eclipse. This means that their light is dimmed by unequal amounts by the Earth's atmosphere, and this effect (often amounting to several tenths of a magnitude) must be corrected for in order to obtain accurate lunar magnitudes.

Figure 1 is a graph which gives the differential extinction correction, E, depending on the altitude of the Moon and the altitude of the comparison star. The vertical axis is the altitude of the higher of the two objects and the horizontal axis is the altitude of the lower object. The curved lines on the graph give the value of E (in magnitudes) found at the intersection of the appropriate altitude values. E is positive if the Moon is higher than the star and is negative if the Moon is lower than the star.

This method is not accurate if the observer is high above sea level (e.g., in mountains where the extinction is less), if the sky is hazy (when the extinction is greater) or if light clouds obscure the Moon and/or the star. This method is also not to be used when either object is within 10° of the horizon, and so the graph does not show altitudes under this value. The graph also "cuts off" at 80° altitude because any object above 80° suffers virtually (i.e., within 0.01 magnitude) the same extinction as at 80°. This writer measures altitudes (accurate to ± 1°) by sighting on the straight edge of a protractor with a plumb bob suspended from its center mark. Lacking this gadget, one can secure estimated altitudes (e.g., assuming the fist at arm's length subtends 10°), which are better than none at all. If possible, the Moon and the star should be at approximately equal altitudes so as to minimize the correction factor (and hence its uncertainties). It is also possible, of course, to compute the altitude of the Moon and the comparison star at the time of each estimate.

Method 1: Comparison of Out-of-Focus Images.--This is a naked-eye method for the near-sighted observer. Remove your glasses and compare the out-of-focus circular image of the Moon with the similarly out-of-focus image of a comparison star. If the Moon's image appears equal in brightness to that of a star of magnitude m, the Moon's magnitude, M, is given by: $M = m + E$.

This method is most useful during totality when the Moon's apparent magnitude is often comparable to that of a star or planet. If you are not near-sighted, you might still experiment with this method by sighting through a positive lens.

Method 2: Reversed Binoculars or Hand Telescope.-- Reduce the apparent size and brightness of the Moon by viewing it through reversed binoculars or a small telescope, comparing the reduced Moon with a star viewed with the naked eye. If the normal magnification of the binoculars or telescope is P, the Moon's actual apparent magnitude is given by: $M = m - [(5 \log P) + 0.2] + E$.

The constant, 0.2, assumes a 0.2 magnitude loss of light in the reversed optical

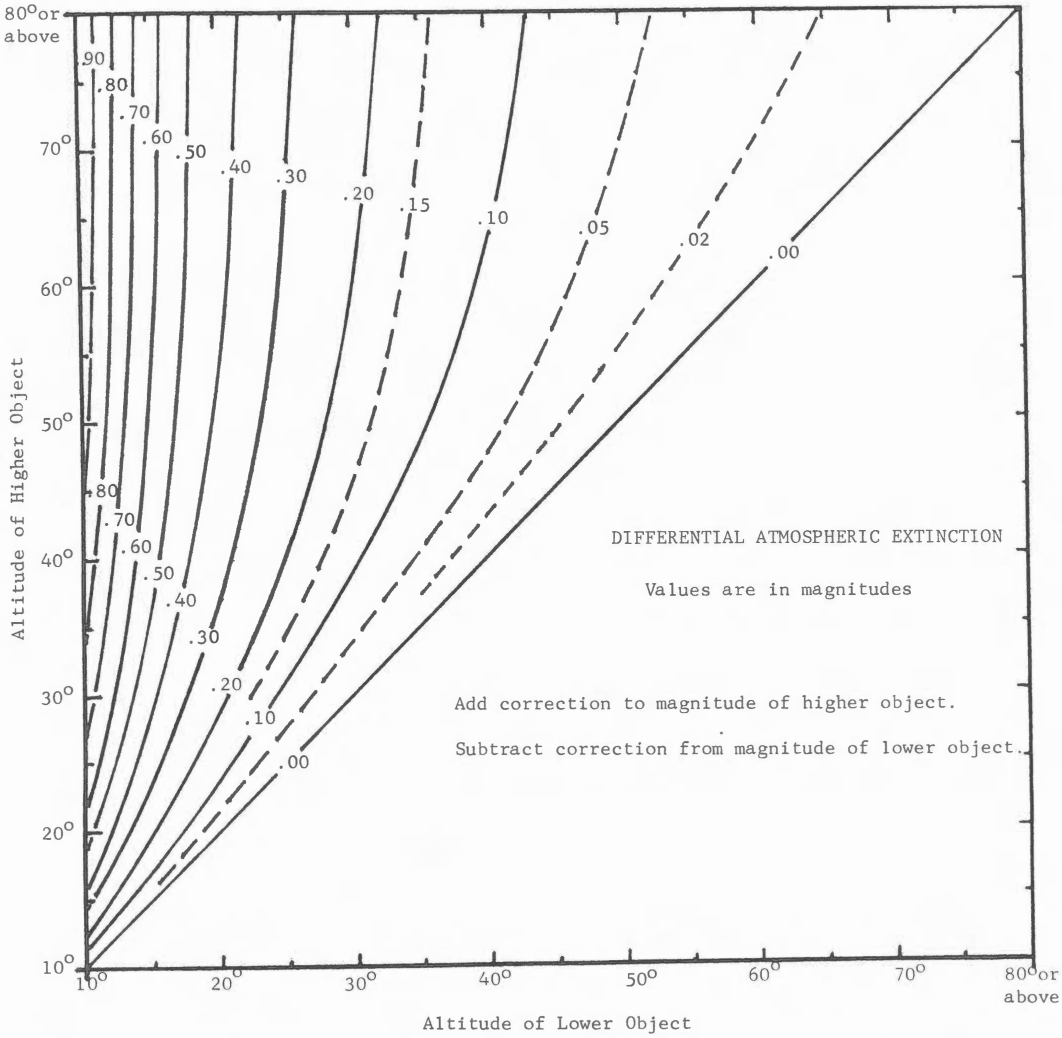

Figure 1. Graph giving magnitude values of the differential atmospheric extinction correction, to be used when estimating the magnitude of the eclipsed Moon when compared to a star or planet. This graph may be used with any lunar eclipse, and its use is described in the text of the article "Photometry Methods and the Total Lunar Eclipse of January 30, 1972." Graph prepared by Dr. John E. Westfall.

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system (you may wish to determine this more accurately for your own instrument by comparing the reversed image of a bright star or planet with a fainter star viewed with the naked eye). Assuming a 0.2 magnitude light loss, the factor [5 log P + 0.2] depends on the normal (non-reversed) magnification of the instrument as follows:

Normal Magnification	Magnitude Reduction
6X	4.09
7X	4.43
8X	4.72
10X	5.20
12X	5.59
16X	6.22
20X	6.71 .

This method can be used during the umbral phases of an eclipse, when the apparent lunar magnitude is in the approximate range from -6 to 0.

Method 3: Convex Reflection.—In this method, the size and brightness of the Moon are reduced by viewing its reflected image on a convex spherical surface—a convex mirror, a highly-polished ball bearing, or even (in the writer's case) a Christmas-tree ball. What is viewed is the virtual image of the Moon, located midway between the center of curvature and the reflecting surface. The lunar image is fainter the farther the eye is removed from the image. In practice, this distance is varied by moving the eye back and forth until the Moon's brightness equals that of the comparison star, at which point the distance, R, to the virtual image is measured (e.g., in inches or centimeters). The Moon's magnitude, M, is then given by: $M = m + K - 5 \log R + E$.

The constant K is found by observing the Full Moon immediately before or immediately after the eclipse, when its magnitude is known (approximately - 12.7). The writer has found it convenient to view the comparison star's image in a plane mirror placed beside the spherical reflector, so that the two images are viewed side-by-side. In such a case, the constant K must also be found when using the plane mirror.

This method is usable during the penumbral stages and, given a sufficiently large radius of curvature of the reflector, may also be used for the brighter umbral stages of the eclipse.

Fractional Method.—When using the first or the second method, the Moon's apparent brightness may not be quite equal to that of any convenient comparison star. In such cases, a method analogous to one used by variable-star observers is employed. The observer should select two stars, one slightly brighter, and the other slightly fainter, than the Moon's image. Estimate how many arbitrary brightness steps the brighter star is brighter than the Moon, and also how many of the same steps the Moon is brighter than the fainter star. The Moon's apparent magnitude is then found as follows, letting:

m_1 = visual magnitude of brighter star,
m_2 = visual magnitude of fainter star,
E_1 = extinction correction for brighter star,
E_2 = extinction correction for fainter star,
S_1 = number of brightness steps between Moon and brighter star,
and S_2 = number of brightness steps between fainter star and Moon.

Then
$$M = (m_1 + E_1) + \frac{S_1}{S_1 + S_2}\Big[(m_2 + E_2) - (m_1 + E_1)\Big].$$

If the reversed binocular or telescope method (2nd method) is used, the correction $\left[(5 \log P) + 0.2\right]$ must also be applied.

The following example illustrates the fractional method, as used with the first method (out-of-focus images):

Example. The Moon appears fainter than Sirius but brighter than Procyon. Sirius is 3 arbitrary units brighter than the Moon, and the Moon appears 2 of the same units brighter than Procyon (in other words, "the Moon's brightness is 3/5 of the way from Sirius to Procyon"). The Moon's altitude is 48°, that of Sirius is 19°, and that of Procyon is 42°. For convenience, this observation would be entered:

Sirius 19°, 3, Moon 48°, 2, Procyon 42°.

Then, using Figures 1 and 2 accompanying this paper:

$m_1 = -1.45,\ E_1 = +0.40,\ S_1 = 3,$
$m_2 = +0.35,\ E_2 = +0.03,\ S_2 = 2;$

and:
$$M = (-1.45 + 0.40) + \frac{3}{5}\Big[(+0.35 + 0.03) - (-1.45 + 0.40)\Big] =$$
$$(-1.05) + \frac{3}{5}\Big[(+0.38) - (-1.05)\Big] =$$
$$-1.05 + \frac{3}{5}(+1.43) = -1.05 + 0.86 = -0.19,$$

which would be rounded off to - 0.2.

(For a further discussion of the fractional and similar methods as applied to vari-

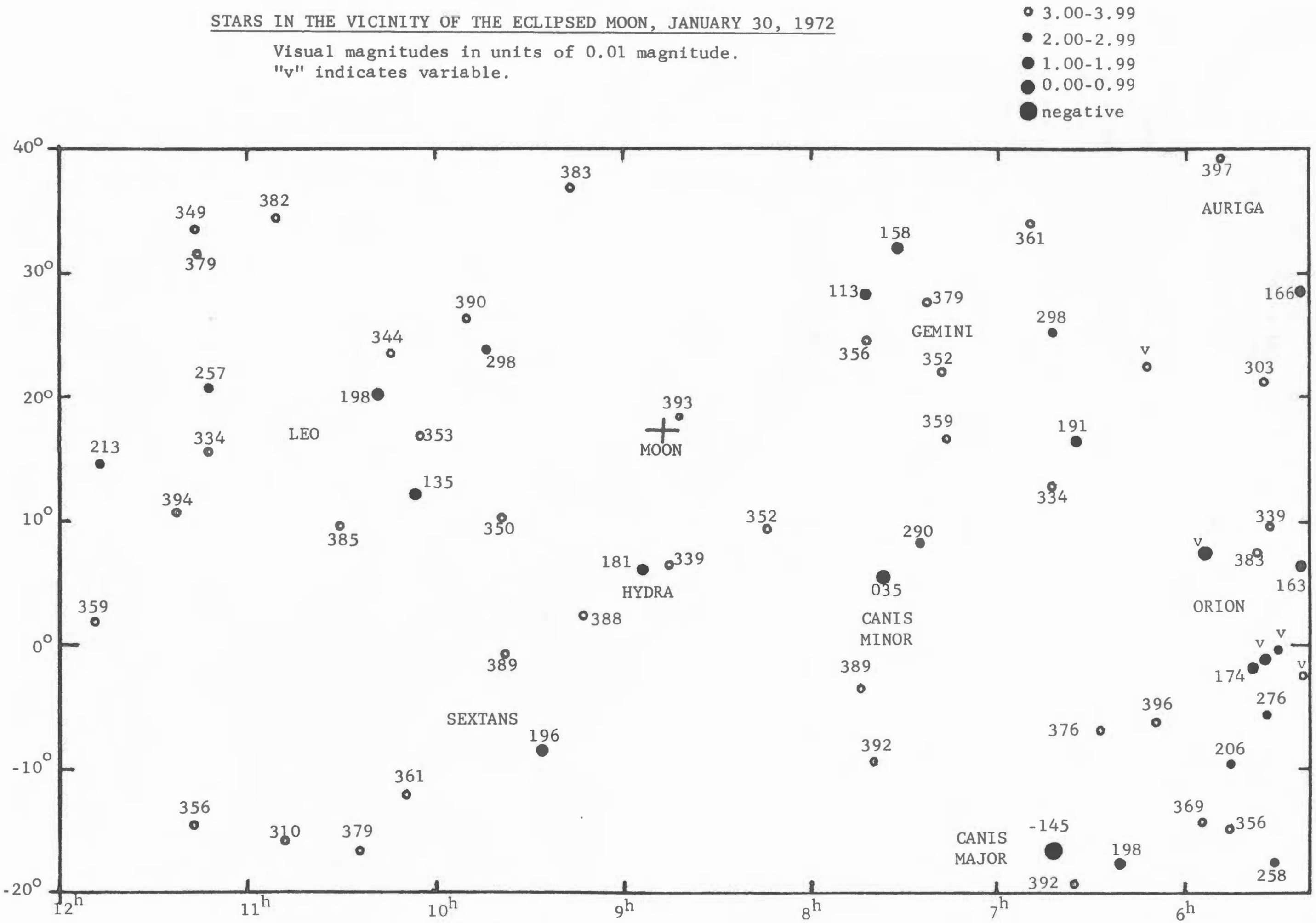

Figure 2. Star chart of the vicinity of the Moon on the night of the lunar eclipse of January 30, 1972. Beside each star is its visual magnitude, based on the Arizona-Tonantzintla Catalogue. This chart is to be used with the methods of lunar photometry described in the article "Photometry Methods and the Total Lunar Eclipse of January 30, 1972." Chart prepared by John E. Westfall.

able stars, see: J. B. Sidgwick, Observational Astronomy for Amateurs. London: Faber and Faber, Ltd., 1955, pp. 268-78. Note that Sidgwick does not apply extinction corrections.)

Photometry of the January 30, 1972, Lunar Eclipse.--Assuming that the mean magnitude of the Full Moon (i.e., with the Sun and Moon at their mean distances from the Earth) is -12.70, the magnitude of the Moon immediately before or after the coming eclipse will be -12.74, which value may be used for determining K in method 3.

Figure 2 is a map showing stars near the eclipsed Moon on January 30, 1972. Stars marked "v" are variable and should not be employed. The visual magnitudes shown are given in units of hundredths of a magnitude, with the decimal point omitted (e.g., 338 = + 3.38, etc.). The magnitude source is the Arizona-Tonantzintla Catalogue. Note that no major planets will be in this portion of the sky.

All magnitude estimates should be carried out to hundredths of a magnitude, then finally rounded off to tenths of a magnitude. Careful observers should be able to estimate the Moon's magnitude to a tenth or perhaps two-tenths of a magnitude, which will be useful for studies of umbral shading variations and for comparisons with other lunar eclipses, both ultimately extending our knowledge of our own upper atmosphere.

LUNA INCOGNITA: THE LAST FRONTIER?

By: John E. Westfall, A.L.P.O. Lunar Recorder

(Paper read at the A.L.P.O. Convention at Memphis, Tennessee, on August 18-22, 1971.)

As this writer, and others, have pointed out before, the excellent lunar photographs by the Orbiter vehicles and the Apollo astronauts have definitely not made earthbound lunar observation obsolete. A number of specialized and useful projects remain for the competent lunar observer, and this paper suggests one such observing program. Taken together, the Orbiter and Apollo missions have photographed about 99.3 per cent of the Moon's surface at least once. The 0.7 per cent left over does not sound like much, yet contains about 270,000 square kilometers, about the area of the state of Colorado.

This area of "unsatisfactory Orbiter photography" (and no Apollo photography) is shown on Figure 3. It includes the region near the Moon's south pole, with an extension northwards, just beyond the (IAU) southwest limb to about 51° south latitude. Because this region is now the least-known portion of the Moon, it is here called Luna Incognita. Even given the current sad state of federal space funding, this area need not remain unknown because most of it—91 per cent in fact—is occasionally visible from Earth, given optimum libration. Only the relatively small portion shaded in Figure 3 is never visible from Earth.

There are three reasons why I think amateur lunar observers should set out to chart this region, and only the third reason is a purely scientific one.

First is what might be called an aesthetic reason; we should make it our goal to know 100 per cent of the Moon's surface, instead of "just" 99.3 per cent.

Second, the charting of this region is an intriguing challenge to earthbased observers. Some particular difficulties will be mentioned later, but one can summarize by stating that the student of this region should be a trained observer, skilled in the interpretation of lunar features seen with considerable foreshortening; and he should also be patient because the optimum conditions of lighting and libration are fairly rare.

The final reason is that this region is interesting. It is physically large, extending up to 350 kilometers across, and is 1,400 kilometers in length (north-south). Besides the fair-sized craters Cabaeus and Malapert, this region includes the Moon's two highest mountain ranges, the Leibnitz and the Dörfel Mountains. The Leibnitz Mountains, near the south pole, have never been mapped accurately enough, on a non-foreshortened projection, for us to know the topographic form of this range; for example, whether it simply forms an irregular upland or, say, a system of parallel ridges like terrestrial folded mountains. We know even less about the Dörfels, located "beyond" Bailly. Schröter estimated their altitudes as ranging up to 26,000 feet (8,000 meters), and this figure has been handed down ever since. The Dörfels are not even shown on most maps because they are invisible at mean libration; only a few special libratory charts, such as Wilkins',

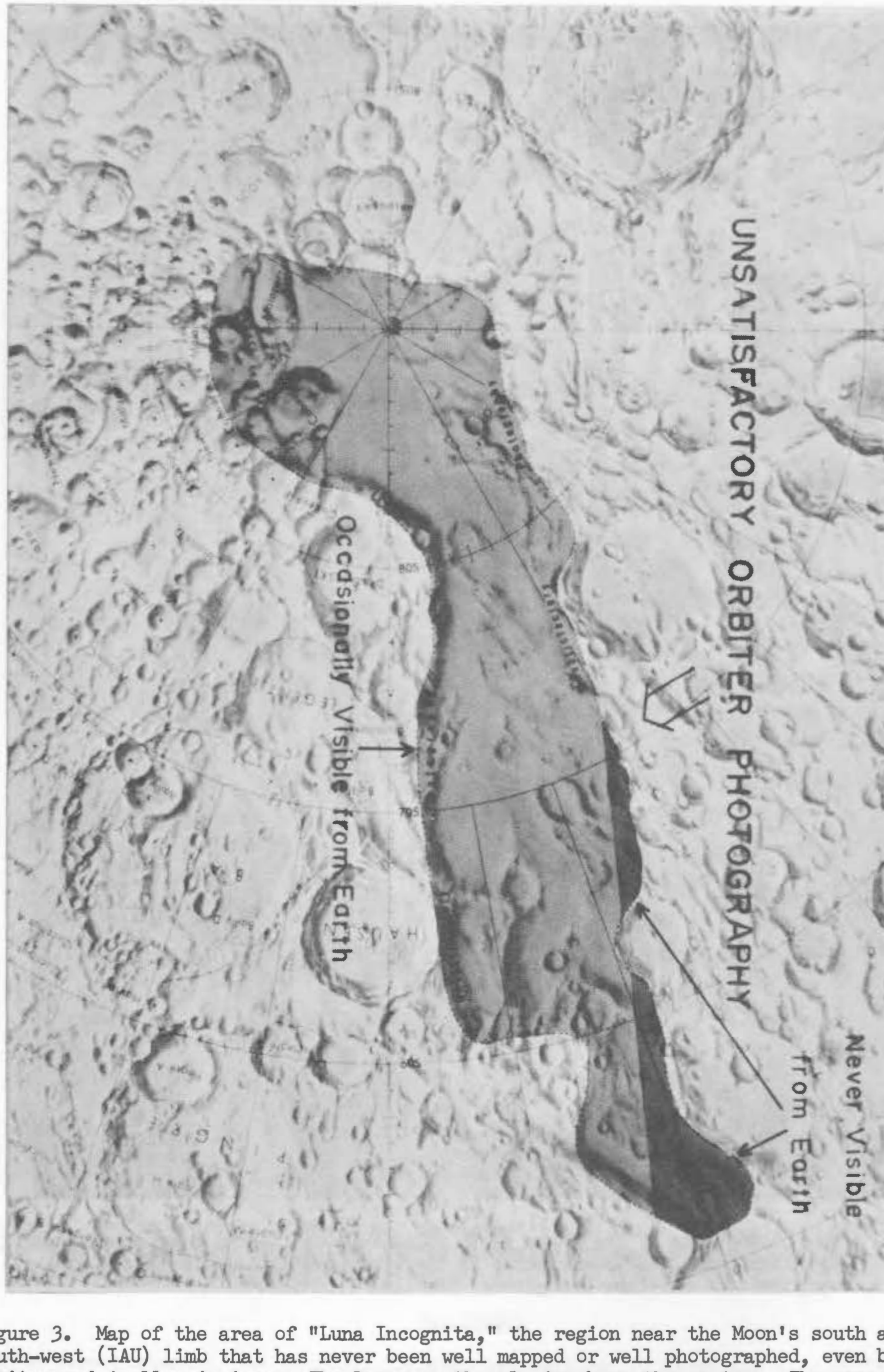

Figure 3. Map of the area of "Luna Incognita," the region near the Moon's south and south-west (IAU) limb that has never been well mapped or well photographed, even by the Orbiter and Apollo missions. The lunar south pole is above the center. The area which is lightly shaded can be occasionally seen from the Earth. The smaller, darkly shaded area in the lower right is never visible from Earth.

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show them at all. We know so little about this mountain range that we are not even sure that it <u>is</u> a mountain range, rather than, say, a chain of large craters seen in profile. It may be related to the Mare Orientale Basin about 1,400 kilometers north. Only a sys-

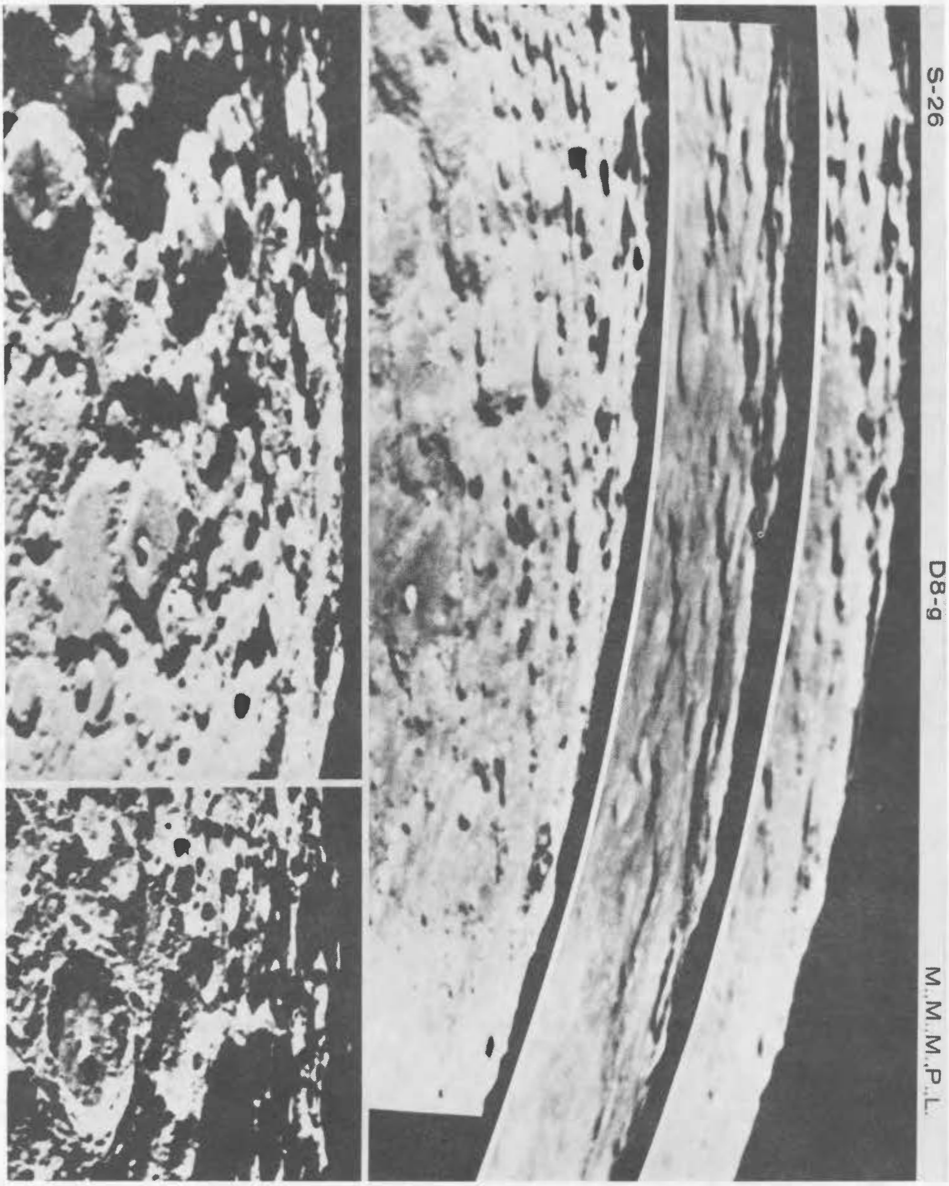

Figure 4. Five photographs of the lunar south polar regions, taken under conditions of high southerly libration. This corresponds to the upper portion of the shaded area in Figure 3. See also text of "Luna Incognita: The Last Frontier?"

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tematic mapping of this region can answer these questions.

Figures 4 and 5 show part of the luna incognita region and suggest some of the difficulties in mapping it. Figure 4 is a reproduction of Plate D8-g of Kuiper's Photographic Lunar Atlas and shows the south polar area. This area can be satisfactorily seen only with high southerly libration, and the five views shown in this figure were taken with librations ranging from 5.1 to 6.6 degrees south. It is evident that, even with libration in latitude about constant, changes in libration in longitude and in solar latitude and colongitude can change appearances greatly. Some obvious observing problems are

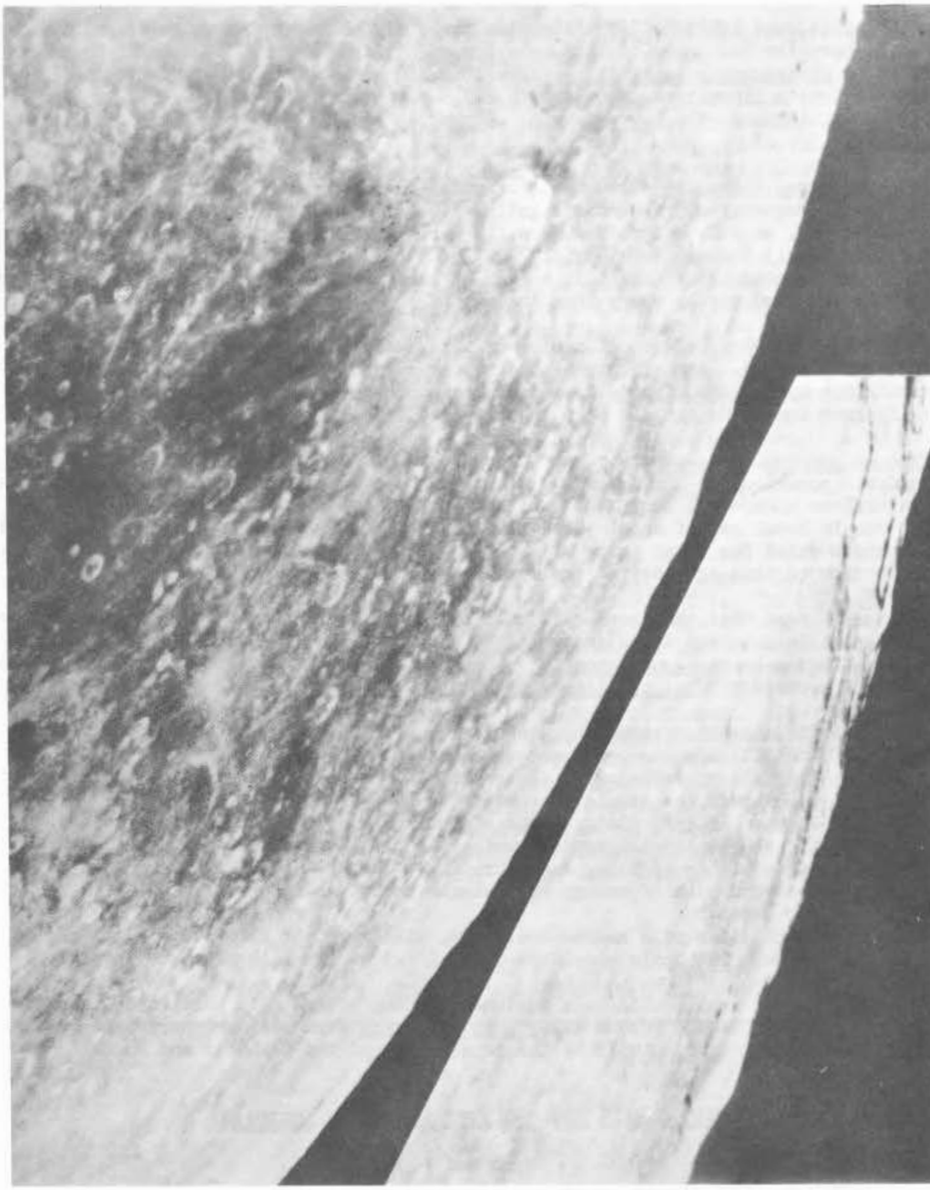

Figure 5. Two photographs of the lunar south-west (IAU) limb. The smaller photograph (lower right) shows the peaks of the Dörfel Mountains outlined on the limb. See also text of "Luna Incognita: The Last Frontier?"

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extreme foreshortening, the tendency for elevated features to block our view of features behind them, and the always-low sun angle which causes many areas to be in shadow most, or even all, of the time.

Despite these problems, the south polar area is presented to our view every lunation; and the sun always illuminates at least part of it. Conditions are much more restrictive for the portion of luna incognita farther from the south pole. Here, shadows are sufficiently long to detect relief only between approximate colongitudes of 95° to 130° and 250° to New Moon. Additionally, longitude libration needs to be about as far west as possible, and latitude libration simultaneously about as far south as possible, in order to have the best view of this area beyond Bailly. Figure 5, which is Plate E8-c in the Kuiper *Photographic Lunar Atlas*, shows, in the view in the lower right, the limb beyond Bailly, with librations of 6°5 south and 3°3 west, at colongitude 101°9. Hausen is the large crater near the lower margin. Beyond it are the peaks of the Dörfels, in *luna incognita*.

To summarize, there are three types of problems in attempting to map this area. First is the infrequency of favorable lighting-libration combinations. There will be favorable conditions, shortly before New Moon, in March through June, 1972, and just after Full Moon, from July through November, 1972. These periods should serve as target dates for any observing program, although it should be remembered that the south polar area can be favorably observed during every lunation.

The second problem is the difficulty of interpretation of the extremely foreshortened features observed. Experiments by the writer suggest that adequate observer training, simulation by the use of models, and stereoscopic viewing of paired photographs taken in different lunations can all help to alleviate this difficulty.

The third problem is a purely cartographic one, the difficulty of obtaining accurate selenographic positions in limb areas. In such cases, we can no longer consider the Moon as a featureless sphere but must take into account the apparent displacements of lunar features due to local relief and to deviations of the Moon's shape from a sphere. Fortunately, methods exist for using pairs of photographs to obtain approximate positions even for the portion of this area beyond the mean lunar limb.

Because I feel that the above difficulties can be overcome, and because this region is of considerable interest to selenographers, I propose that the A.L.P.O. Lunar Section embark on a program to map *luna incognita*. Details about this program will follow in the "Lunar Notes" section of *The Strolling Astronomer*, but in outline it should proceed roughly as follows:

1. Bibliographic research, studying maps, photographs, drawings, position and altitude measures, and written accounts.
2. Specialized training of observers, involving observations of well-mapped limb areas and simulated observations of models.
3. Preparation and distribution of outline maps to be used for drawings.
4. The observational input--drawings and photographs made at all conditions of favorable lighting and libration.
5. Determination of enough approximate positions to serve as the framework for a map.
6. Compilation of a medium-scale map, utlizing data from steps 1, 4, and 5 above. The scale should be about 1/2.5 million (40 miles to the inch).

Thus, the final result will be a medium-scale map of the only portion of the Moon that has not yet been mapped adequately. *Luna incognita* may have some surprises in store for us, not the least of which will be the true nature of the Leibnitz and Dörfel Mountains.

OBSERVING MARS IV - THE MARTIAN CENTRAL MERIDIAN

By: C. F. Capen and V. W. Capen

The central meridian of longitude, commonly designated as CM, is an imaginary line passing through the poles of rotation which bisects the full planetary disk. Refer to Fig. 6. It is used by the astronomer to define what areographic longitudes are present on the planetary disk during an observation period. The Martian areographic longitude in degrees that is on the CM at a given Universal Time to the nearest 5 minutes should be noted at the beginning of each observing period, or when gross dark surface features are first placed on a drawing disk. If a visual observing period persists for over an hour the CM at the beginning and ending U.T. should be noted on the data sheet. For timed transits of surface features, the CM can be computed to the nearest minute of U.T., which is equivalent to about 14 kms. This, of course, is below the observational definition, which is limited by the telescopic resolution and the atmospheric seeing. When a short series of photographs is obtained, the mean time of the observation is conventionally used to determine the CM.

The Martian mean solar day is 24 hours, 39 minutes, and 35 seconds, which is about 40 minutes longer than that of the Earth. Since the Martian axial rotation is slower than

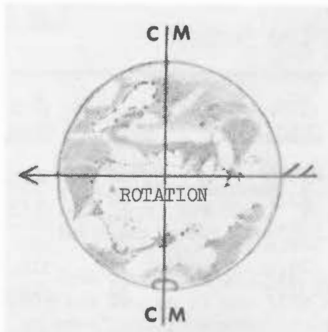

Figure 6. Sample telescopic aspect of the Martian disc. The CM (central meridian) is determined by the center of the disk regarded as circular and the Earth-turned pole. The arrow shows the direction of the rotation. The view is a simply inverted one in middle northern latitudes (south at top).

the Earth's, Mars turns through only about 350° in areographic longitude during a 24 hour interval. Consequently, any given Martian surface feature will arrive on the central meridian (CM) about 40 minutes later each night. This daily 10° lag in Martian longitude will add up to a full retrograde rotation in about 36 days, thus allowing the entire surface of Mars to be observed from Earth in that interval.

The accompanying Martian CM Rotation Table is a convenient reference from which the areographic longitude that is on the CM of the Martian disk as viewed from the Earth may be calculated. The areographic longitude that appears on the CM at any given Universal Time of observation may be determined by merely adding the known rotation rate of Mars of 0°24 longitude per minute of time, or 14°6 per hour, or the Mars CM Rotation Table values to the <u>American Ephemeris and Nautical Almanac's</u> (<u>AENA</u>) 0^h U.T. daily "Ephemeris for Physical Observations" value.

As an example, a visual observation of Mars is made on the night of August 10, 1971 U.T. date at 0930 M.S.T. (0430 U.T.). The 1971 <u>AENA</u> Ephemeris For Physical Observations table located on page 325 gives the CM longitude of Mars as <u>45°5</u> at 0^h U.T. The CM Rotation Table shows that Mars rotates 65°8 during 4 hours and 30 minutes. Thus, by simply adding the two above tabular values the areographic longitude that is transiting the CM at the time of observation is found to be 111°3. After rounding off the insignificant tenths, the CM = 111°, which is the "hard-seeing side" of Mars of the Tempe-Arcadia-Amazonis-Tharsis Desert and the Solis Lacus-Thaumasia regions. A more complex example occurs on the evening of August 20, 1971 U.T. date at 0540 U.T. The <u>AENA</u> gives the CM value of 316°9 at 0^h U.T. The CM Rotation Table gives a value of 82°9. Adding these two values gives a sum of 399°8, or 400°. Since the areographic longitudes range from 0° to 360°, this too large sum indicates that the rotation of Mars has passed through the 360° or 0° longitude. It is therefore necessary to subtract 360° from the larger sum of 400°, making the CM = 40°, which is the Mare Acidalium and Margaritifer Sinus side of Mars.

CM ROTATION TABLE FOR MARS
CHANGE IN MARTIAN LONGITUDE VS. UNIVERSAL TIME INTERVAL

U.T.	♂ CM. CORR.	U.T.	♂ CM. CORR.	U.T.	♂ CM. CORR.	U.T.	♂ CM. CORR.
0^h00^m	0°0	6^h00^m	87°7	12^h00^m	175°5	18^h00^m	263°1
10	2.4	10	90.2	10	177.9	10	265.5
20	4.9	20	92.6	20	180.3	20	268.0
30	7.3	30	95.0	30	182.8	30	270.4
40	9.7	40	97.5	40	185.2	40	272.8
50	12.2	50	99.9	50	187.6	50	275.3
1 00	14.6	7 00	102.4	13 00	190.1	19 00	277.8
10	17.1	10	104.8	10	192.5	10	280.2
20	19.5	20	107.2	20	195.0	20	282.7
30	21.9	30	109.7	30	197.4	30	285.1
40	24.4	40	112.1	40	199.8	40	287.5
50	26.8	50	114.5	50	202.3	50	290.0
2 00	29.2	8 00	117.0	14 00	204.7	20 00	292.4
10	31.7	10	119.4	10	207.1	10	294.8
20	34.1	20	121.8	20	209.6	20	297.3
30	36.6	30	124.3	30	212.0	30	299.7
40	39.0	40	126.7	40	214.4	40	302.1
50	41.4	50	129.2	50	216.9	50	304.6

CM ROTATION TABLE FOR MARS (Cont.)
CHANGE IN MARTIAN LONGITUDE VS. UNIVERSAL TIME INTERVAL

U.T.	♂CM. CORR.	U.T.	♂CM. CORR.	U.T.	♂CM. CORR.	U.T.	♂CM. CORR.
3^h00^m	43°9	9^h00^m	131°6	15^h00^m	219°3	21^h00^m	307°0
10	46.3	10	134.0	10	221.7	10	309.4
20	48.7	20	136.5	20	224.2	20	311.9
30	51.2	30	138.9	30	226.6	30	314.3
40	53.6	40	141.3	40	229.0	40	316.7
50	56.0	50	143.8	50	231.5	50	319.2
4 00	58.5	10 00	146.2	16 00	233.9	22 00	321.6
10	60.9	10	148.7	10	236.3	10	324.0
20	63.4	20	151.1	20	238.8	20	326.5
30	65.8	30	153.5	30	241.2	30	328.9
40	68.2	40	156.0	40	243.6	40	331.3
50	70.7	50	158.4	50	246.1	50	333.8
5 00	73.1	11 00	160.8	17 00	248.5	23 00	336.2
10	75.5	10	163.3	10	250.9	10	338.6
20	78.0	20	165.7	20	253.4	20	341.1
30	80.4	30	168.2	30	255.8	30	343.5
40	82.9	40	170.6	40	258.2	40	345.9
50	85.3	50	173.0	50	260.7	50	348.4

BOOK REVIEWS

Die Welt der Planeten, by Wulff Heinz. Wilhelm Goldmann Verlag, Munich, 1969. 185 pages. Paperbound. Reviewed by Joseph Ashbrook.

The World of the Planets: Its Investigation by New Methods is a German-language popular work by a German-born professional astronomer who is on the staff of Sproul Observatory at Swarthmore College in Pennsylvania. Dr. Heinz is a recognized authority on double stars, both in measuring them and in calculating their orbits, as well as an experienced planetary observer. This is not an observing manual but a well-informed summary of what astronomers know about the planets and how this knowledge was collected. It is evidently written to orient amateurs and laymen who have intellectual curiosity.

The special merit of The World of the Planets lies in its careful value judgements. On controversial subjects such as the possibility of life on Mars, the author expresses sober good sense. Repeatedly, he seeks to give an idea of the degree of certainty or uncertainty attached to some bit of information. The reader often meets unexpected insights. For example, after Dr. Heinz esplains that the diameters of Phobos and Deimos have been estimated as about 15 and 9 kilometers respectively from their apparent magnitudes and assumed albedos, he goes on to point out that the actual diameters cannot be much greater since shadow transits of these satellites have never been observed.

A principal limitation of this book is that it was originally published in 1966, and the updating of the text has not been adequate. Perhaps this is one of the all-too-common cases in which the good intentions of an author have been defeated by the desire of his publisher to save money by holding down revisions to the barest minimum when a new edition is being prepared. There is no way to know. At any rate, the book is surprisingly complete up to about 1966. We find, for example, the new rotation periods for Mercury and Venus, Mariner IV observations of Mars, details about the radio emission by Jupiter, and Saturn's recently discovered satellite Janus. However, only the briefest mention is given to any space results after 1966; and consequently the rather brief section on the Moon is already badly out of date.

Nearly 70 illustrations are provided. The many line diagrams are often refreshingly unhackneyed, but the offset reproductions of planetary photographs and spectrograms are not satisfactory. One full-page photograph that will delight dyed-in-the-wool planetary observers shows the old 8-inch Merz refractor at Milan Observatory, used by Schiaparelli nearly a century ago for his epoch-making studies of Mars, Venus, and Mercury.

Written in clear, grammatically simple German, this paperback should prove very helpful to English-speaking amateurs and students who want to exercise a reading knowledge of scientific German. A good many others, including knowledgeable planetarians, will find some useful insights and ideas in this text.

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The Shadow of the Telescope. Translation copyright 1970; translated by Bernard Pagel from Gunther Battmann's German edition, 1965. Published by Charles Scribner's Son's, New York, New York. Price $7.95.

Reviewed by Mike Covington, Valdosta, Georgia.

John Frederick William Herschel often sinks into the shadow of his father. This should not be; so it was with some degree of thankfulness that I greeted this book, which is an excellent biography of John Herschel. He was born exactly 178 years before the 7 March, 1970, solar eclipse in the southeastern United States.

The book begins with a capsule biography of William Herschel, and of John's boyhood, which was like that of no other person of which I have heard. The environment was perfectly suited to producing a great astronomer. Did you know that Herschel was a member of a clique at Cambridge, the members of which pledged themselves "to do their best to leave the world wiser than they found it"? According to one report, he studied Latin in order to read the Principia of Newton, and in his later years translated the Iliad into English hexameters.

Although we usually think of John Herschel as an astronomer, he researched in many fields, notably photography and chemistry. The book raises the point that if he had not wanted to complete his father's researches, he would not have gone into astronomy at all.

If I must criticize something about the book, the author's great use of footnotes was rather annoying. There are no less than 282 footnotes in the book, 266 of which the reader need not consult in this reviewer's opinion.

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Apollo 12 Data Users' Package, NASA, National Space Science Data Center, Greenbelt, Maryland, 20771. Sent free upon request.

Reviewed by Brian Webb, Redondo Beach, California.

The Apollo 12 Data Users' Package represents a formidable effort on the part of NASA to compile an index proof of photographs into a catalogue with corresponding indices. The documents processed are as follows:

1. 70 mm. Photographic Catalogue: NSSDC 70, July 10, 1970. There are over 1,000 (2" X 2") black and white proof prints reproduced on the standard format pages of 8" X 12" with unusually crisp detail, which is welcome improvement in government documents examined thus far. Photographs of the Earth and the spacecraft interior are omitted. Investigators wishing to obtain Earth photographs are advised to direct their request to the Technology Application Center, University of New Mexico, Albuquerque, New Mexico 87106.

2. Apollo 12 Photographic 70 mm., 16 mm., and 35 mm. Frame Index: NSSDC 70, July 11, 1970. This is an index of photographs listed by film magazine designation and frame number. Information concerning general photographic quality and scale are given in addition to other data such as solar angle, geographic position, and tilt.

3. Apollo Mission 12 Lunar Photography Indices: March, 1970. This is prepared by the Manned Spacecraft Center Mapping Sciences Laboratory. Four Mercator maps of notable quality are bonded into an index showing the direction and the area covered in the myriads of conventional and scientific photographs of a specialized nature. The Mercator projection extends from 180 degrees W. to 180 degrees E. Latitudes between 30 degrees N. and 30 degrees S. are shown, though with some distortion.

Catalogues and indices similar to the above are also available for Apollo 11 and 13. A catalogue for Apollo 14 is in process and will be available soon.

SATURN CENTRAL MERIDIAN EMPHEMERIS, 1972

By: John E. Westfall

The two tables on pages 128 and 129 give the longitudes of Saturn's geocentric central meridian (C.M.) for the apparent disk for 0^h, U.T. for each day in 1972. These values are a continuation of the tables for 1970 and 1971, previously published in The Strolling Astronomer, and incorporate corrections for phase, light-time, and the Saturnicentric longitude of the Earth.

"System I" assumes a sidereal rotation rate of 844°.00/day (period = $10^h\ 14^m\ 13^s.1$), intended for use with features in the NEB, EZ, and SEB. "System II", intended for the rest of the ball (excluding the NPR and SPR), assumes a sidereal rotation rate of 812°.00/-day (period = $10^h\ 38^m\ 25^s.4$). These rates are only approximations because latitude-dependent rotation rates for Saturn are more uncertain than for Jupiter, but longitudes calculated from the accompanying tables should give conveniently small drift rates in most cases. Actually, one of the most useful observing projects for Saturn is the determination of latitudes and rotation periods for observable features, which would incidentally lead to more accurate and useful rotation rates to be used for central meridian ephemerides.

To find the central meridian for an observed feature at any given time, find the 0^h U.T. central meridian for the appropriate date and system, and then add the hours and minutes corrections from the table "Motion of the Central Meridian," as shown in the example below.

Example.--A dark spot in the SEB transits the apparent central meridian at $13^h\ 14^m$ on 16 August, 1972 (U.T.). (System I applies to the SEB.)

System I C.M. at 0^h U.T., 16 August, 1972	. . . .	189°.2
(+) Motion of the System I C.M. in:	13^h	097.2
	10^m	005.9
	4^m	002.3
System I C.M. at $13^h\ 14^m$ U.T., 16 August, 1972	. . . .	294°.6

More realistically, this result would be rounded off to 295°. Note that if the calculated longitude exceeds 360°, one subtracts 360°.

IAPETUS AND THE GLARE OF SATURN

By: Richard G. Hodgson

In the past few years there has been considerable discussion of the magnitude range of Saturn's satellite Iapetus. Among those who have published on this subject, Patrick Moore[1], Reverend Kenneth Delano[2], and myself[3] all found Iapetus at maximum to be at least a full magnitude brighter than the commonly quoted 10.2 maximum magnitude determined photoelectrically at McDonald Observatory[4] in 1951-1953.

In a paper given at the A.L.P.O. Convention in Sacramento in August, 1970, I called attention to the possibility of resolving the discrepancy in terms of differing polar presentations of the satellite. While such changes may be a factor in varying satellite magnitudes, observations made at Dordt College Observatory with a 32-cm. Newtonian reflector in the fall of 1970 showed clearly that in the case of Iapetus at least most of the discrepancy arises from the deceptive glare of Saturn. In spite of their apparent freedom from the glare of Saturn when at or near elongation, satellites Titan and Rhea (which are most commonly used as comparison objects) are never really free from that glare, thus making Iapetus, which is much more remote from Saturn at its maximum brightness (at western elongation), appear much brighter than it really is.

The subtle effects of Saturn's glare were observed with reference to a tenth magnitude non-variable star located at Right Ascension $3^h19^m.6$, Declination + 15°51' (1950.0 coordinates) as measured on Hans Vehrenberg's Atlas Stellarum. On 1970, September 29 at 4^h U.T. this star was seen just north of Iapetus, and at approximately the same distance from Saturn. Iapetus was to reach western elongation on the same day at $12^h.1$, so it was at maximum brightness at the time. Iapetus and the star appeared exactly equal in magnitude based on visual variable star techniques.

On October 2 the planet Saturn passed to the south of the star, approximately 3' of arc distant. Due to glare, the comparison star then appeared (at 4^h) considerably fainter than Iapetus, although 3 days earlier they had been judged equal. Compared with Rhea on October 2, the comparison star appeared to be of equal magnitude, although Rhea was considerably closer to the planet at the time. Had the comparison star been as close to Saturn as Rhea was on that occasion it would have undoubtedly appeared distinctly fainter than that satellite due to Saturn's glare. Since the comparison star is not known to be variable (and subsequent observations gave no evidence of variability), one can reasonably conclude that even at maximum magnitude Iapetus is fainter than Rhea (magnitude 9.7), despite appearances to the contrary. This evidence is therefore in general agreement with the conclusion of McDonald Observatory's 10.2 magnitude figure for Iapetus at maximum. It is also in good agreement with the recently published findings of R. W. Payne (also 10.2)[5].

Thanks to that convenient comparison star, the subtleties of Saturn's glare became apparent. Iapetus may go on looking like a 9.0 magnitude object when at western elongation, but we ought not to believe it.

References

1. The Journal of the British Astronomical Association, Vol. 79, No. 2 (1969), pp. 121-123.

2. The Strolling Astronomer, Vol. 22, Nos. 11-12 (February 1971), pp. 206-208.

3. The Strolling Astronomer, Vol. 22, Nos. 9-10 (November 1970), pp. 154-160.

4. Planets and Satellites, edited by G. P. Kuiper and B. Middlehurst, University of Chicago Press, Chicago, 1961, D. L. Harris on pp. 295-297.

5. The Journal of the British Astronomical Association, Vol. 81, (April 1971), pp. 193-195.

THE 1971 ALPO BUSINESS MEETING AT MEMPHIS

For a number of years it has been the practice of the ALPO to hold a "business meeting" in connection with the annual Convention. These meetings provide an opportunity for informal discussion of matters of interest to the Association and for certain necessary decisions and choices of policies. Last year, when the ALPO Convention was held at Memphis, Tennessee, the business meeting was at 8:15 P.M., C.D.S.T., on August 19. About 25 members attended. The Director, Walter Haas, acted as chairman of the meeting. Mrs. Laura Jamieson kindly recorded minutes, from which this article is written.

The Director reported that the membership was then about 820. He reported on Association finances and broke down the current cost of producing an issue of The Strolling Astronomer. He remarked that there was a substantial backlog of papers on hand waiting to be published - a pleasant problem.

An increase in the price of our journal was proposed. Discussion about the amount of the increase followed. The hope was expressed that higher rates would permit an increase in the number of pages published. Harry Jamieson moved that new rates of $6.00 for one year and $10.00 for two years go into effect on January 1, 1972. The motion was seconded and was passed. The new single copy price will be $1.50.

The history and current status of the ALPO Observing Manual were described. Co-Editors Dale Cruikshank and Clark Chapman were continuing to look for a commercial publisher for the Manual. A portion of a recent letter from Dr. Cruikshank was read by the Director. Some thought had also been given to attempting to find a private publisher and to trying to raise the cost of publication from interested ALPO members. The Manual contains approximately 500 pages and a large number of illustrations. It was estimated that the cost of private publication would be $2500.00 or more.

It was moved that a special issue of The Strolling Astronomer be published soon in which the work of each Section is described. This issue could serve to give elementary information on ALPO programs until the Observing Manual is published. The motion was seconded and passed. Charles Ricker agreed to correspond with the intended authors of different articles in this special issue, primarily staff members, and to collect the manuscripts for it. It was envisioned that this issue might serve as a training manual for new members and as useful reference material for those who are more advanced. It was

SATURN, 1972

LONGITUDE OF CENTRAL MERIDIAN OF APPARENT DISK

	SYSTEM I -- 0^h U.T.											
Day	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	022°5	265°3	258°1	137°4	252°4	131°5	247°8	129°5	013°2	134°6	021°4	144°7
2	146.5	029.2	022.0	261.2	016.2	255.3	011.7	253.5	137.2	258.6	145.5	268.8
3	270.5	153.2	145.9	025.0	140.0	019.2	135.6	017.5	261.2	022.7	269.6	032.9
4	034.5	277.1	269.7	148.9	263.8	143.0	259.5	141.4	025.2	146.8	033.7	157.0
5	158.5	041.0	033.6	272.7	027.6	266.9	023.4	265.4	149.3	270.9	157.8	281.1
6	282.5	164.9	157.5	036.5	151.5	030.8	147.3	029.4	273.3	034.9	282.0	045.2
7	046.4	288.8	281.3	160.4	275.3	154.6	271.2	153.4	037.3	159.0	046.1	169.3
8	170.4	052.7	045.2	284.2	039.2	278.5	035.1	277.3	161.4	283.1	170.2	293.4
9	294.4	176.6	169.0	048.0	163.0	042.4	159.0	041.3	285.4	047.2	294.3	057.4
10	058.4	300.5	292.9	171.8	286.8	166.2	283.0	165.2	049.4	171.3	058.4	181.5
11	182.4	064.4	056.7	295.7	050.7	290.1	046.9	289.2	173.5	295.4	182.5	305.6
12	306.4	188.3	180.6	059.5	174.5	054.0	170.8	053.2	297.5	059.5	306.6	069.7
13	070.4	312.2	304.4	183.4	298.4	177.8	294.7	177.2	061.5	183.6	070.7	193.8
14	194.3	076.1	068.2	307.2	062.2	301.7	058.6	301.2	185.6	307.6	194.8	317.9
15	318.3	200.0	192.1	071.0	186.0	065.6	182.6	065.2	309.6	071.7	318.9	082.0
16	082.3	323.9	315.9	194.8	309.9	189.4	306.5	189.2	073.7	195.8	083.0	206.0
17	206.2	087.8	079.8	318.7	073.7	313.3	070.4	313.1	197.7	319.9	207.2	330.1
18	330.2	211.7	203.6	082.5	197.6	077.2	194.3	077.1	321.8	084.0	331.3	094.2
19	094.1	335.5	327.5	206.3	321.4	201.1	318.3	201.1	085.8	208.1	095.4	218.3
20	218.0	099.4	091.3	330.2	085.3	325.0	082.2	325.1	209.9	332.2	219.5	342.3
21	342.0	223.3	215.2	094.0	209.1	088.8	206.1	089.1	333.9	096.3	343.6	106.4
22	106.0	347.2	339.0	217.8	333.0	212.8	330.1	213.1	098.0	220.4	107.7	230.5
23	229.9	111.0	102.8	341.7	096.8	336.6	094.0	337.1	222.0	344.5	231.8	354.5
24	353.9	236.9	226.7	105.5	220.6	100.5	218.0	101.1	346.1	108.6	355.9	118.6
25	117.8	358.8	350.5	229.3	344.5	224.4	341.9	225.1	110.2	232.7	120.0	242.7
26	241.7	122.7	114.3	353.1	108.3	348.3	105.8	349.1	234.2	356.8	244.1	006.7
27	005.7	246.5	238.2	117.0	232.2	112.2	229.8	113.1	358.3	120.9	008.2	130.8
28	129.6	010.4	002.0	240.8	356.0	236.1	353.8	237.1	122.4	245.0	132.4	254.8
29	253.5	134.3	125.8	004.6	119.9	000.0	117.7	001.1	246.4	009.1	256.5	018.9
30	017.5	-----	249.7	128.5	243.8	123.9	241.6	125.2	010.5	133.2	020.6	142.9
31	141.4	-----	013.5	-----	007.6	-----	005.6	250.2	-----	257.3	-----	267.0

MOTION OF THE CENTRAL MERIDIAN

01^h -- 035°2	09^h -- 316°5	17^h -- 237°8	10^m -- 005°9	1^m -- 000°6
02 -- 070.3	10 -- 351.7	18 -- 273.0	20 -- 011.7	2 -- 001.2
03 -- 105.5	11 -- 026.8	19 -- 308.2	30 -- 017.6	3 -- 001.8
04 -- 140.7	12 -- 062.0	20 -- 343.3	40 -- 023.4	4 -- 002.3
05 -- 175.8	13 -- 097.2	21 -- 018.5	50 -- 029.3	5 -- 002.9
06 -- 211.0	14 -- 132.3	22 -- 053.7		6 -- 003.5
07 -- 246.2	15 -- 167.5	23 -- 088.8		7 -- 004.1
08 -- 281.3	16 -- 202.7			8 -- 004.7
				9 -- 005.3

Figure 7. Table for computing longitude of central meridian of Saturn in 1972. The value at 0^h, U.T. in System I on each date and the rate of increase with time are tabulated. System I applies to the North Equatorial Belt, Equatorial Zone, and South Equatorial Belt. See text on page 126.

SATURN, 1972

LONGITUDE OF CENTRAL MERIDIAN OF APPARENT DISK

SYSTEM II -- 0^h U.T.

Day	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	262°4	233°2	018°2	345°5	220°6	187°6	063°9	033°6	005°2	246°5	221°3	104°5
2	354.4	325.2	110.0	077.3	312.4	279.5	155.8	125.6	097.2	338.6	313.4	196.6
3	086.3	057.1	201.9	169.1	044.1	011.4	247.7	217.6	189.2	070.6	045.5	288.7
4	178.4	149.0	293.8	261.0	136.0	103.2	339.6	309.5	281.2	162.7	137.6	020.8
5	270.3	240.9	025.6	352.8	227.8	195.1	071.6	041.5	013.3	254.8	229.7	112.9
6	002.3	332.8	117.5	084.6	319.6	286.9	163.4	133.5	105.3	346.8	321.8	205.0
7	094.3	064.8	209.4	176.5	051.5	018.8	255.4	225.4	197.3	078.9	053.9	297.1
8	186.3	156.7	301.2	268.3	143.3	110.7	347.3	317.4	289.4	171.0	146.0	029.2
9	278.3	248.6	033.1	000.1	235.2	202.5	079.2	049.4	021.4	263.1	238.1	121.2
10	010.3	340.5	124.9	092.0	327.0	294.4	171.1	141.3	113.4	355.2	330.2	213.3
11	102.3	072.4	216.8	183.8	058.8	026.2	263.0	233.3	205.4	087.3	062.3	305.4
12	194.3	164.3	308.6	275.6	150.7	118.1	354.9	325.3	297.5	179.4	154.4	037.5
13	286.2	256.2	040.4	007.5	242.5	210.0	086.8	057.3	029.5	271.4	246.6	129.6
14	018.2	348.1	132.3	099.3	334.4	301.9	178.8	149.2	121.6	003.5	338.7	221.7
15	110.2	080.0	224.1	191.2	066.2	033.8	270.7	241.2	213.6	095.6	070.8	313.8
16	202.1	171.8	316.0	283.0	158.0	125.6	002.6	333.2	305.6	187.7	162.9	045.8
17	294.1	263.7	047.8	014.8	249.9	217.5	094.5	065.2	037.7	279.8	255.0	137.9
18	026.1	355.6	139.7	106.6	341.7	309.4	186.5	157.2	129.7	011.9	347.1	230.0
19	118.0	087.5	231.5	198.5	073.6	041.3	278.4	249.2	221.8	104.0	079.2	322.1
20	210.0	179.4	323.4	290.3	165.4	133.1	010.3	341.2	313.8	196.0	171.3	054.1
21	301.9	271.3	055.2	022.1	257.3	225.0	102.3	073.2	045.9	288.1	263.4	146.2
22	033.9	003.2	147.1	114.0	349.1	316.9	194.2	165.1	137.9	020.2	355.5	238.3
23	125.8	095.0	238.9	205.8	081.0	048.8	286.1	257.1	230.0	122.3	087.6	330.3
24	217.8	186.9	330.8	297.6	172.8	140.7	018.1	349.1	322.0	204.4	179.7	062.4
25	309.7	278.8	062.6	029.4	264.7	232.6	110.0	081.1	054.1	296.5	271.8	154.5
26	041.6	010.7	154.4	121.3	356.5	324.4	202.0	173.2	146.2	028.6	004.0	246.6
27	133.6	102.5	246.3	213.1	088.4	056.4	293.9	265.1	238.2	120.7	096.1	338.6
28	225.5	194.4	338.1	305.0	180.2	148.2	025.9	357.2	330.3	212.8	188.2	070.6
29	317.4	286.3	069.9	036.8	272.1	240.1	117.8	089.2	062.4	305.0	280.3	162.7
30	049.4	-----	161.8	128.6	003.9	332.0	209.8	181.2	154.4	037.0	012.4	254.7
31	141.3	-----	253.6	-----	095.8	-----	301.7	273.2	-----	129.2	-----	346.8

MOTION OF THE CENTRAL MERIDIAN

01^h -- 033°8	09^h -- 304°5	17^h -- 215°2	10^m -- 005°6	1^m -- 000°6
02 -- 067.7	10 -- 338.3	18 -- 249.0	20 -- 011.3	2 -- 001.1
03 -- 101.5	11 -- 012.7	19 -- 282.8	30 -- 016.9	3 -- 001.7
04 -- 135.3	12 -- 046.0	20 -- 316.7	40 -- 022.6	4 -- 002.3
05 -- 169.2	13 -- 079.8	21 -- 350.5	50 -- 028.2	5 -- 002.8
06 -- 203.0	14 -- 113.7	22 -- 024.3		6 -- 003.4
07 -- 236.8	15 -- 147.5	23 -- 058.2		7 -- 003.9
08 -- 270.7	16 -- 181.3			8 -- 004.5
				9 -- 005.1

Figure 8. Table for computing longitude of central meridian of Saturn in 1972. The value at 0^h, U.T. in System II on each date and the rate of increase with time are tabulated. System II applies to the region between the North Equatorial Belt and the North Polar Region and the region between the South Equatorial Belt and the South Polar region. See text on page 126.

suggested that a large number of copies of the special issue might be produced, these perhaps to be sold to each new member as his first issue. On the present date (January 4, 1972) Mr. Ricker has collected most of the required manuscripts, and there is a good chance that the next issue (Vol. 23, Nos. 9-10) can be the special issue here described.

Since the ALPO was founded in 1947, it will celebrate its 25th anniversary in 1972. Several suggestions were made for this occasion, including a Convention at Albuquerque, where the ALPO had its beginning. Bill Shawcross suggested that a review of selected old articles in the light of new findings from space missions might be rewarding. Some interest was expressed in publishing historical articles of good quality in the 25th anniversary issue.

Mr. Carlisle from Spartansburg, South Carolina urged that we take part in a campaign to persuade Congress to proclaim a National Astronomical Week. The AAVSO and the League had already approved such a resolution. Letters could be written to certain senators and congressmen. The subject was discussed. It was moved by Harry Jamieson and seconded by Charles Ricker that the ALPO support the idea of a National Astronomical Week. The motion carried.

A necessary task of each business meeting is to choose a site for the next ALPO Convention. The only invitation on hand was from Mr. Clifford Holmes to meet with the WAA at Riverside, California in 1972. It was decided to accept this invitation. There was some discussion of the desirability of more ALPO Conventions in parts of the United States other than the West and Southwest and of the inseparable need for willing host societies.

The Director read parts of a letter from Christopher Vaucher, strongly urging that our 1973 Convention be held in Portland, Oregon.

The Director reported that microfilm copies of old issues of _The Strolling Astronomer_ are now available in the Library of New Mexico State University.

Charles Ricker suggested that it would be valuable to add to the staff certain "Coördinators", who would work closely with Section Recorders and who would thus gain experience needed to become Recorders themselves in due time. Discussion followed, but no action was taken. There was some hope that such Coördinators could make the frequent staff changes easier and smoother and that Recorders unable to continue with Section duties could be replaced more quickly.

The history of the proposed ALPO Constitution was outlined. The text of this Constitution was published in _Str. A._, Vol. 22, Nos. 3-4, pp. 41-43. At the ALPO Convention in Sacramento in 1970 the Constitution was approved with a few changes, and it was decided to poll the whole membership on the question of its adoption. However, this poll had still not been conducted when the Memphis Convention occurred in August, 1971.

Some marked differences of opinion about the Constitution were expressed during the floor discussion at Memphis. Questions were raised about the future role of the present Director and about the effectiveness of the elective Council provided for in the Constitution. Mr. William Shawcross of the _Sky and Telescope_ staff raised the question of the need for legal incorporation. It was finally agreed that Mr. Shawcross should ask a qualified outsider of his acquaintance for a critical evaluation of the present draft of the Constitution and of the desirability of incorporation. Mr. Shawcross's findings will be reported in this _Journal_ after they become known.

It was moved, seconded, and passed to thank Southwestern at Memphis and the Astronomical League for their hospitality and considerable assistance in making the Memphis gathering possible.

LUNAR NOTES

By: John E. Westfall, A.L.P.O. Lunar Recorder

Additions to the A.L.P.O. Lunar Photograph Library: Amateur and Apollo-11, -12, and -13 Photographs

(concluded from Vol. 23, Nos. 3-4, pp. 63-67)

Foreword by Editor. In the part of his article already published Dr. Westfall gave general information about borrowing lunar photographs from the A.L.P.O. Lunar Photograph Library and described the format of the listing of Apollo photographs in this library. Lunar <u>east</u> is the hemisphere of Mare Crisium.

Apollo-12 (41 photographs)

Code Number AS12-	Format	Sun Angle	Description
47-6876	H-OBL 60-70°	Low	Copernicus, Rheinhold. (05°N/21°W).
50-7402	H-OBL 50-65°	Medium	Triesnecker, Agrippa, Hyginus, Manilius. (09°N/07°E).
50-7403	H-OBL 50-65°	Medium	Hyginus, Lade, Arago. (04°N/11°E).
50-7430	L-OBL 5-10°	Medium	Hipparchus, Albategnius, Ritchey. (08°S/07°.5 E). 1/1,100,000.
50-7432	L-OBL 20-25°	Medium	Ptolemaeus, Herschel, Flammarion, Reamur. (4°S/0°). 1/1,200,000.
50-7433	H-OBL 65-75°	Low	Eratosthenes, Wallace. (14°N/11°W).
50-7434	H-OBL 70-80°	Low	S. Aestuum, M. Apenninus. (16°N/4°.5 W).
50-7435	L-OBL 40-50°	Low	Ptolemaeus, Lalande, Mösting. (04°S/07°W).
50-7439	L-OBL 8-14°	Low 3-5°	Gambart, Turner, Lalande η. (2°.5 S/14°W). 1/210,000.
51-7465	L-OBL 30-40°	High	Mädler. (10°.5 S/29°E).
51-7471	L-OBL 40-45°	Medium	Klein, Parrott. (13°S/03°E).
51-7477	H-OBL 60-70°	Medium	Davy, Lassell, Birt. (15°S/08°.5 W).
51-7482	L-OBL 50-60°	Low	Parry, Parry A and M. (08°.5 S/15°W).
51-7485	L-OBL 60-70°	Medium	Davy, Davy Y and A. (10°.5 S/7°W).
51-7538	L-OBL 35-40°	Medium	Lansberg, Lansberg C. (0°.5 S/26°.5 W).
51-7539	L-OBL 35-40°	Low	Lansberg A and X, Kunowsky D. (01°N/29°W).
51-7544	H-OBL 65-70°	Medium	Hortensius, Hortensius E Milichius, Tobias Mayer C. (10°N/26°.5 W).
51-7546	H-OBL 65-70°	Medium	Hortensius, Hortensius A, Milichius. (09°.5 N/31°W).
51-7548	L-OBL 45-50°	Low	Kunowsky, Hortensius A and D. (3°.5 N/32°.5 W).
51-7551	H-OBL 50-60°	Low	Kepler, Encke, Encke B. (04°.5 N/36°.5 W).
52-7589	L-OBL 30-35°	Low	Lalande η, Fra Mauro ζ. (05°.6 S/13°.4 W).
52-7591	L-OBL 30-35°	Low	Lalande η, Fra Mauro H. (04°.4 S/14°.4 W).
52-7595	L-OBL 35-40°	Low	Fra Mauro, Fra Mauro A and H. (04°.9 S/17°.4 W).
52-7741	L-OBL 61-65°	Medium	Hortensius B, Milichius. (06°.5 N/29°.4 W).
52-7744	L-OBL 61-65°	Medium	Hortensius D, Milichius A. (07°.2 N/31°.8 W).
52-7746	L-OBL 45-51°	Medium	Kunowsky. (02°.1 N/32°.5 W).
54-8080	VERT	Medium	Lalande η, Turner K, L, and M. (04°S/13°W). 1/360,000.
54-8083	VERT	Medium	Fra Mauro H, K. (04°S/16°W). 1/410,000.
54-8085	VERT	Medium	Fra Mauro J, Rima Parry I. (03°S/18°W). 1/380,000.
54-8087	VERT	Medium	Fra Mauro J, T, ν. (03°.5 S/20°W). 1/390,000.
54-8089	VERT	Medium	Fra Mauro ν, Lansberg P. (02°S/22°W). 1/390,000.
54-8091	VERT	Medium	Lansberg P, σ, β. (03°S/24°W). 1/400,000.
54-8093	VERT	Medium	Lansberg, Lansberg N. (01°.5 S/26°W). 1/400,000.

Apollo-12 Photographs-(Continued).

Code Number AS12-	Format	Sun Angle	Description
54-8095	VERT	Medium	Lansberg, Lansberg B and C. (01°5 S/28°W). 1/350,000.
54-8097	VERT	Medium	Lansberg C, G, A, E. (01°5 S/30°W). 1/430,000.
54-8099	VERT	Medium	Lansberg A, Fb; Kunowsky C, Ca. (01°S/32°W). 1/400,000.
54-8101	VERT	Medium	Lansberg Fc and area to north. (0°/34°W). 1/360,000.
54-8103	VERT	Low	Encke C. (0°5 N/36°W). 1/460,000.
54-8105	VERT	Low	Encke K. (0°5 N/37°5 W). 1/430,000.
54-8107	VERT	Low	Encke E. (01°N/40°W). 1/410,000.
55-8226	----	Low-High	Whole-disk, centered on Mare Smythii.

Apollo-12: Overlapping Pairs ("S" indicates stereoscopic overlap).

AS12-50-7402/50-7403 (S)	51-7548/51-7551	54-8085/54-8087
50-7432/50-7435	52-7589/52-7591	54-8087/54-8089
50-7439/52-7589	52-7589/52-7595	54-8089/54-8091
50-7439/52-7591	52-7589/54-8080	54-8091/54-8093
50-7439/52-7595	52-7591/52-7595	54-8093/54-8095
50-7439/54-8080	52-7591/54-8080	54-8095/54-8097
50-7439/54-8083	52-7591/54-8083	54-8097/54-8099
51-7538/51-7539	52-7595/54-8083	54-8099/54-8101
51-7544/51-7546 (S)	52-7595/54-8085	54-8101/54-8103
51-7546/51-7548	54-8083/54-8085	54-8103/54-8105
		54-8105/54-8107

Note: AS12-54-8080 through 54-8107 form a continuous strip of 14 photographs across southern Oceanus Procellarum from 4°S/13°W to 1°N/40°W at a scale of approximately 1/400,000.

Apollo-13 (20 photographs)

Code Number AS13-	Format	Sun Angle	Description
60-8631	L-OBL	25°	Prager, Lane, Ten Bruggencate. (4°5 S/134°5 E).
60-8632	L-OBL	25°	Danjon, Perepelkin, Love. (7°5 S/127°E).
60-8636	H-OBL	Low	Schliemann, Ventis, Keeler. (4°5 S/157°E).
60-8638	H-OBL	30°	Tsiolovsky, Fermi, Naujmin, Waterman. (19°S/121°E).
60-8643	H-OBL	30°	Khwolson, Kondratyuk, Fermi, Izsak, Schaeberle, Milne, Zhiritsky, Scaliger, Alden. (19°5 S/115°5 E).
60-8645	H-OBL	30°	Hilbert, Khwolson, Meltner, Pasteur, Backlund, Perelman. (16°S/106°E).
60-8647	H-OBL	Low	Komarov, Tihomirov, Konstantinov, Van Gelt, Kohlschütter, Nagaoka, Tsu Chung-Chi, Leonov. (18°N/152°E).
60-8648	H-OBL	Low-Medium	Komarov, Siedentopf, Tereshkova, Mare Moscoviense. (24°N/144°E).
60-8649	H-OBL	Low	Papaleski, Konstantinov, Mills, Henderson, Mandel'shtam, Schuster. (9°N/162°5 E).
60-8652	H-OBL	Low-Medium	Mendelev, Schuster, Kohlschütter, Van Gelt, Papaleski, Mills. (11°N/151°5 E).
60-8656	H-OBL	35°	Vernadsky, Siedentopf, Tereshkova. (25°N/135°E).
60-8670	H-OBL	High	Maria Crisium, Marginis, Humboldtianum; Joliot-Curie. (30°N/75°E).
60-8671	L-OBL	High	Maria Crisium, Marginis, Smythii; Joliot-Curie, Gauss. (15°N/85°E).
60-8673	H-OBL	High	Maria Crisium, Tranquillitatis, Serenitatis, Frigoris. (30°N/50°E).
60-8674	H-OBL	High	Maria Frigoris, Humboldtianum; Gauss. (45°N/70°E).
60-8675	H-OBL	High	M. Humboldtianum; Bruno, Joliot-Curie. (35°N/105°E).
60-8676	L-OBL	High	Maria Smythii, Marginis; Joliot-Curie. (15°N/110°E).
60-8687	H-OBL	High	Maria Fecunditatis, Tranquillitatis, Nectaris; Langrenus. (15°S/45°E).

Apollo-13 Photographs-(Continued).

Code Number AS13-	Format	Sun Angle	Description
60-8693	H-OBL	High	Maria Crisium, Tranquillitatis, Serenitatis, Imbrium, Fecunditatis, Nectaris; S. Medii. (5°N/45°E).
61-8788	----	High	Whole-disk, centered near Mare Undarum. (0°N/75°E).

Apollo-13: Overlapping Pairs ("S" indicates stereoscopic overlap).

AS13-60-8643/8645	60-8670/8673 (S)	60-8671/8693 (S)
8647/8648 (S)	8670/8674 (S)	8673/8674 (S)
8674/8649 (S)	8670/8676 (S)	8673/8687 (S)
8647/8652 (S)	8670/8693 (S)	8673/8693 (S)
8648/8656 (S)	8671/8674 (S)	8674/8675 (S)
8649/8652 (S)	8671/8675 (S)	8675/8676 (S)
8670/8671 (S)	8671/8676 (S)	8687/8693 (S).

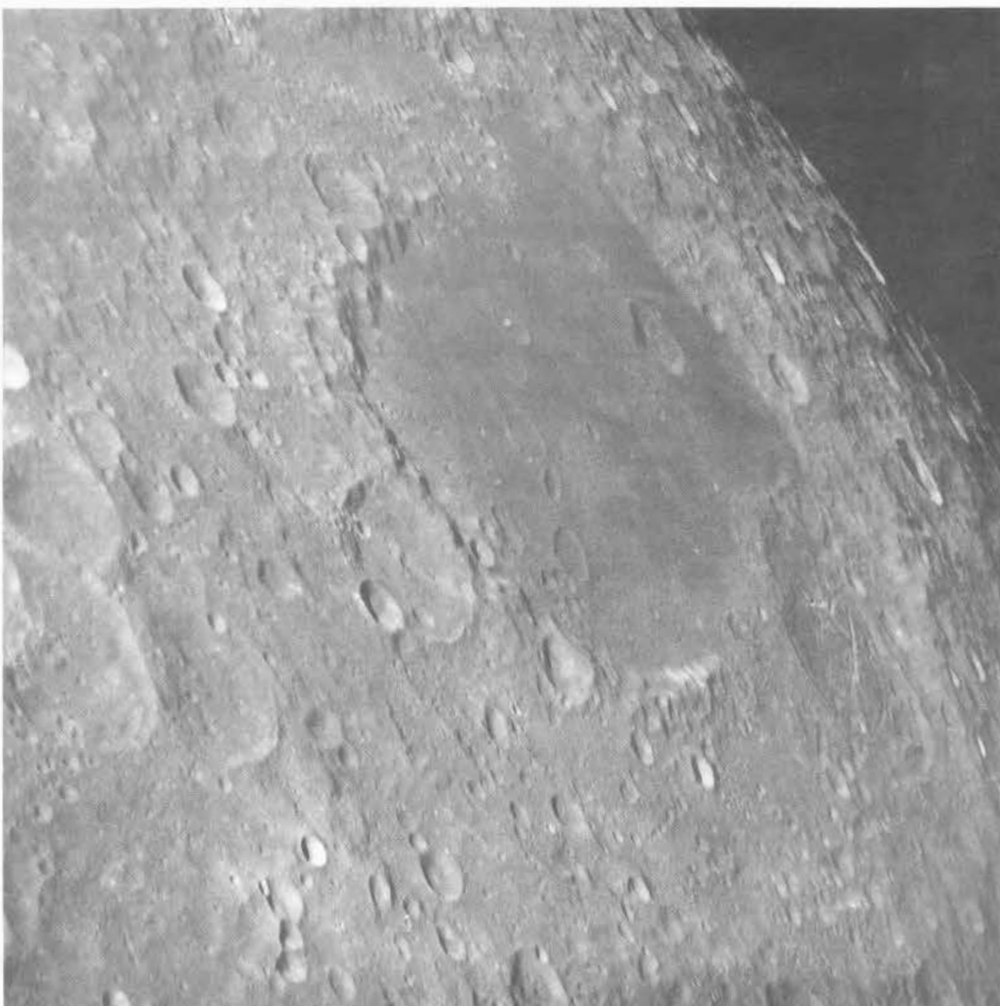

Figure 9. The farside Mare Moscoviense appears in this view from Apollo-13 (AS13-60-8648). Mare Moscoviense lies in a depression about 500 kms. in diameter. Adjoining the mare on the lower right is the crater Komarov, with a system of rilles on its floor similar to those in Humboldt and Gassendi. North is to the upper left.

Luna Incognita—Observing Schedule for 1972

At the 1971 ALPO-Astronomical League Convention, a paper of the writer's, titled "Luna Incognita: The Last Frontier?" was read. This paper, on pages 118-122 of this issue, proposed an ALPO project to map that portion of the moon not satisfactorily mapped from Earth or by the Lunar Orbiter Missions--the south polar zone and the marginal zone beyond the southwest (IAU) limb, extending northward to about 52°S/110°W (i.e., beyond the craters Pingré, Hausen, Bailly, and Drygalski). This region is difficult to observe, requiring satisfactory lighting and optimum libration <u>in combination</u>. The south polar zone (SPZ) is readily visible for a period in every lunation, but the portion of "Luna Incognita" farther north (here called the southwest marginal zone or SWMZ) is less frequently well seen.

The following table gives those dates during 1972 when the SPZ, or both the SPZ and the SWMZ, will be well presented, along with the solar colongitude and the Earth's selenographic latitude and longitude for 0^h, U.T. (A negative latitude libration exposes the south limb; a negative longitude libration, the I.A.U. west limb.) Under "Notes":

SPZ--Only south polar zone visible.
SWMZ—South polar zone visible <u>and</u> southwest marginal zone visible (i.e., illuminated and well presented).
SWMZ*--Medium to low sun angle for the SWMZ.
SWMZ-N—Northern portion (i.e., about 52° to 70° S) of the SWMZ most favorably presented.
Also when the direction of maximum combined latitude and longitude libration lies toward Luna Incognita, the position angle and magnitude of the maximum libration are given in parentheses (position angles are measured north through I.A.U. west; thus I.A.U. west = 90°, south = 180°).

<u>Luna Incognita Observing Schedule, 1972.</u>

Date	Colongitude	Earth's Selenographic Latitude	Earth's Selenographic Longitude	Notes
Jan. 21	330°34	- 5°42	- 1°87	SPZ (161°/6°)
22	342.51	- 6.26	- 0.84	SPZ (173°/6°)
23	354.68	- 6.71	+ 0.23	SPZ (182°/7°)
24	006.83	- 6.75	+ 1.28	SPZ
25	018.99	- 6.38	+ 2.26	SPZ
26	031.13	- 5.62	+ 3.13	SPZ
Feb. 17	298°67	- 5°08	- 2°11	SPZ (158°/6°)
18	310.87	- 6.03	- 0.65	SPZ (175°/6°)
19	323.06	- 6.59	+ 0.81	SPZ
20	335.24	- 6.72	+ 2.16	SPZ
21	347.42	- 6.42	+ 3.31	SPZ
22	359.59	- 5.74	+ 4.23	SPZ
Mar. 13	242°86	- 1°69	- 6°51	SWMZ*-N
17	291.70	- 6.34	- 0.40	SPZ (175°/6°)
18	303.91	- 6.59	+ 1.51	SPZ
19	316.12	- 6.39	+ 3.24	SPZ
20	328.32	- 5.77	+ 4.67	SPZ
Apr. 11	236°27	- 4°15	- 6°35	SWMZ*-N
12	248.49	- 5.29	- 4.88	SWMZ*-N
16	297.40	- 5.86	+ 3.32	SPZ
May 9	217°90	- 5°08	- 6°54	SWMZ-N
10	230.13	- 5.95	- 5.21	SWMZ*-N
11	242.37	- 6.45	- 3.47	SWMZ* (152°/7°)
June 5	187°67	- 5°00	- 6°51	SWMZ-N
6	199.90	- 5.91	- 5.77	SWMZ-N
7	212.13	- 6.49	- 4.64	SWMZ (145°/8°)
8	224.37	- 6.66	- 3.16	SWMZ (155°/7°)
9	236.61	- 6.39	- 1.43	SWMZ* (167°/7°)
10	248.86	- 5.68	+ 0.43	SWMZ* (184°/6°)
30	133.26	- 2.27	- 5.60	SWMZ*-N

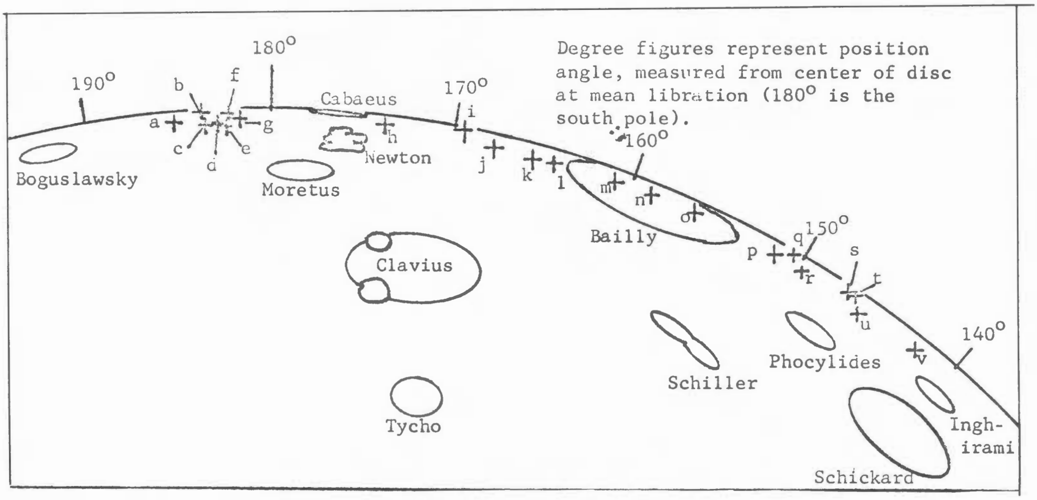

Figure 10. SOUTH AND SOUTHWEST LIMBS--CONTROL POINTS AND POSITION ANGLES (Orthographic Projection, Mean Libration)

Control Points

a Schomberger E
b Schomberger M
c Schomberger F
d Schomberger L
e Schomberger K
f Malapert E
g Malapert C

h Newton E
i Casatus G
j LeGentil A
k Wilson E
l LeGentil G
m Bailly B
n Bailly F

o Bailly D
p Hausen F
q Hausen
r Hausen A
s Hausen E
t Hausen D
u Pingré A
v Wargentin G

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Luna Incognita Observing Schedule, 1972 (Continued):

Date	Colongitude	Earth's Selenographic Latitude	Earth's Selenographic Longitude	Notes
July 3	169°.88	- 5°.86	- 4°.93	SWMZ-N
4	182.10	- 6.50	- 4.17	SWMZ (148°/8°)
5	194.33	- 6.76	- 3.16	SWMZ (155°/8°)
6	206.56	- 6.61	- 1.93	SWMZ (164°/7°)
7	218.80	- 6.02	- 0.56	SWMZ (175°/6°)
8	231.05	- 5.05	+ 0.88	SPZ
27	103.34	- 1.90	- 4.99	SWMZ*-N
28	115.53	- 3.36	- 4.87	SWMZ*-N
29	127.72	- 4.65	- 4.49	SWMZ*-N
30	139.92	- 5.69	- 3.88	SWMZ (146°/7°)
31	152.12	- 6.41	- 3.08	SWMZ (155°/7°)
Aug. 1	164°.33	- 6°.74	- 2°.14	SWMZ (163°/7°)
2	176.54	- 6.67	- 1.09	SWMZ (172°/7°)
3	188.76	- 6.19	- 0.01	SPZ (180°/6°)
4	200.99	- 5.33	+ 1.08	SPZ
25	097.64	- 4.25	- 4.69	SWMZ*-N
26	109.82	- 5.37	- 3.84	SWMZ* (145°/7°)
27	122.00	- 6.18	- 2.75	SWMZ* (156°/7°)
28	134.18	- 6.60	- 1.52	SWMZ* (168°/7°)
29	146.37	- 6.61	- 0.23	SWMZ (178°/7°)
30	158.56	- 6.20	+ 1.01	SPZ
31	170.76	- 5.41	+ 2.13	SPZ
Sep. 22	079°.42	- 5°.00	- 5°.19	SPZ
23	091.58	- 5.89	- 3.97	SPZ (146°/7°)
24	103.75	- 6.42	- 2.43	SWMZ* (160°/7°)
25	115.91	- 6.52	- 0.74	SWMZ* (174°/7°)

Luna Incognita Observing Schedule, 1972 (Continued):

Date	Colongitude	Earth's Selenographic Latitude	Earth's Selenographic Longitude	Notes
Sep. 26	128°.08	- 6°.19	+ 0°.97	SPZ
27	140.25	- 5.44	+ 2.55	SPZ
Oct. 20	060°.78	- 5°.66	- 6°.12	SPZ
21	072.93	- 6.29	- 4.74	SPZ (143°/8°)
22	085.08	- 6.51	- 2.96	SPZ (156°/7°)
23	097.22	- 6.28	- 0.95	SWMZ* (172°/6°)
24	109.37	- 5.61	+ 1.11	SPZ
Nov. 16	029°.55	- 5°.55	- 7°.59	SPZ
17	041.70	- 6.25	- 6.83	SPZ
18	053.85	- 6.60	- 5.56	SPZ
19	065.98	- 6.51	- 3.85	SPZ (150°/8°)
20	078.12	- 5.97	- 1.82	SPZ (163°/6°)
Dec. 13	357°.98	- 5°.48	- 7°.42	SPZ
14	010.14	- 6.25	- 7.26	SPZ
15	022.29	- 6.68	- 6.68	SPZ
16	034.44	- 6.73	- 5.67	SPZ
17	046.57	- 6.35	- 4.26	SPZ (146°/8°)
18	058.71	- 5.53	- 2.53	SPZ (156°/6°)

Experienced ALPO observers are requested to observe Luna Incognita on as many of the dates listed as possible, particularly on those dates when the SWMZ is visible. Both sketches and photographs are desirable. Photographs should be detailed views of the extreme south and southwest limb areas (whole-disc views will be at too small a scale), and should be submitted in the form of 8X10-inch enlargements on double-weight paper. If a photograph is to be usable for position measures, it should include at least four well-spaced control points, as shown on Figure 10. Figure 10 also shows position angles along the lunar limb (at mean libration), spaced at intervals of 10°. Note that the study area here discussed extends approximately from position angles 142° to 187°.

Observers should forward their sketches and photographs to Lunar Recorder John Westfall. Further news on this mapping project will appear in future "Lunar Notes".

THE SHADOW OF THE MOON IN THE SKY AT A TOTAL SOLAR ECLIPSE: PART I

By: William H. Glenn

At the time of a total eclipse of the Sun, the shape of the Moon's shadow projected on the Earth's surface is that of an ellipse, with its major axis directed towards and away from the Sun's azimuth and its eccentricity controlled by the Sun's altitude in the sky. If the Sun is high in the sky for an observer witnessing the total phase from within the shadow, the Moon's shadow in the sky overhead appears dark blue, if there are no clouds; and the light from outside the shadow then appears as a bright border around the horizon. Since air transmits the long wavelengths of light more readily than the short ones, the light from outside the shadow tends to be yellow or orange, the exact color depending on the distance of the shadow edge from the observer. If the shadow edge is far from the observer, reddening is pronounced and the bright horizon glow does not extend upward very far before it meets the shadow edge. As the distance from the observer to the shadow edge decreases, the horizon glow extends higher into the sky, and the color becomes less yellowish. If the major axis of the shadow projected on the Earth is extremely elongated, as in sunrise or sunset eclipses, no horizon glow is seen in the direction along the axis; and an observer facing the Sun sees what appears to be a truncated V-shaped shadow expanding upward into the sky from the horizon. In sunrise eclipses the shadow strikes the Earth tangentially, and the shadow appears first in the sky above the observer as it falls down through the atmosphere to the Earth's surface. In a sunset eclipse the reverse situation is seen, and the shadow appears to rise upward into the sky as it leaves the Earth tangentially.

The degree of sky darkness occurring during the total phase depends on the solar altitude, the dimensions of the Moon's shadow on the Earth's surface, and the elevation above sea level of the observer. Theoretical discussions of factors affecting the general illumination and observations of the June, 1937 eclipse were reported by J. Q.Stewart and C. D. MacCracken (1); and observations of the July, 1945 sunrise eclipse were reported by J. Q. Stewart and W. L. Hopkins, Jr. (2). Observations of the October, 1959 sunrise eclipse were reported by W. H. Glenn (3) and J. W. Stewart (4).

The eclipse of July 20-21, 1963, which was total shortly after sunrise in Japan and passed across Alaska, Canada, and Maine, provided an opportunity for observations to be made of sky color and illumination under both sunrise and high sun conditions. A revised version of a questionnaire originally used by J. Q. Stewart at the 1945 eclipse was therefore prepared by the writer and was distributed to observers along the path of totality. This report of the sunrise eclipse in Japan is based partly on replies to the questionnaire, and partly on additional observational material received.

The following observers submitted reports from Hokkaido:

A. Yoshihiro Yamada, President of the Western Japan Astronomical Association, Hiroshima. (Reported results obtained by a party of 66 members of the Sun Section of the W.J.A.A.)

Location: Six sites in northeastern Hokkaido.
Elevation: 296 meters and 1480 meters reported for two mountain sites.
Sky conditions: Two sites cloudy. Some stratocumulus flanked the Sun at the other sites.

B. Isamu Hirabayashi

Location: Mt. Rausu (Rausudake), about 17 kms. southeast of the central line.
Elevation: 1529 meters.
Sky conditions: Sea of clouds obscured low areas. Above this the clouds extended to about 2° above the "cloud horizon".

C. Wataru Tanaka, Department of Astronomy, University of Tokyo. (Summarized eight reports.)

Location: Daimachi, Abashiri-shi and Tentosan, Abashiri-shi, 12 kms. north of the central line.
Elevation: Daimachi - 50 meters; Tentosan - 200 meters.
Sky conditions: 50-70% overcast of cirrocumulus and stratus clouds.

D. Katsuhiro Sasaki, Head of Astronomy Club of Tokyo College of Science. (Summarized reports of his party in addition to submitting his own report.)

Location: Mt. Rausu (Rausudake).
Elevation: Not reported.
Sky conditions: Extremely clear except very near the horizon. See (B).

E. Tamotsu Fujii, Yamashiro Astronomical Association, Uji City, Kyoto. (With S. Kurihara, Mitsugi Sagane, and Miss Kuniko Fujita.)

Location: Mt. Rausu (Rausudake).
Elevation: 1387 meters.
Sky conditions: Clear. Some clouds. See (B).

F. Yasuo Yabu (with S. Murayama, K. Komaki, and others).

Location: Bihoro-cho.
Elevation: 390 meters.
Sky conditions: Thin clouds.

G. Hiromichi Fukuda, Tokyo College of Science

Location: Mt. Rausu (Rausudake).
Elevation: 1528 meters.
Sky conditions: See (B) and (D).

H. Kanae Yamamoto, Hiroshima University Party

Location: Mt. Rausu (Rausudake).
Elevation: Not reported.
Sky conditions: See (B) and (D).

I. A. Fujii, Hiroshima University Party

Location: Mt. Rausu (Rausudake).
Elevation: 1528 meters.
Sky conditions: See (B) and (D).

Many parties of observers were stationed on Mt. Rausu, Hokkaido, about 17 kms. southeast of the central line. At this site observers had a clear view eastward over Nemuro Strait toward Kunashiri Island in the Kurils. See Figure 11. At totality a sea of low clouds obscured Nemuro Strait and all but the peaks of the mountains on Kunashiri. A few scattered thin clouds lay above this "cloud horizon", and above this level the sky was extremely clear. The sun rose over the sea of clouds at 3:47 a.m., JST (E)*. At totality the Sun's position was azimuth N 62°E, altitude 4° (B). Second contact occurred at 4:13:44 a.m. and third contact at 4:14:12, JST (G).

K. Sasaki (D) observed the Moon's shadow before, during, and after totality from Mt. Rausu. He writes that the "Moon's shadow was first noticed presumably 30 seconds before second contact, though the shadow was already prominent at that time. The shadow in the atmosphere became invisible about 15 seconds after third contact, and the shadow on the clouds became invisible after 1.5 minutes after third contact. Change in the intensity of the shadow was faster after totality than before totality. The color of the shadow was very deep indigo or dark blue." See Figure 12.

Photographs taken from Mt. Rausu provide confirmation for the Sasaki observations. Three Fuji-Color prints by K. Yamamoto (H), shown in Figure 13, and one by H. Fukuda (G) show the truncated V-shaped shadow as grayish-blue to grayish indigo, with light blue and pale orange predominating in the sky outside the shadow. These, plus three additional black-and-white prints provided by H. Fukuda and made from Fuji-Color originals, and one black-and-white print by I. Hirabayashi (B), show the motion of the shadow in the vicinity of the Sun from just after second contact to shortly after third contact. The appearance of the shadow on the photographs is strikingly similar to Sasaki's sketches numbered 3, 5, 6, and 7 (Figure 12). For an observer facing the Sun, just after second contact the Sun appears just inside the left (northeast) edge of the V-shaped shadow. The shadow moves right to left (east to northeast) along the horizon during totality; and by the time just prior to third contact the Sun appears just inside the right (eastern) edge. At third contact the shadow edge is tangential to the Sun, and after third contact the shadow "drops to Earth" as it moves to the left (northeast) of the Sun and rotates counterclockwise as it disappears below the horizon.

A series of black-and-white prints, taken with an all-sky camera (5) by A. Fujii (I) of the Hiroshima University party on Mt. Rausu also show the advance of the shadow across the sky during totality. Of these, a photograph taken 13 seconds prior to second contact shows most of the sky dark, with a narrow light band around the horizon except in the southwest, where the darkness appears to extend to the horizon. The bright band extends considerably higher into the sky in the northern sector, from east, through north, to the west. Two photographs during totality, one of which is Figure 14, reveal the V-shaped shadow rising from the horizon below the Sun, and obscuring all of the sky except a narrow band along the horizon in all directions. The darkest region lay along the horizon opposite to the Sun in the sky, but even here there was enough light to show the clouds silhouetted against the somewhat brighter background.

A fourth photograph, taken five seconds after third contact, shows the sky almost completely dark, with a very narrow band of light along the northern horizon. The band of light along the southern horizon is not so intense as in the north, but extends higher into the sky. The horizon opposite the Sun in the sky is also lit up to some extent, the horizon therefore being illuminated for a full 360° in azimuth.

Two other observers (A, B) have reported the visibility of the shadow in the sky prior to totality. The first of these indicates that the shadow was seen in the sky three seconds before second contact. The other first noticed it five or more seconds prior to totality, at which time it lay above him. The color of the shadow during totality was described as dark blue, with the unshadowed sky pink.

Estimates of the faintest stellar magnitudes noted during totality, and of the times of appearance and disappearance of stars and planets, were received from several observers. Almost all observers report having seen Venus (A, B, C, D, E) and Jupiter (A, B, D). Other

*Letters in parentheses refer to the list of observers.

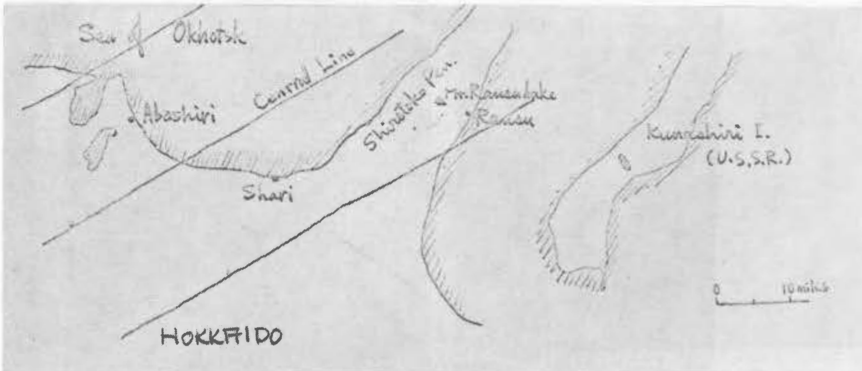

Figure 11. The path of the total eclipse of July 21, 1963 in northeastern Hokkaido, Japan. Drawn by T. Fujii. See article by Mr. William Glenn.

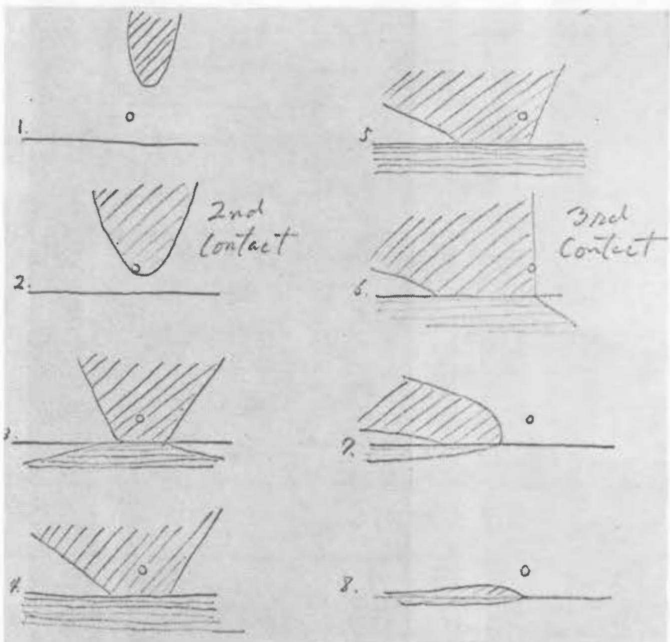

Figure 12. The Moon's shadow in the sky at the total eclipse of July 21, 1963, as seen from Mt. Rausu, Japan, looking eastward over a "sea" of low clouds obscuring Nemuro Strait. Horizontal line represents "cloud horizon"; shading below this line is shadow reflected on the cloud layer. Solar azimuth N 62° E, altitude 4°. Observations by K. Sasaki. See text of Mr. Glenn's article.

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objects reported were Vega (A), Capella (D), and Pollux (C). In addition, one observer (A) reported that the minimum magnitude visible was 1.5, and another (D) stated that "every star in the pentagon of Auriga was visible, so at mid-totality stars down to third-magnitude were visible."

Times reported for the appearance and disappearance of stars and planets are given below.

Object	Appearance (2nd contact minus...)	Disappearance (3rd contact plus...)	Observer
Venus	10-30 secs.	0 secs.	C
"	No Data	20 secs.	A
"	30-60 secs.	No Data	D
Jupiter	30-60 secs.	No Data	D
"	No Data	10 secs.	A
Capella	30-60 secs.	No Data	D
Vega	No Data	5 secs.	A
Pollux	10-30 secs.	0 secs.	C

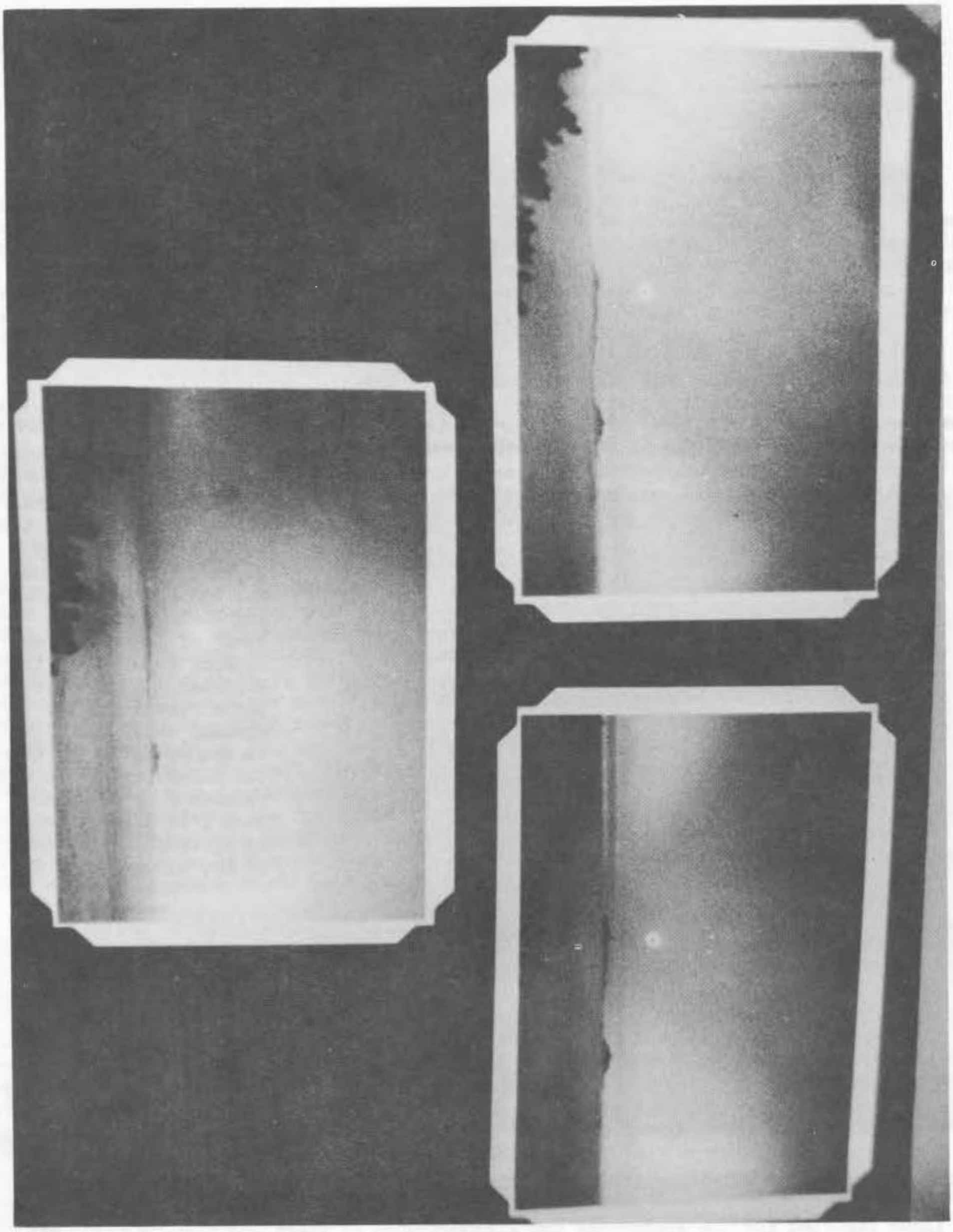

Figure 13. The Moon's shadow in the sky on July 21, 1963, as seen on Fuji-Color prints taken by K. Yamamoto at Mt. Rausu. Upper right: $4^h13^m50^s$ (approx.) JST, about 6 seconds after 2nd contact. Lower right: $4^h14^m01^s$, mid-eclipse. Left: $4^h14^m20^s$, 8 seconds after 3rd contact. Solar azimuth N 62° E, Altitude 4°. Reproductions by Mr. Glenn of color prints supplied by Mr. Yamamoto.

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In addition, one report indicated that at 7 minutes after third contact Venus was still visible, but not Jupiter (E).

A number of observations of the visibility of the hands of watches and of various sizes of newsprint during totality were made. Four reports (A, B, C, E) indicated that the hour hands of a watch were visible at mid-totality. Three others (A, C, E) indicated that a second hand could be seen. One report stated that the F-numbers and exposure settings on a camera were visible (B). The 11-point standard type of the questionnaire could be read by one observer (C), and another (A) reported that Japanese characters equivalent in size and weight to 9-point light face type could be read.

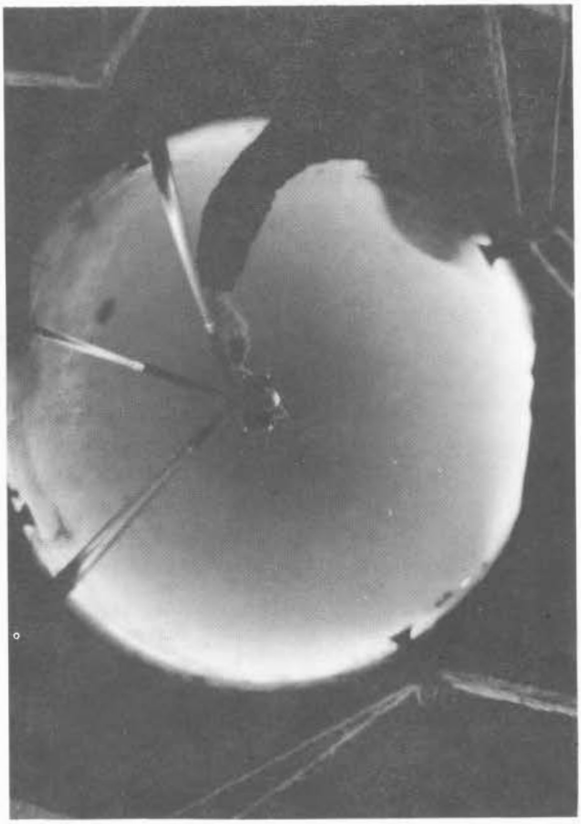

Figure 14. The Moon's shadow in the sky on July 21, 1963, as photographed by A. Fujii on Mt. Rausu with an all-sky camera. $4^h13^m55^s$ (JST), 7 seconds before mid-eclipse. Solar azimuth N 62° E, altitude 4°. North at right, east at bottom, west at top, south at left.

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Only one attempt to make quantitative estimates of the sky illumination during the eclipse was reported to this writer. Y. Yabu (F) photographed two pieces of white paper set up at right angles to the Sun with an 8 mm. motion picture camera during the partial and total phases. A sensitivity curve for the film was then prepared to allow comparison of the true intensity of illumination reflected off the papers to the degree of darkening of the film. The result was a plot of true intensity versus time during both the partial and total phases. The graph shows, however, that at totality the intensity of illumination was too low to be measured with the instrumentation used. In spite of this low level of illumination, however, Mr. Yabu reports that "the smallest size letters of a Japanese newspaper could be read."

The color of the Moon's disc during totality does not appear black at all times to all observers. Colors reported by the Japanese observers were as follows:

Color	Observer
Dark purple to black	A
Dark brownish	D
Reddish brown-black	C
"Moon's disc little darker than the sky"	C
Black	C

The writer postulates that some of this color was due to the low solar elevation, and that some may have been due to earthshine on the Moon's disc.

The corona also appeared colored, undoubtedly because of atmospheric absorption at the low solar observation. Colors reported were as follows:

Color	Observer
Orange	A, E
Orange-red. Very faint.	C
Reddish-white. Reddish very faint, as if it were pearly color.	B

K. Sasaki (D) also summarized the reports of his group. He reports that the corona appeared about 15 seconds before second contact and disappeared about 20 seconds after third contact. The colors seen and the number of observers reporting each color are listed below:

Bluish-white (2 observers) — Yellowish-white (4 observers)
Yellowish-green (7 observers) — Orange (3 observers)
Orange (On Hi-Speed Ektachrome film)

The Hokkaido observations provide the most complete documentation of the appearance of the Moon's shadow in the sky at a sunrise eclipse that has come to the attention of this writer. In this regard the results obtained with the all-sky camera are of particular interest since its photographs include the sky "behind" the observer, where nobody would be likely to make visual observations during totality. The current availability of "fish-eye" 180° field-of-view lenses should eliminate the need for constructing all-sky cameras in the future.

At future eclipses direct photoelectric measurements should be considered as replacements for the rather subjective estimates of the readability of newsprint or camera dials.

The orange and pink colors reported for the corona can, of course, be explained by the low elevation of the Sun. Coloration of the Moon's disc, reported by some of the Hokkaido observers, was also reported by J. Q. Stewart and C. D. MacCracken (6) at the 1937 eclipse; and W. H. Glenn noted at the 1954 sunrise eclipse that the Moon was a slate-blue, the same as the sky around it, but much darker.

The report of the visibility of third magnitude stars also agrees with the results obtained by Bailey and Korff near sunset at the 1937 eclipse from Moro, Peru, at an elevation of about 2400 feet (732 meters) (7).

In addition to the observers, the writer wishes to thank the following persons who assisted in distributing and transmitting the questionnaires and reports of observations:

Yoshio Fujita, University of Tokyo, Tokyo — Hideo Honda, Nagoya
Takeshi Sato, Rakurakuen Planetarium, Hiroshima — Seiichi Sakuma, Tokyo
Yoshikazu Tsuneoka, Kwansee Gakuin University, Nishonomiya.

References and Notes

1. John Q. Stewart and C. D. MacCracken, "The General Illumination During a Total Solar Eclipse," The Astrophysical Journal, XCI (January, 1940), 51-71.

2. John Q. Stewart and William L. Hopkins, Jr., "Observations of the Total Solar Eclipse by the 'Princeton Party' and Volunteers," Part I, Popular Astronomy, LIII (December, 1945), 477-485, and Part II, LIV (January, 1946), 20-31.

3. William H. Glenn, "Observations of the Moon's Shadow at the October 2, 1959, Solar Eclipse," The Strolling Astronomer, XV (January-February, 1961), 14-22.

4. John W. Stewart, "Atmospheric Phenomena at a Sunrise Total Solar Eclipse," Weatherwise, XIII (June, 1960), 115-117.

5. Described in The Strolling Astronomer, XVII (March-April, 1963), 55-59.

6. Stewart and MacCracken, op. cit., p. 54.

7. Stewart and MacCracken, op. cit., pp. 56, 65.

VENUS SECTION REPORT: THE EASTERN (EVENING) APPARITION OF 1970

By: Dale P. Cruikshank, A.L.P.O. Venus Recorder

Introduction:

This evening apparition of Venus includes the period from January 25, 1970 (superior conjunction of the planet) to November 10, 1970 (inferior conjunction). Seven observers sent in reports of their work during this period, which included drawings, estimates of phase, and written descriptions of the appearance of Venus. The observers are:

Julius L. Benton, Jr. — 4-inch refractor

Michael A. Covington	2.4-inch refractor
Mike Ford	2.4-inch refractor
Kevin L. Krisciunas	6-inch reflector and 3.2-inch refractor
Ken Pearson	6-inch reflector
Gary Stover	4.5-inch reflector
Bruce Sumner	8-inch reflector

Mr. Krisciunas sent in the bulk of the drawings of Venus, while Mr. Sumner contributed an extensive series of phase estimates. We express our thanks to all the observers who participated in keeping watch over Venus during this period. The total number of drawings submitted was 39, covering the period from April 9 to September 29, 1970.

Markings on the Planet:

During the period covered by this report, too few observations were received to attempt a detailed analysis of the markings on the drawings. In previous reports we have seen that the markings drawn by observers fall into fairly distinct categories: band patterns (usually dark bands roughly parallel to one another and perpendicular to the line of cusps), radial patterns (something like a spider web), amorphous markings (no recognizable pattern), and bright spots or regions (appearing brighter than the background intensity of the planet). Among the drawings (mostly those of Mr. Krisciunas) received for the period of this report nearly all types of markings are represented.

Observers using the standard reporting form are asked to estimate the conspicuousness of the markings they see on a scale of zero to ten. Most observers regarded the markings they saw as having conspicuousness of from 3 to 7, where 3 means "nothing certain, vague, suspicious", and 7 means "marking strongly suspected". This appears to be quite an honest appraisal of the appearance of the markings during this entire apparition of the planet. At some apparitions, markings are much more conspicuous; and sometimes several observers, working independently, simultaneously record essentially the same appearance of the markings. There were no cases of simultaneous observations during this period.

A collection of drawings of Venus by Mr. Krisciunas is reproduced in Figures 15 through 23. The series from June 20 to June 27, 1970, is particularly interesting because of the great similarity of the markings as seen from one night to the next. Mr. Krisciunas noted this similarity of the markings and wrote that the configuration might represent a semi-permanent feature on the planet, persisting for at least eight days, and not changing position much. Scientists studying ultraviolet photographs of Venus in the last few years have shown rather conclusively that there is an apparent rotation of the uppermost cloud layers of the planet having a period of 4-5 days. This result came as a surprise initially since the solid planet rotates so very much more slowly, but recent theoretical work has made progress in understanding how the upper clouds can rotate differently from the solid planet. If the features that Mr. Krisciunas drew were directly correlated with the ultraviolet markings frequently photographed, it is unlikely that the slower rotation (perhaps with a period of about 40 days, judging from his drawings reproduced here) implied by his sketches could be real. Mr. Krisciunas used an orange filter, however; and it is not impossible that the markings he drew were at a different level in the upper atmosphere of Venus from that level where the ultraviolet clouds occur. With our present understanding (or lack of understanding) of the dynamics of the atmosphere of Venus, it would be unwise to discount the possibility of a slower "rotation" period as implied by Mr. Krisciunas' drawings.

Miscellaneous Aspects of the Appearance of Venus:

In other Venus Section Reports we have discussed unusual aspects of Venus' appearance, such as irregular terminator shape, extension of the cusps (near inferior conjunction), cusp bands, and the bright limb band. There is no information in the observations received for this apparition to warrant a detailed analysis of these topics in the present report.

Dichotomy:

As is well known, the observed phase of Venus is usually a little different from the phase predicted in the Ephemeris. This phase discrepancy is most easily detected at half phase (dichotomy), and the difference between the observed date of dichotomy and the predicted date is often from five to ten days. The disparity in phase is called the Schroeter Effect after its discoverer, J. Schroeter, an 18th Century observer. ALPO observers

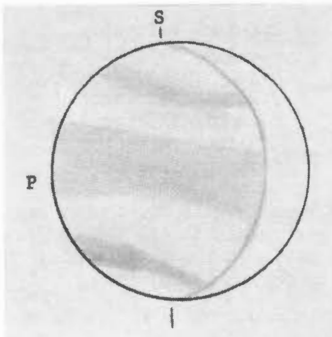

Figure 15. Venus drawing by K. Krisciunas, April 15, 1970, 0^h55^m U.T., 6-inch refl., 138X, orange filter.

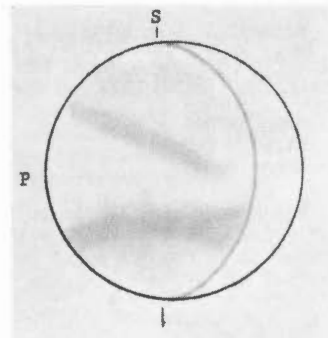

Figure 16. Venus drawing by K. Krisciunas, April 18, 1970, 1^h00^m U.T., 6-inch refl., 138X, orange filter.

Figure 17. Venus drawing by K. Krisciunas, June 8, 1970, 2^h00^m U.T., 6-inch refl., 138X, orange filter.

Figure 18. Venus drawing by K. Krisciunas, June 20, 1970, 2^h05^m U.T., 6-inch refl., 216X, orange filter.

Figure 19. Venus drawing by K. Krisciunas, June 22, 1970, 1^h55^m U.T., 6-inch refl., 216X, orange filter.

Figure 20. Venus drawing by K. Krisciunas, June 25, 1970, 2^h 10^m U.T., 6-inch refl., 180X, orange filter.

Figure 21. Venus drawing by K. Krisciunas, June 27, 1970, 2^h20^m U.T., 6-inch refl., 216X, orange filter.

Figure 22. Venus drawing by K. Krisciunas, July 4, 1970, 2^h10^m U.T., 6-inch refl., 216X, orange filter.

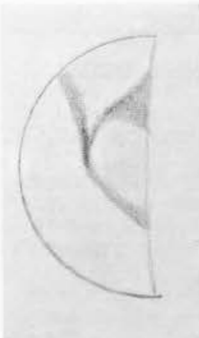

Figure 23. Venus drawing by K. Krisciunas, August 27, 1970, 1^h15^m U.T., 6-inch refl., 250X, orange filter.

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have been keeping track of the magnitude of Schroeter's Effect for several years now, trying to reason out a way in which this peculiarity of Venus' appearance might help us to understand something more about the planet.

Mr. Sumner, of Hornsby, N.S.W., Australia, made a special effort to determine the date of dichotomy from a series of phase estimates between August 8 and August 28, 1970. The predicted date of dichotomy was August 29 at about 17 hours, U.T., but at eastern apparitions dichotomy always appears to occur a few days early. Mr. Sumner used a Wratten 15 Filter to help reduce glare; but from comparisons of phase estimates made with and without the filter, he found that it caused a slight difference in the observed date of dichotomy (one-half day). A graph of Mr. Sumner's phase estimates is reproduced here in Figure 24. Readers will note the interesting shape of the curve on either side of dichotomy; before half phase is reached phase estimates tend to be less than those after half phase. Alan Binder (1) found the same phenomenon in his work in 1964 and pointed out the probable psychological effects responsible for the errors in phase estimates in this part of the curve.

He noted that after the phase is less than about 0.7 at an evening apparition, one tends to compare the terminator to an imaginary straight line connecting the cusps. This practice induces the observer to draw the terminator straighter than it really is, and results in an underestimation of the phase. An additional cause of phase underestimation here is the real Schroeter's Effect tending to make the phase less than predicted. After dichotomy, the terminator is still compared subconsciously to a straight line; and since the cusps are getting more and more dim, the position of the imaginary straight line is shifted, causing the phase to be overestimated. While Mr. Sumner's phase curve agrees with Binder's, some individuals may prefer another explanation for the effect.

Mr. Sumner's date for dichotomy is August 22, 1970 at 6 hours, U.T., which means that observed dichotomy was 7 days, 11 hours early.

Mr. Covington also made phase estimates, though rather few at the time when the planet was very near dichotomy. On July 29 he estimated 0.51^-, and on August 17 he found 0.49. This result conflicts with Mr. Sumner's estimate and is probably a result of the small number of estimates in Mr. Covington's series. On August 21, Mr. Krisciunas drew the disk at essentially half phase; and on August 25 he showed it a slight crescent, in agreement with Mr. Sumner's work. We shall therefore take Mr. Sumner's date as the best determination of the time of observed dichotomy for this 1970 apparition.

<u>The Dark Side of Venus</u>:

Only one marginal report of the possible visibility of the dark side of Venus was received. On August 21 Mr. Krisciunas suspected that the dark side was observed, but considers his observation "not definite". He was observing in twilight with a 6-inch reflector at 250X and with an orange filter in seeing of quality 6 (0105 U.T.).

<u>Concluding Remarks</u>:

This report appears out of sequence, with the reports for several apparitions between 1965 and 1969 not yet published. For some of those apparitions the collections of observations received from members are quite large, thus lending themselves to a more detailed study than has been attempted in the present report. The Recorder offers his apologies to all those observers who have waited so patiently for the analysis of their work to appear in print, and hopes that interest among observers will not wane as the result of his slowness of reporting.

<u>References</u>:

1. Alan Binder, "The Venus Phase Anomaly", <u>Str</u>. <u>A</u>., <u>18</u> (9-10), Sept.-Oct., 1964, pp. 189-192.

The most recent Venus Section reports previously published are:

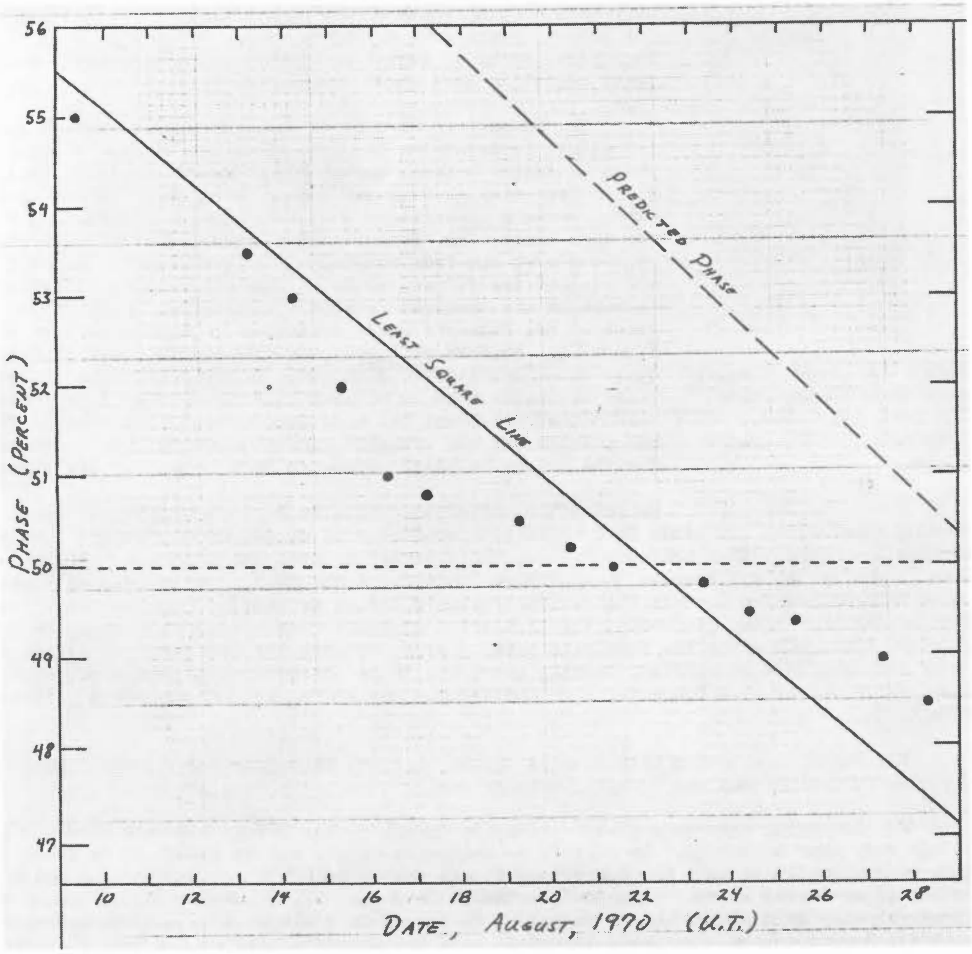

Figure 24. Observations of the phase of Venus made by Bruce Sumner, 8-inch reflector, evening apparition, 1970. The dashed line is the predicted phase (from The Handbook of the British Astronomical Association), and the solid line is a linear least square fit to Mr. Sumner's observations (points). See also discussion in Dr. Cruikshank's Venus Report, pg. 145.

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2. Dale P. Cruikshank, "Venus Section Report - Evening Apparition, 1963-1964", Str. A., 19 (7-8), 1965, pp. 132-138 (Part I); Str. A., 19 (9-10), 1965, pp. 154-164 (Part II).

3. Dale P. Cruikshank, "Venus Section Report - The Western Apparitions of 1962-3, 1964-5, and 1966", Str. A., 21 (5-6), 1969, pp. 83-89.

Some recent technical papers on Venus that should interest some readers are:

4. P. J. Gierasch, "The Four-Day Rotation in the Stratosphere of Venus: A Study of Radiative Driving", Icarus, 13, 1970, p. 25.

5. V. I. Moroz, "Height of the Venusian Clouds at Equatorial and Polar Latitudes", Nature Physical Science, 231, May 10, 1971, p. 36.

6. Carl Sagan, "The Trouble With Venus", in Planetary Atmospheres, edited by C. Sagan, T. Owen, and H. Smith, Reidel, 1971, p. 116.

ANNOUNCEMENTS

Sustaining Members and Sponsors. The persons in these special kinds of membership as of February 3, 1972 are listed below. Sponsors pay $25 per year; Sustaining Members, $10. The balance above the normal rate is employed to help meet the general expenses of the A.L.P.O. We thank all these colleagues for their generous and meaningful assistance.

Sponsors - William O. Roberts, Grace A. Fox, David P. Barcroft, Philip and Virginia Glaser, Dr. John E. Westfall, Dr. James Q. Gant, Jr., Ken Thomson, Reverend Kenneth J. Delano, Richard E. Wend, A. B. Clyde Marshall, Alan Mc Clure, Walter Scott Houston, Frederick W. Jaeger, and Phillip and Janet Budine.

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New Address for Julius Benton. Our Jupiter and Saturn Recorder now has the following address: Julius L. Benton, Jr. - Jones Observatory - P.O. Box 5132 - Savannah, Georgia 31403.

Mr. Benton has been appointed Director of the Jones Observatory of Armstrong College. The Observatory will house a 24-inch reflector. Mr. Benton has been in Europe since early in December, 1971. In his absence Mrs. Deborah Benton has been handling the routine business of the Saturn and Jupiter Sections. We are deeply grateful for her considerable and capable assistance in this emergency. Mr. Benton expects to return to Savannah in March, 1972.

Staff Changes. Mr. Charles Ricker has found it necessary to resign from the staff because of extreme pressures in his work. He has recently had scarecely any time for his efforts as an ALPO Recorder, and he felt it unfair to continue. We are, of course, sorry to lose his services. These have been considerable and include the publication of the Lunar Observer's Guide and the initiation of several Lunar Section observing projects. Mr. Ricker also started the Lunar and Planetary Training Program in its present form. He has maintained a tremendous volume of correspondence with a great number of ALPO members.

Mr. Richard Wessling has kindly taken over the supervision of the ALPO Lunar and Planetary Training Program. All persons interested in this activity should write to him at the address given on the back inside cover. As of December 1, 1971, he was providing training for 10 students in visual drawing and lunar and planetary photography. This service would be extremely useful to a far greater number of our members, and Mr. Wessling warmly welcomes all new recruits.

In the Lunar Section Dr. John Westfall has helpfully agreed to take over Mr. Ricker's duties. These will include the general supervision of the Section activities, the preparation of "Lunar Notes" for each issue, and the handling of all lunar observations not part of a specific program.

Honors Paid to Frank G. Chase. Mr. Chase of Van Nuys, California is known to many of our readers. Mr. James W. Young, Resident Observer at JPL's Table Mountain Observatory, has informed us of many honors paid Mr. Chase in June, 1971 upon his retirement from a long and distinguished professional music career. These honors included an honorary citizenship of Riverside, California, a one-year appointment as a JPL Research Affiliate, and a lifetime honorary membership in the ALPO. A long and happy retirement, Frank!

Solar Eclipse Cruise. A new kind of astronomical adventure is being offered by Eclipse Cruises, Inc., Box 1972, Englewood, New Jersey 07631. Passengers on the Greek Line Cruise Ship "TSS Olympia" will watch the total solar eclipse of July 10, 1972 from the North Atlantic. The ship will be at sea for a week altogether, and the trip will cost $395-$495 per person.

Our Humble Apology. The Editor regrets very much that the publication of this issue has been delayed beyond the occurrence of the lunar eclipse of January 30, 1972 discussed in the lead article. Both personal matters and unusual pressures at work contributed to these delays. He is especially sorry that Dr. John Westfall's description of lunar eclipse photometry methods was not available to observers of that eclipse. The Editor hopes that readers will pardon his failure and will use Dr. Westfall's material in planning their personal studies of future lunar eclipses.

OBSERVATIONS AND COMMENTS

Note on Mars. The drawing reproduced here as Figure 25 shows such famous Martian features as Solis Lacus, Tithonius Lacus, Aurorae Sinus, and Margaritifer Sinus. The observer, Mr. Bruce Salmon of Oklahoma City, Oklahoma, adds these remarks: "An unusually small, dark dot graces the extreme left edge of the S. polar cap now. It is as small and dark as Juventae Fons [near the bottom of Figure 25]. An elongated, ultra-bright rim strip (without clear separation from the normal cap whiteness at its upper-S.-edge) stretches from about the black dot to the C.M.." Mr. Salmon again recorded the same black spot against the background of the cap on August 20 at 6^h, U.T.; it was again small, dark, and well defined. On August 18 the Martian Date was November 20 so that the south cap was dwindling rapidly during its spring "melting". Perhaps some of our readers could examine this portion of Mars on the Mariner IX photographs; it would be interesting to try to identify Mr. Salmon's spot with any topographical feature recorded by the spacecraft some terrestrial months later in the Martian year. Others may enjoy looking for this feature on their own drawings and photographs last August.

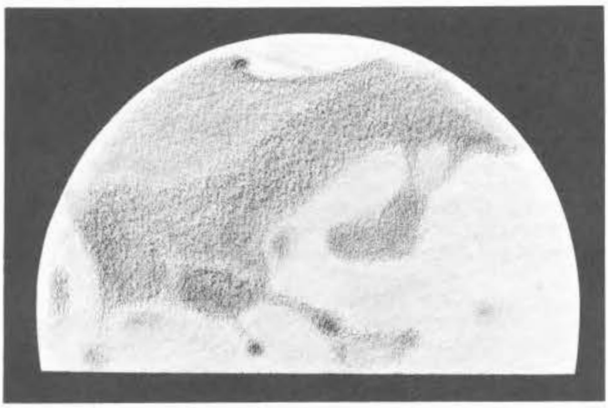

Figure 25. Drawing of southern hemisphere of Mars by Bruce Salmon on August 18, 1971 at 6^h40^m, U.T. 12.5-inch refl., 500 X. Seeing 7, transparency 4. No filter. Diameter = 24"7. CM = 72°.

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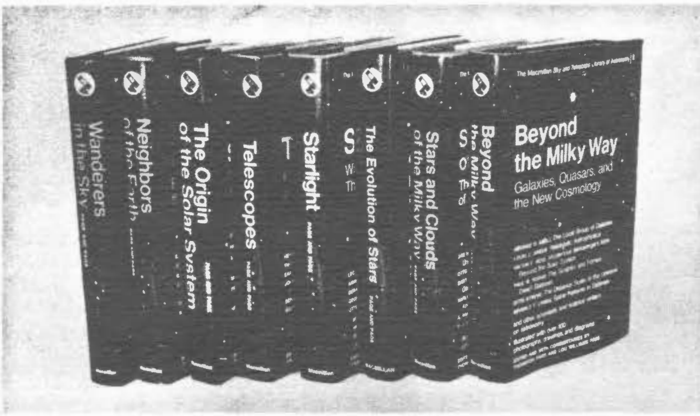

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