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Artificial Satellite Exhibit at Great Lakes Region Convention at Detroit, Michigan, July, 1960. Rockets even simulate leaving earth and striking moon in upper right. Photograph contributed by Joseph Maple.

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IN THIS ISSUE

PLANETARY APPULSES AND OCCULTATIONS IN 1961

By: Gordon E. Taylor

1. The following appulses may be of interest to observers:

Planet	Date 1961	Time of Conjunction by U.T.	Star	Mag.	Geocentric Separation*	Horizontal Parallax
		h m			"	"
Venus	May 15	02 33	Z.C. 136	6.3	+20	21
Mars	Jan. 14	04 29	B.D. +27° 1049	8.8	+19	14
	Jan. 21	15 18	B.D. +27° 1006	8.0	+20	13
	Feb. 19	09 58	B.D. +26° 1079	7.5	-27	10
	Apr. 25	16 09	B.D. +23° 1825	8.7	+23	6
	June 22	01 51	B.D. +14° 2166	8.6	-10	4
	July 28	18 10	B.D. + 6° 2429	8.9	- 2	4
	Aug. 14	23 34	B.D. + 1° 2633	7.7	-11	4
	Sept. 5	01 01	B.D. - 3° 3360	8.0	+10	4
Jupiter	Feb. 6	16 28	B.D. -21° 5471	8.8	-52	1
	Feb. 8	19 49	B.D. -21° 5482	8.7	+38	1
	Feb. 10	03 17	B.D. -21° 5494	8.6	-50	1
	Feb. 19	07 39	B.D. -21° 5546	8.8	-38	1
	Mar. 15	07 12	B.D. -20° 5836	7.3	+25	2
	Mar. 16	03 16	B.D. -20° 5844	8.5	+12	2
	Mar. 23	17 25	B.D. -20° 5880	7.8	+15	2
	June 27	20 37	B.D. -19° 5850	8.7	-12	2
	Dec. 8	08 51	B.D. -19° 5852	7.9	+14	2

2. The following occultation by Mars has been predicted:

Date 1961	Star	Area of Visibility	Station	Disappearance U.T.	P.	Reappearance U.T.	P.
				h m	°	h m	°
July 28	B.D. + 6° 2429 (8^m.9)	S. Africa	Cape	18 11	99	18 13	310

3. The following occultations by Jupiter have been predicted:

Date 1961	Star	Area of Visibility	Station	Disappearance U.T.	P.	Reappearance U.T.	P.
Mar. 16	B.D. -20° 5844 (8^m.5)	S. Africa	Cape	02 43	127	03 33	210
		N.E. Africa	Helwan	02 40	120	SUN	
Mar. 23	B.D. -20° 5880 (7^m.8)	Australasia	Sydney	16 59	147	17 28	189
			Welling-ton	17 01	149	SUN	
June 27	B.D. -19° 5850 (8^m.7)	E. Europe	Simeis	LOW		21 38	36
		Africa	Helwan	LOW		21 41	38
		Asia	Cape	19 07	284	21 51	44
		Australasia	Hyderabad	19 07	289	21 38	40
			Perth	18 58	284	21 43	46
			Sydney	18 54	282	SUN	
Dec. 8	B.D. -19° 5852 (7^m.9)	E. Asia	Tokyo	08 24	125	09 09	206
		Australasia	Welling-ton	08 30	138	09 03	195

4. No passages of planets in front of radio sources are predicted.

Postscript by Editor. We express our thanks to Dr. Taylor of H. M. Nautical Almanac Office of the Royal Greenwich Observatory for

*The geocentric separation given here is in the sense $\delta p - \delta *$.

these predictions. We shall be very interested in receiving observations of these phenomena and urge our members everywhere to make special efforts to study them.

RECENTLY OBSERVED ROTATION RATES ON SATURN

By: Thomas A. Cragg

(Paper read at the Sixth A.L.P.O. Convention at San Jose, California, on August 24, 1960)

Late in April of 1960, Dr. Audouin Dollfus at Pic du Midi, France, discovered a major white spot on Saturn at a latitude of about 60°N. He recovered the spot at the next available rotation, yielding a period of about $10^h\ 40^m$. The spectroscopic period for latitude 57° is about $11\frac{1}{4}^h$. Dr. Dollfus then informed the astronomical world of the existence of the spot so that a good rotation rate would be obtainable by more observers. Members of the A.L.P.O. immediately responded to the challenge. Although the spot was quickly degenerating into a bright zone adjacent to the dark North Polar Region, a sufficiently definite spot persisted throughout the month of May, 1960, to allow several C.M. transit observations to be made. What made these observations so important was that this was the first time that any spot of long duration had ever been observed at such a high latitude. If a spot endures for several weeks, a period good to 0.1 minutes can be obtained by this simple technique.

Apparently the spot was very obvious when it first appeared, but then it quickly lost its conspicuousness. In fact, during most of May it was a very difficult object in a 12-inch telescope. The smallest instrument supplying a successful C.M. transit of the spot was the 6-inch refractor on Mt. Wilson.

From the transit observations available, it appears that a nearly constant rotation-period of $10^h\ 39^m.8$ fits the observations best.

One may inquire as to how often long-enduring spots may be expected on Saturn. In the history of the A.L.P.O. only two other long-enduring (a month or more) spots have been followed, both in the North Equatorial Belt (N.E.B.). The first spot, first seen by W. H. Haas in November of 1949, started with a period of about $10^h\ 15^m$ (normal for that latitude). It was a dark section in the belt and was watched by several A.L.P.O. members until almost mid- 1950, when Saturn disappeared into the glare of the Sun. By that time the period had shortened to $9^h\ 35^m$!! The second spot, first seen by Toshihiko Osawa of Osaka, Japan, in February, 1952, started with a period of $10^h\ 14^m$. The spot was largely seen as a bulging dark section in the N.E.B. and barely lasted until March. The period by that time, however, had lengthened to $10^h\ 15^m.8$! To illustrate the current confusion in Saturnian rotation rates, in the N.E.B. one spot started at $10^h\ 15^m$ and ended at $9^h\ 35^m$ while a second spot in the same belt started at $10^h\ 14^m$ and ended at $10^h\ 15^m.8$!

A table of generally accepted rotation rates for Saturn at various latitudes follows:

Latitude	Rotation Period
0° - ±10°	$10^h\ 12^m$ - $10^h\ 16^m$
±10° - ±20°	10 15 - 10 20
±35° - ±40°	10 36 - 10 38
±57°	11 00 - 11 15.

These rates have been published by G. D. Roth in <u>Mitteilungen fuer Planetenbeobachter</u> and are sufficiently good for <u>initial</u> recovery of spots found in those regions. It is also clear that our present knowledge of rotation rates for Saturn leaves much to be desired.

Postscript by Editor. Since this paper was written, a surprising amount of activity has occurred near latitude 60°N. on Saturn. No less than six observers recorded C.M. transits of spots both here and in the Equatorial Zone during the W.A.A. Convention at San Jose in late August! Splendid work in following these spots has been carried out by Messrs. Thomas Cragg, Leif Robinson, and Dale Cruikshank.

It is extremely important in a study of this kind to have available for study all the observations made. We must also stress the uniqueness, to the Editor's knowledge, of this opportunity for a valuable direct visual determination of the rotation of Saturn near latitude 60°N. We hence urge everyone who obtained any observations of this kind to forward them immediately to Thomas Cragg, 246 W. Beach Ave., Inglewood 3, California.

REPORT OF THE A.L.P.O. OBSERVATIONS OF CRATER TIMES AT THE MARCH 13, 1960, LUNAR ECLIPSE

By: Joseph Ashbrook

During the total eclipse of the moon on March 13, 1960, many members of the A.L.P.O. recorded the times of the four contacts of the moon with the umbral shadow, as well as the times when particular craters entered or left the umbra. Mr. Haas very kindly sent a transcript of the observers' records to the author for analysis, and this article is a summary of the results. Some A.L.P.O. observers had also sent their timings directly to Sky and Telescope; and these were analyzed on pages 474-475 of the June, 1960, issue of that magazine. Observations already treated there are not included in the present discussion, which is therefore independent. The importance of careful timings of contacts and crater times is that they can be subsequently used to study the size of the earth's shadow, which, as is well known, always appears slightly larger than predicted from the eclipse geometry alone, without reference to the earth's atmosphere. This excess in shadow size usually runs about 2% or slightly more, and varies somewhat from eclipse to eclipse.

Suppose that an observer has timed Contact I, the beginning of partial eclipse. At that instant, the moon's disk is externally tangent to the umbra outline. The first step in the reduction is to compute the angular distance of the moon's center from the center of the shadow. Then, subtracting from this value the angular semidiameter of the moon gives the angular radius of the umbra. The shadow radius can be evaluated more accurately from crater times. Suppose that the entrance of Plato into the shadow has been observed; that is, the moment has been noted at which the umbra edge passed through the center of the crater. The location of the crater's midpoint with respect to the center of the moon's disk can be calculated, taking into account the crater's selenographic coördinates and the libration. We can also compute the location of the disk center relative to the shadow center. As the final step, we can then deduce the angular distance of Plato's midpoint from the center of the shadow, in other words, the radius of the umbra.

This process of reduction is possible only if the observed time refers to a definite point on the moon whose coördinates are known, such as the midpoint of a crater. Observations of the time when Plato first begins to be covered and of the time when it is just covered can be used because their average gives the time for the midpoint. However, timings for large and irregular features like Mare Crisium cannot be evaluated.

A few other suggestions to observers should be mentioned. Since the uncertainty in a good crater timing is several tenths of a minute, the most suitable unit in recording observations is 0.1 minutes (6 seconds). Timings should not be attempted in a hazy sky or through thin clouds, as this makes the umbra appear too large by an indeterminate amount. Also, since a misidentified crater gives a false result, it is best not to record the time of any feature whose identity is not certain.

These precepts will explain the omission of a small proportion of the observations reported. In addition to A.L.P.O. timings, two other short lists are included in this analysis: one by members of the Observing Group of the New York Amateur Astronomers Association, published in Eyepiece for May, 1960; a second by members of the Observation and Study Group of the Toronto Centre, Royal Astronomical Society of Canada, published in Scope, 1960, spring number.

A total of 15 observations of contact times is available, omitting a lone determination of Contact IV. Listed here for each of the other contacts are: the average time, number of observations, and the observed enlargement of the umbra (expressed as a percent of the predicted radius):

Contact	U.T.	No.	Enlargement
I	6:38:21	5	1.8%
II	7:40:34	7	2.4%
III	9:15:13	3	2.9%

The result for Contact I may be systematically too small, as it is to be expected that ordinarily this event is not recognized until the umbra has already advanced a little way onto the moon's disk. Giving weights of 1, 2, and 1, respectively, we adopt 2.4% for the enlargement from the contact data. The corresponding value found in the Sky and Telescope discussion was 2.8%, from 100 observations.

We turn to the crater times. For each of the 53 observations is listed the observer, the crater name, observed Universal Time, the deduced umbral radius (expressed as a fraction of the earth's equatorial radius), and the excess of this figure over the predicted radius.

Entrance Into Umbra

Observer	Crater	U.T.	r_o	$r_o - r_c$
O	Seleucus	6:40.6	.738	+.021
CC	Riccioli	6:42.0	.737	+.020
B	Grimaldi	6:43.9	.746	+.030
CC	Grimaldi	6:44.2	.743	+.027
JB	Grimaldi	6:44.4	.741	+.025
VF	Marius	6:45.0	.740	+.023
CC	Aristarchus	6:46.1	.740	+.023
CJ	Aristarchus	6:46.2	.739	+.022
B	Aristarchus	6:46.3	.738	+.021
TC	Aristarchus	6:46.4	.736	+.019
J	Aristarchus	6:46.8	.733	+.016
O	Kepler	6:50.4	.742	+.025
CC	Kepler	6:50.8	.737	+.020
B	Encke	6:50.8	.748	+.031
B	Harpalus	6:51.2	.741	+.024
O	Euler	6:53.1	.741	+.024

Observer	Crater	U.T.	r_o	$r_o - r_c$
O	Pytheas	6:57.4	.743	+.026
VF	Copernicus	6:58.0	.747	+.030
CJ	Copernicus	6:58.0	.747	+.030
CC	Copernicus	6:58.5	.742	+.025
JB	Copernicus	6:58.8	.739	+.022
B	Plato	7:00.5	.747	+.030
VF	Plato	7:01.0	.742	+.025
JB	Plato	7:01.2	.740	+.023
J	Plato	7:01.4	.738	+.021
R	Plato	7:01.5	.737	+.020
CC	Plato	7:01.6	.737	+.020
O	Plato	7:01.9	.734	+.017
TC	Cassini	7:06.7	.741	+.024
R	Herschel	7:10.8	.738	+.021
CC	Pitatus	7:11.6	.737	+.020
J	Manilius	7:13.2	.737	+.020
J	Menelaus	7:15.2	.742	+.025
B	Tycho	7:15.5	.748	+.031
R	Menelaus	7:15.8	.736	+.019
O	Menelaus	7:16.4	.731	+.014
VF	Tycho	7:16.5	.740	+.023
CC	Tycho	7:16.8	.737	+.020
J	Tycho	7:17.0	.736	+.019
JB	Tycho	7:17.2	.734	+.017
O	Proclus	7:28.1	.737	+.020
J	Proclus	7:28.4	.734	+.017

Exits From Umbra

Observer	Crater	U.T.	r_o	$r_o - r_c$
O	Seleucus	9:22.7	.736	+.019
VF	Aristarchus	9:27.5	.723	+.008
TC	Gassendi	9:28.5	.741	+.025
CC	Aristarchus	9:28.8	.735	+.020
TC	Aristarchus	9:29.5	.742	+.027

Observer	Crater	U.T.	r_o	$r_o - r_c$
VF	Tycho	9:37.6	.722	+.006
R	Plato	9:45.0	.734	+.017
JB	Plato	9:45.2	.735	+.018
O	Plato	9:45.8	.741	+.024
TC	Herschel	9:48.2	.733	+.016
TC	Cassini	9:51.8	.742	+.025

Key To Observers

B--Bergen County Astronomical Society, West Englewood, N. J. (Several observers with instruments from 8-inch reflectors to 2¼-inch refractors).

CC-Clark R. Chapman, Buffalo, N. Y. 10- and 6-inch reflectors.

CJ-Craig L. Johnson, Boulder, Colorado. 4-inch reflector.

J--Tom and Dan Joldersma, Holland, Michigan. 4-inch reflector.

JB-John Bortle, New York, N. Y. 2.4-inch refractor.

O--Thomas Osypowski, West Allis, Wis. 6-inch reflector.

R--Beaufort S. Ragland, Richmond, Va. 3-inch refractor.

TC-Toronto Centre, Royal Astronomical Society of Canada, Toronto, Ont. (Three observers).

VF-Vincent Favelora, New York, N. Y. 4-inch reflector.

The average of all 53 values of $r_o - r_c$ is +.0218 earth radii, with a mean error of ±.0013. Dividing this mean by the theoretical shadow radius, r_c = .717, we get 3.04 ±.18 percent as the observed enlargement of the umbra. This is somewhat larger than the 2.4 percent derived from the 15 contact times, but should be more reliable.

What is the most probable value of the shadow enlargement at the March 13, 1960, eclipse? It is best to base this on crater times only. In the June, 1960, Sky and Telescope, 203 crater timings were discussed in precisely the same way as in this paper, giving 2.71 ± .06 percent. Taking a weighted mean of this value and the new data, we conclude from all 256 crater observations that during the March 13 eclipse the earth's umbra was 2.78 ± .06 percent larger than the theoretical value.

This number is decidedly larger than the value of 2.0 percent, which is arbitrarily used in the American Ephemeris lunar eclipse predictions.

The reader who wants further information on the general subject of the size of the earth's shadow should consult F. Link's book on lunar eclipses, Die Mondfinsternisse, Leipzig, 1956. The formulae for reducing crater timings are given by Link in Publication No. 25 of Ondrejov Observatory. Both works can be found in almost all observatory libraries.

Postscript by Editor. We are very grateful to Dr. Ashbrook for this analysis of A.L.P.O. umbral contact crater timings during the March 13, 1960, lunar eclipse. This program is highly recommended to our members at future lunar eclipses; and small apertures of only a few inches are adequate, and even preferable. Dr. Ashbrook's suggestions to observers should be followed. It is pointless to record times of this kind to the nearest second and too rough to record them to the nearest minute only.

Dr. Ashbrook has given these additional details about his analysis: "In the reductions, two details warrant mention. Since the observed times are Universal Time, a -0.6 minute correction was applied to each, to convert them to Ephemeris Time, in which the American Ephemeris gives lunar and solar coördinates. Second, due allowance was made for the slight ellipticity of the umbra outline, resulting from the ellipticity of the earth."

THE AREA EAST OF TRIESNECKER

By: Ernst E. Both and Joseph Ashbrook

Many lunar observers have devoted especial attention to the region just west of Triesnecker, because of the famous rill system there. However, east and north of this crater, between it and Ukert, is a curious formation that has never been adequately charted. Under a very low sun, what appears to be a broad, very shallow trough can be seen, touching the east wall of Triesnecker. About 20 miles across at its widest, it runs approximately from northwest to southeast. The shadow in the trough is conspicuous in a 3-inch telescope, at colongitude 174°.

Excellent photographs covering this neighborhood have been published, such as Mt. Wilson No. 261, and sheet C4-e of Kuiper's Atlas. They indicate that the eastern flank of the trough is a low swelling, about 20 miles across. These photographs also suggest the possibility that the trough forms the western part of a very large, shallow depression, seemingly filling most of the area bordered by Triesnecker, Ukert, and Chladni.

Existing maps disagree badly in this area, as a comparison among the representations by Neison, Krieger, Goodacre, Fauth, and Wilkins indicates. Of these, Krieger's is the best. It has been reproduced in Popular Astronomy, 22, facing page 12, 1914.

The area of the trough and swelling deserves careful reëxamination by visual observers, as its interpretation is unclear. There is much need for good drawings, made when the region is very near the terminator. E. Both will welcome observing reports of it. His address is on the back inside cover.

Postscript by Editor. Here is one more good project for such of our lunar observers as may be wondering what they can do or what programs of this kind the A.L.P.O. has.

VENUS FROM SUPERIOR CONJUNCTION, 1957 THROUGH SUPERIOR CONJUNCTION, 1958

By: James C. Bartlett, Jr.

In the Autumn of '58 this writer suffered a sea change; if not "Into something rich and strange," at least into something confused in schedules, retarded in projects, and bereft of his wonted leisure. The immediate cause of this sad metamorphosis was a business merger, from the effects of which I find myself only now recovering. In the meantime, however, it is regrettable that many letters have had to go unanswered and observations unacknowledged, for which sincere apologies are hereby offered. Doubtless this unfortunate period has earned me the reputation of being the worst Recorder ever heard of.

When, some years ago, Prof. Haas asked me to serve as Venus Recorder, I consented in the hope of doing something useful for the A.L.P.O.; and so far as in me lay I have tried to justify his and your confidence.

But circumstances often modify intentions, and it may be that someone of greater leisure, and quite possibly of greater competence, is worthier of the post. At any rate I anticipate the years immediately ahead as very full ones which will scarcely permit me to do the kind of job which should be done for A.L.P.O. observers. Therefore, with this Report and its 1959 sequel to follow, I take my leave of you, grateful for a stimulating experience and hopeful that in some small measure I have been of service to the Association.

And now to an account of the 1957-58 apparitions, to which the following observers have contributed:

Observer	Place	Instrument
Steve Almen	Topeka, Kansas	6-in. refl.
James C. Bartlett, Jr.	Baltimore, Maryland	3.5 & 5-in. refl's.
Ray Berg	West Lafayette, Ind.	4-in. refl.
J. D. Bestwick	Leek, Staffs., England	12-in. refl.
Charles Cyrus	Baltimore, Maryland	10-in. refl.
D. P. Cruikshank	Des Moines, Iowa	8¼-in. refr. & 12-in. refl.
W. K. Hartmann	New Kensington & Pittsburgh, Pa.	2.4-in. refr., 8-in. refl., 13-in. refr.
Craig L. Johnson	Boulder, Colorado	4-in. refl.
C. M. Jensen	Salt Lake City, Utah	3¼-in. refr.
Mike Kaiser	Keokuk, Iowa	6-in. refl., 11½-in. refr.
Franklin Loehde	Edmonton, Alberta, Canada	12½-in. refl.
Charles P. Martens	Charles City, Iowa	6-in. refl.
Prof. R. R. de Freitas Mourao	Rio de Janeiro, Brazil	8-in. refr.
Owen C. Ranck	Milton, Pennsylvania	4-in. refr.
T. J. Richards	Wellington, New Zealand	5-in. refr., 6-in. refl.
L. J. Robinson	Sylmar, California	10-in. refl.
G. Steelman	Glendale, California	4-in. & 6-in. refr's.
Stephen Sinotte	Keokuk, Iowa	6-in. refl.
C. J. Smith	Oakland, California	9½-in. refr.
T. Sato	Hiroshima, Japan	6-in. refl.
Stephen E. Stoessel	Fairfield, Conn.	4-in. refl.
H. P. Squyres	El Monte, Calif.	8-in. refl.
Frank Vaughn	Madison, Wisconsin	10-in. refl.
Gary Wegner	Bothell, Washington	4-in. refl.
F. C. Wykes	Tunbridge Wells, Kent, England	8-in. refr.
Tim Wyngaard	Madison, Wisconsin	4¼-in. refl.

The above observers contributed a total of 255 observations, of which 168 were made in the evening apparition of 1957 and 87 in the morning apparition of 1958. The relatively large number of morning observations shows an encouraging increase, for the planet is never as well observed between Inferior Conjunction and Superior Conjunction as in the reverse case. Yet western apparitions should receive special attention, particularly at the quadrature. Here we may see, as it were, the reverse side of such features as the South Cusp Indentation, and here--and especially in the crescent--we have the opportunity of comparing cusp irregularities as seen under two directions of illumination. Such studies are important in assisting us to a clearer judgment of the nature of terminator and cusp irregularities, commonly studied only near eastern elongations.

The much larger number of eastern, as compared to western, apparitions which are observed makes the following statement of low statistical value; yet there may be some indication that the luminescence of the dark side is less frequently reported for morning than for evening observations. Given the nature of Venus, it is not easy to see why this should be so; but a good program would be to determine whether it is so, hence the importance of observations between Inferior Conjunction and Greatest Elongation West.

We now turn to the features reported by the various observers for the 1957-58 period.

The Dark Side. One of the many unsolved problems of this enigma is whether it shows any cyclical pattern, such, for instance, which might relate it to established solar cycles. At any rate it is interesting to note that in the 1954 evening apparition the luminescence of the dark side was reported by only two observers, O. C. Ranck and the writer. In the 1956 evening apparition a total of 25 observations of the phenomenon was obtained from only 6 observers; but in the 1957-58 apparition--largely on the evening side--no less than 36 observations of dark side visibility were made by 9 observers. This apparent rise in the visibility curve from 1954 probably represents only a statistical artifact, but it points up one of the relations of dark side visibility which should receive close attention.

W. K. Hartmann was the first to report the phenomenon for the 1957 apparition, registering it on September 3, between 21^h 20^m and 21^h 42^m by Universal Time, using the 13-inch refractor of the Allegheny Observatory at 245X. Hartmann, however, queries the objectivity of the appearance and writes: "As often before, I can imagine dark side (darker than sky) but I have considered this imaginary." An interesting point is raised, however, if this was really an observation of the actual luminescence; for the ephemeris value of k (which defines the phase in percentage illumination of the disc) was 0.782 for that date. Hartmann's report, therefore, becomes the earliest report of the dark side following Superior Conjunction in A.L.P.O. records. Previously the two earliest observations had been made by O. C. Ranck, July 21, 1954, with k at 0.694, and by the writer on May 13, 1951, with k at 0.701.

In support of Hartmann's observation as objective rather than illusionary, it may be noted that several observers reported dark side appearances in September. On September 13, 1957, L. J. Robinson, with a 10-inch refl. at 160X, 1^h 20^m U.T., reported dark side visibility and also "darker than sky"; k equalled 0.753. Thus Robinson also excells the previous early reports by Ranck and the writer. Next in order is a report by T. Sato, September 18, 7^h 10^m U.T., with 6 inches at 224X, in which the night side is briefly noted as being "dark," presumably meaning darker than the sky; the value of k equalled 0.737. Sato, therefore, becomes the third observer reporting visibility earlier than Ranck or the writer. Finally we have the report of C. L. Johnson, for September 24, 0^h 10^m U.T., 4-inch refl. at 167X, in which the dark side is given as brighter than the sky. Johnson describes the night side as "faintly visible" and "glowing" against a dark sky. He made a comparison (intensity) as follows: "If Venus...was 10, the sky 0, dark side would be 1". It may be noted that on this date the phase was still slightly more than 70% full. Johnson thus also exceeds the earliest previous reports.

The Recorder would consider that these observations tend to confirm Hartmann's very early observation as being quite possibly objective; and at the very least they establish new upper limits for the visibility of the phenomenon, or for "imagining" it as critics of dark side luminescence would insist.

In this connection one of the favorite arguments for the illusionary nature of the appearance runs something like this: When the moon is a crescent we are accustomed to seeing the dark side lit by earthshine; therefore when Venus is in similar phase, the eye unconsciously supplies the missing dark hemisphere because we know that it is there. In these September '57 observations, however, Venus was not a crescent. Moreover the phase, from 70% to 78% of being full, is one in which we never see the dark side of the moon. Finally it may be noticed, in the case of the gibbous moon, that while we know that the dark side is actually there, this knowledge does not cause the eye to create an illusionary presence. Why then should it do so for the gibbous planet?

A suggestive aspect of the 1957 observations is that with the exception of a single observation by O. C. Ranck on October 4, the dark side is not again reported until November 12 (also by Ranck) and again on November 20. C. L. Johnson saw it on November 26 and Tim Wyngaard on November 27. In December, with development of the crescentic phase, the reports become more frequent. Hartmann saw it on December 29 and 30; Ranck, on December 2, 10, 15, 21, 23, and 24; L. J. Robinson, on December 10 and 13; C. L. Johnson, December 26 and 27; Gary Wegner, on December 10 and 30.

A remarkable observation by C. L. Johnson for November 26, 1957, at $0^h\ 59^m$ must be noticed. Johnson had observed the planet first at $23^h\ 55^m$ (Nov. 25) and writes: "At $0^h\ 59^m$ U.T. on 11/26, the dark side was seen, and it had a very peculiar appearance. Coming out from the N. end of the disc, it then formed a point, and went back toward the center of the disc. Coming out from the S. end, the horn reached (in an arc) out, out, and OUT, and in fact it extended farther into space than the side would if fully illuminated. [Recorder: This was by visual estimate apparently.] It then from a point went about half the way back toward the terminator, made an inverted V, and continued, finally disappearing at the terminator. This with 167X." Johnson estimates the seeing at 8 (!) and transparency at 5, so conditions were of the best.

The Recorder would interpret this unusual observation as an example of a very rare appearance, i.e., a mottling of the dark side. Mottled appearances of the dark side have been noted before; and if the luminescence is to be ascribed to a universal aurora, then such manifestations must signify local areas in the planet's upper atmosphere in which auroral intensities are greater or lesser than for other areas. In this connection it may be recalled that in the case of terrestrial polar aurorae, the bands, curtains, etc. frequently show areas of greater and lesser intensity. If terrestrial aurorae were sufficiently widespread to illuminate the night hemisphere of the earth, such inequalities might well appear as a mottling to observers on Mars.

It is remarkable that on November 27, just a day following this unusual observation by Johnson, Tim Wyngaard observed a somewhat similar appearance. Between $23^h\ 05^m$ and $23^h\ 20^m$ U.T., with a 4-inch reflector at 167X, Wyngaard recorded a partial visibility of the dark side (Figure 1). In this view only an inner lune of the dark side was visible, and it had a coppery color. As Wyngaard remarked, the appearance was "like the moon during a total lunar eclipse". The dark limb of the planet remained invisible. Some points of interest should be noted. Whereas C. L. Johnson fancied an extension of the dark hemisphere beyond the physical bounds of the true dark hemisphere, Tim Wyngaard reports a dark hemisphere smaller than the true dark hemisphere. In both cases one may suspect local intensity differences of the Venusian aurora. Finally it should be remarked that the appearance noted by Wyngaard differs fundamentally from the somewhat similar manifestation of Haas' phenomenon. In the latter case a darker or a lighter lune within the dark hemisphere is noticed, but the whole of the dark hemisphere is visible. In Wyngaard's case the luminescence is confined to the lune.

Wyngaard's observation would be considered unique were it not for confirmatory observations by W. K. Hartmann. On December 29, 1957, between $22^h\ 27^m$ and $23^h\ 15^m$, and again on December 30 between $22^h\ 48^m$ and $23^h\ 02^m$, using an 8-inch reflector at 4-inches off axis, power 214X apparently on a Barlow, Hartmann recorded the same phenomenon. In the December 29 observation Hartmann, like Wyngaard, thought the inner lune to be red-tinged. In the December 30 observation no mention of color is made. Hartmann, however, questioned the objectivity of the appearance. In the December 29 observation Hartmann, referring to the red-tinged lune on the dark side, remarks: "I think this may be stray light; not real." Again, on December 30 he writes: "I believe this is imaginary, connected with this mirror's stray light pattern." Summing up his dark side observations for the 1957-58 apparitions he feels that results were "nothing conclusive." It should be remarked, however, that when Hartmann made these observations and summed up his conclusions he did not know of the similar observations by Johnson and Wyngaard. Such knowledge might well have modified his judgment. At any rate, to this writer it seems a little unlikely that three different instruments, differing in aperture and doubtless in quality, should all indicate a partial visibility of the dark side and that two of them (Wyngaard and Hartmann) should reproduce exactly the same appearance, unless we may regard the appearance as objective.

Finally we may notice a confirmatory observation by O. C. Ranck, December 22, 1957, with a 4-inch refractor at 120X, in which Ranck found the dark side visible but "too small for a complete disc (Figure 2)." Ranck made an identical observation also on November 20 with the same intrument. In neither case did the visible lune of the dark side show color.

As is usually the case most observations of the dark side were singles; but on December 10 Wegner, Ranck, and Robinson all reported dark side visibility; on December 29, Hartmann and Ranck; on December 30, Hartmann, Ranck, and Wegner. In the December 29 observations Ranck reported the whole dark hemisphere visible whereas Hartmann saw only the red-tinged lune. Ranck observed at 18^h 05^m U.T.; Hartmann, between 22^h 27^m and 23^h 15^m U.T. In this period--some five hours--a real difference may have occurred. On December 30 both Ranck and Wegner reported the whole dark side visible, though Hartmann again reported partial visibility. Ranck observed at 21^h 15^m U.T.; Wegner, at 0^h 37^m U.T.; Hartmann, between 22^h 48^m and 23^h 02^m U.T.

On January 2, 1958, at 0^h 05^m U.T., 4-inch reflector at 167X, C. L. Johnson reported another anomalous appearance of the dark side, exactly the reverse of the appearances noted by Hartmann on December 29 and 30 and by Ranck on November 20 and December 22, 1957. In this January observation by Johnson, the dark limb of the planet was faintly visible, visibility extending inward toward the terminator in a broad crescent which Johnson estimated as being about 40% of the area of the whole disc. Between this faintly lit crescent and the terminator there was a lens-shaped area "in which nothing was seen." Thus the planet presented the perhaps unique appearance of a double crescent, each half opposite in phase. This <u>may</u> have been an observation of Haas' phenomenon, though Johnson felt strongly that the len-shaped area was simply invisible.

Another unusual January observation was made by D. P. Cruikshank, January 5, 1958, at 23^h 35^m U.T., 8¼-in. refractor at 190X, in which he found the outer portion of the dark side "intermittently" visible while "portions of the dark disk nearest the cusps could be seen nearly all the time." Observing conditions, however, were poor with seeing between 3 and 4, and varying transparency may have produced this effect.

Venus passed Inferior Conjunction on January 28, 1958 at 20^h. The first report of dark-side visibility following Inferior Conjunction came just 2 days later in an observation by Wyngaard on January 30 at 18^h 00^m - 18^h 12^m U.T. with a 15.6-in. refractor at 120X (Washburn Observatory). Haas' phenomenon was observed, the inner lune being somewhat brighter than the outer or as 1 is to 0.5 on the intensity scale of 0 for invisibility to 10 for very brightest.

Two observations by O. C. Ranck, March 7 and 10, 1958, are the next in order for the morning appariton. On the 7th Ranck merely "suspected" visibility; but on March 10 he found the dark side partially visible (Figure 3), again repeating the Hartmann-Wyngaard observations of the 1957 evening apparition.

The last--and only other--report for the 1958 morning apparition comes from Stephen E. Stoessel for June 15 at 10^h 15^m , 6-in. reflector at 200X. The dark side exhibited Haas' phenomenon, the inner lune being the brighter of the two. It should be noted that the value of k for that date was 0.764. Thus Stoessel demonstrates that visibility of the dark side with gibbous phase may occur in western as well as in eastern apparitions.

<u>The Illuminated Atmosphere</u>. This beautiful phenomenon, to be seen close to and on either side of Inferior Conjunction, was reported in whole or in part by only four observers: Johnson, Squyres, Wyngaard, and Wykes. On January 3, 1958, with a 6-in. refractor at 225X, F. C. Wykes

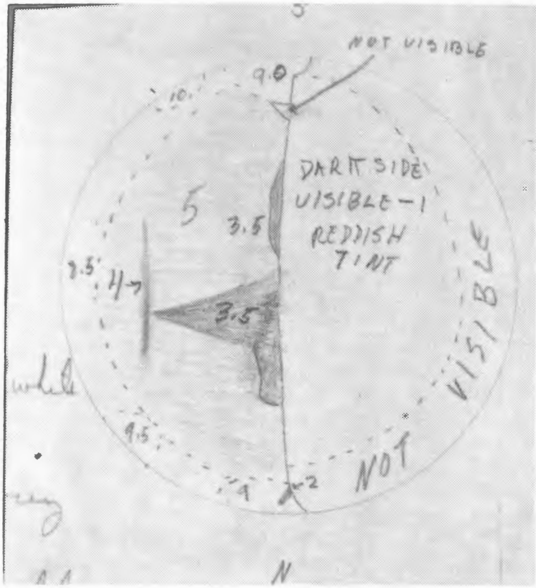

FIGURE 1. Venus. Tim Wyngaard.
November 27, 1957.
$23^h\ 05^m$–$23^h\ 20^m$ U.T.
4-in. refl. at 167X.
S = 5. T = 1.5 to 2.

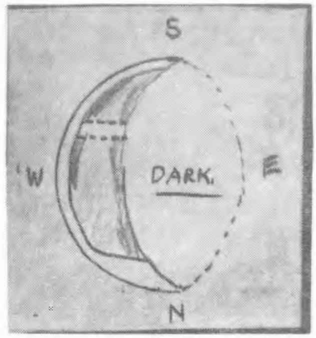

FIGURE 2. Venus. O. C. Ranck.
December 22, 1957.
$23^h\ 30^m$ U.T.
4-in. refr. at 120X.
S = 5. T = 3.

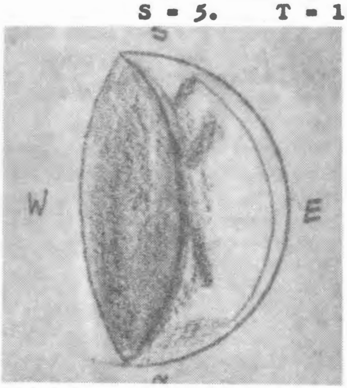

FIGURE 3. Venus. O. C. Ranck.
March 10, 1958.
$14^h\ 50^m$ U.T.
4-in. refr. at 120X.
S = 1 to 6. T =2 to 3.

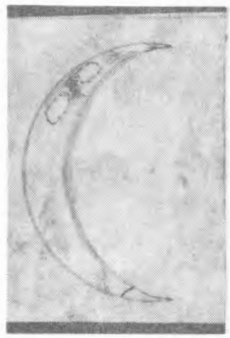

FIGURE 4. Venus. Ray Berg.
December 26, 1957.
$23^h\ 05^m$–$23^h\ 20^m$ U.T.
4-in. refl. at 120X.
S = 5. T = 3.

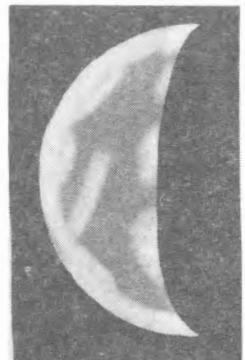

FIGURE 5. Venus.
J. D. Bestwick.
December 9, 1957.
$15^h\ 45^m$ U.T.
12-in. refl. at up to 500X.
S = 9. T = 4.

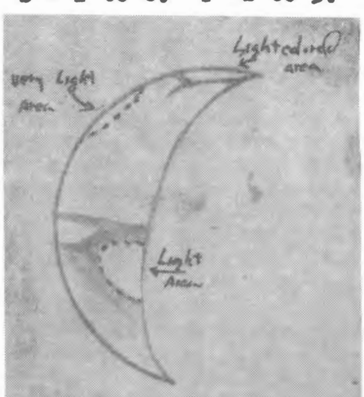

FIGURE 6. Venus.
D. P. Cruikshank.
December 14, 1957.
$22^h\ 27^m$ U.T.
$8\frac{1}{4}$-in. refr. at 190X.
S = 6 to 7.
T = 4.5.

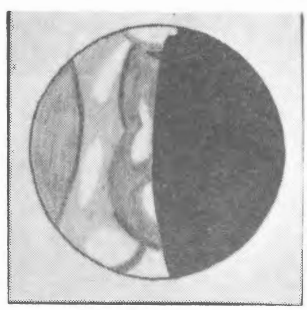

FIGURE 7. Venus. L. J. Robinson.
November 25, 1957.
10-in. refl. at 300X.
S = 2 to 3. T = 2.

observed a faint extension of the south cusp; there were slight extensions of both cusps on January 3 (?) and a slight extension of the north cusp on January 8. On January 23, 1958, H. P. Squyres and C. L. Johnson both observed this phenomenon. Johnson found both cusps greatly extended along the dark limb, the northern cusp showing the greater extension; but Squyres observed extension around the whole of the dark limb, which thus appeared bordered by a very delicate line of light. Wyngaard on January 30, after Inferior Conjunction, also observed the dark limb delicately outlined in light.

Bright Spots. These were abundantly developed and reported by Berg, Bestwick, Cruikshank, Hartmann, Johnson, Loehde, Kaiser, Ranck, Robinson, Richards, Stoessel, Wegner, and Wyngaard.

The bright spots took the form of large bright "bays" on the bright limb, vague bright areas on the disc, bright streaks, and occasional star points. Figures 4, 5, 6, and 7 illustrate the general appearances. Star points were observed by T. J. Richards, O. C. Ranck, Stephen Stoessel, Ray Berg, and Gary Wegner. They were found in all parts of the disc.

Some of these observations merit individual attention, especially one by Wegner for November 23, 1957. At 1^h 20^m U.T., 4-in. reflector at 130X, Wegner observed two widely separated points of light, which he compared to 9th magnitude stars, on the night side of the terminator (Figure 8). He considers that these may have been "optical illusions caused by contrast," but notes that instead of appearing brighter as the sky darkened they "eventually faded away." Next day, Wegner observed two indentations in the terminator near the sites of the star points previously observed. Whether these were in fact illusionary it is impossible, of course, to determine; but it may be recalled that observations of bright points on the night side of the terminator, though quite rare, have been reported from time to time and by observers of high standing.

On December 15, 1957, D. P. Cruikshank made four observations of the planet between 21^h 29^m and 22^h 06^m U.T., using the $8\frac{1}{4}$-inch refractor of Drake University Observatory at 190X with an orthoscopic ocular. His first drawing, made between 21^h 29^m and 21^h 35^m, is reproduced as Figure 9. In Figure 10 we have the second drawing, made between 21^h 45^m and 22^h 00^m, in which a Wratten green filter was used. Attention is drawn to the little spot near the south limb, bordering on the western side of the south cusp-cap. Figure 11 shows this spot in greater detail. Between 22^h 00^m and 22^h 06^m U.T. a third observation was made, this time with Wratten red filter No. 25. The limb spot remained conspicuous. Describing this spot, Cruikshank states that it was "a brilliant point of light that fluctuated slightly over periods of about one-half minute." Cruikshank further remarks that the spot "did not appear cloud-like" but "was nearly a point-source with no real dimensions." He observed no projection over the limb, though the drawings would suggest this aspect.

On December 26, 1957, Ray Berg observed two bright spots on the illuminated crescent quite near to the position of Cruikshank's fluctuating star point of December 15. These remained visible through January 4. The northern member of the pair seems to have been brightest in yellow light. On January 7, 1958, T. J. Richards observed a brilliant star point near the south cusp, which, so far as can be judged, occupied the position of Cruikshank's spot of December 15, 1957. Richards remarks that the spot was "most obvious on high powers, and unmistakably clear." He recovered it 24 hours later but found it "not so bright."

Dark Markings. One of the characteristics of the 1957-58 apparitions was the marked predominance of streak markings and bands over the dusky, maria-like spots. The majority of the observers appear to have seen linear markings of one kind or another as the representative form, but the most interesting development was in numerous reports of the "Spoke System." This controversial system was observed by Johnson, Kaiser, Martens, and Sinotte and possibly confirmed in one instance by Hartmann. Johnson observed the system on Sept. 17, Oct. 1, Oct. 5, Oct. 12, Oct. 17, and Nov. 20, 1957. Kaiser observed it on July 1, August 1, August 4, August 6,

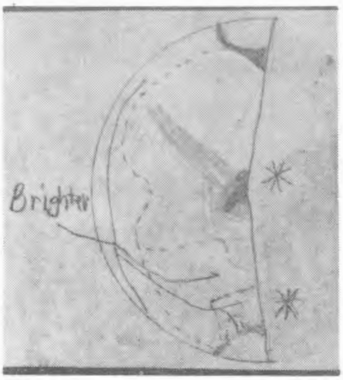

FIGURE 8. Venus. Gary Wegner.
November 23, 1957.
1^h 20^m U.T.
4-in. refl. at 130X.
S = Good. T = Good.

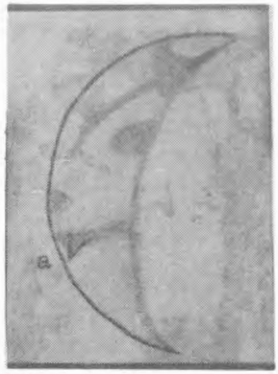

FIGURE 9. Venus.
D. P. Cruikshank.
December 15, 1957.
21^h 29^m to 21^h 35^m U.T.
$8\frac{1}{4}$-in. refr. at 190X.
S = 6. T = 3.

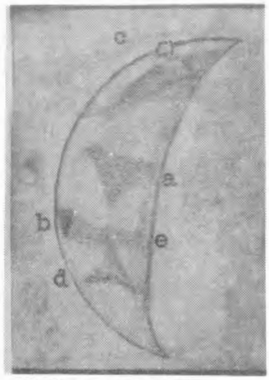

FIGURE 10. Venus.
D. P. Cruikshank.
December 15, 1957.
21^h 45^m to 22^h 00^m
U.T. $8\frac{1}{4}$-in. refr.
at 190X.
S=6 to 7. T=3 to 3.5.

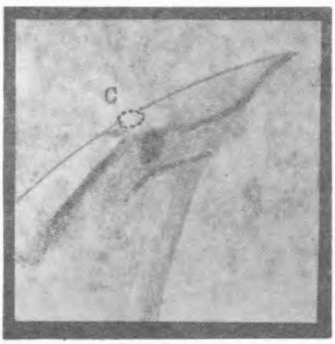

FIGURE 11. Venus. D. P. Cruikshank. December 15, 1957.
22^h 00^m U.T.
$8\frac{1}{4}$-in. refr. at 190X.
S=6 to 7. T=3 to 3.5.

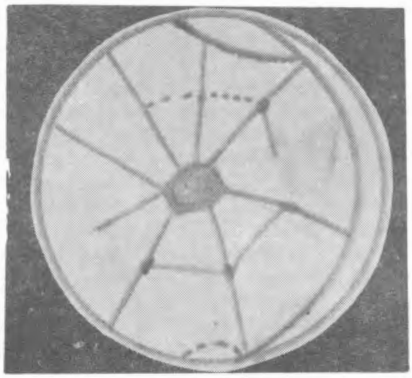

FIGURE 12. Venus. Stephen Sinotte.
July 10, 1957. 1^h 30^m U.T.
6-in. refl. at 144X - 288X.
S = ? T = ?

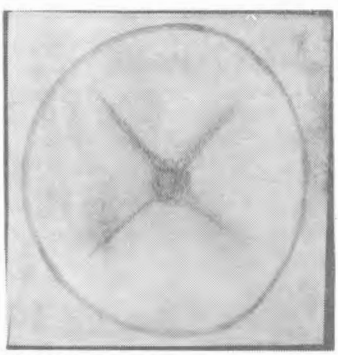

FIGURE 13. Venus.
Charles Martens.
July 10, 1957.
0^h 00^m U.T.
6-inch refl. at 141X.
S = 3. T = 3.

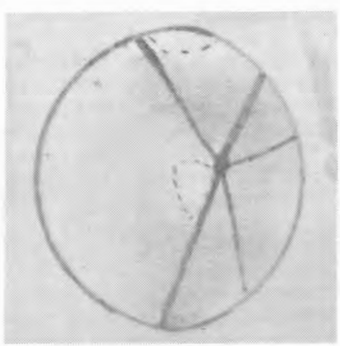

FIGURE 14. Venus.
Mike Kaiser.
August 1, 1957.
2^h 10^m U.T.
6-inch refl. at 144X.
S = 4. T = 3.

FIGURE 15. Venus.
Stephen Sinotte.
August 1, 1957.
2^h 20^m U.T.
6-inch refl. at 144X.
S=3 to 4. T=3 to 4.

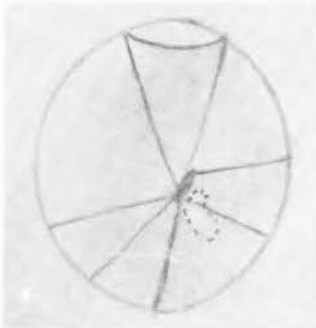

FIGURE 16. Venus. Mike Kaiser. August 4, 1957. $23^h\ 40^m$ U.T. 6-inch refl. at 146X. S = 8. T = 5.

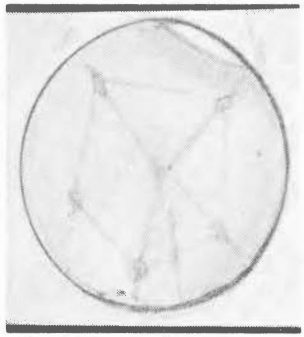

FIGURE 17. Venus. Stephen Sinotte. August 4, 1957. $2^h\ 00^m$ U.T. 6-inch refl. at 144X. S=2 to 3. T=4 to 5.

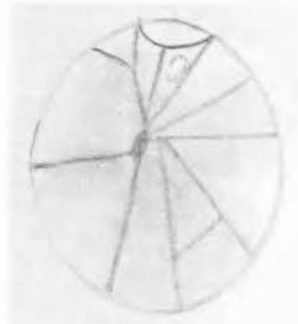

FIGURE 18. Venus. Mike Kaiser. August 6, 1957. $23^h\ 30^m$ U.T. 6-in. refl. at 146X--260X--413X. S = 10. T = 5.

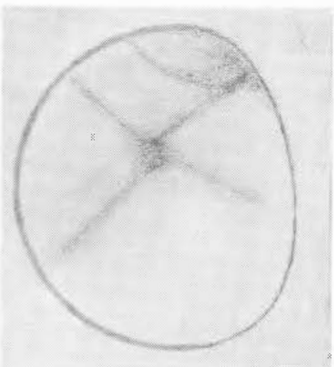

FIGURE 19. Venus. Charles Martens. August 6, 1957. $1^h\ 30^m$ U.T. 6-inch refl. at 171X. S=7. T=4.

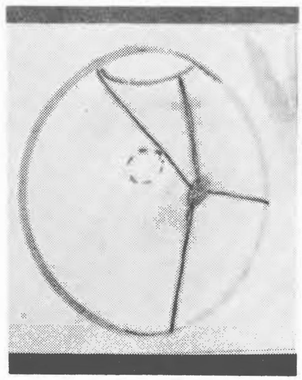

FIGURE 20. Venus. Mike Kaiser. August 7, 1957. $23^h\ 20^m$ U.T. 6-in. refl. at 146X. S = 7. T = 5.

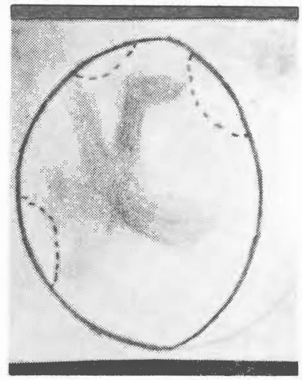

FIGURE 21. Venus. William K. Hartmann. August 7-8, 1957. $24^h\ 52^m$(?)-$0^h\ 07^m$U.T. 13-in. refr. at 245X. S = 2. T = 2 to 3.

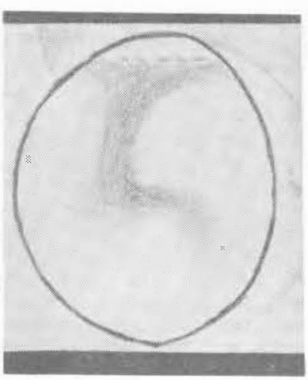

FIGURE 22. Venus. William K. Hartmann. August 1, 1957. $21^h\ 12^m$-$21^h\ 18^m$ U.T. 13-in. refr. at 245X. S = 4. T = 4.

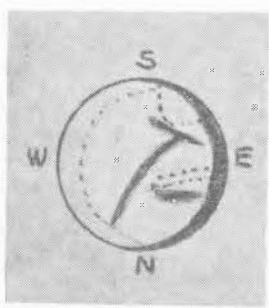

FIGURE 23. Venus. O. C. Ranck. July 8, 1957. $0^h\ 10^m$ U.T. 4-in. refr. at 120X. S = 5. T = 3.

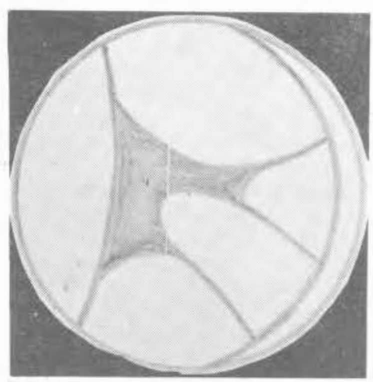

FIGURE 24. Venus. Stephen Sinotte. July 8, 1957. $2^h\ 00^m$ U.T. 6-inch refl. at 144X. S = poor. T = ?

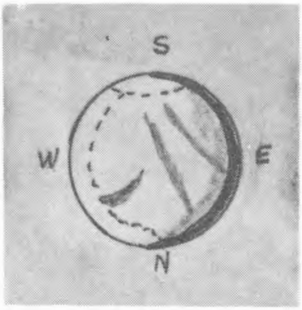

FIGURE 25. Venus.
O. C. Ranck.
July 10, 1957.
$23^h\ 00^m$ U.T.
4-inch refr. at 120X.
S=3 to 4. T=2 to 3.

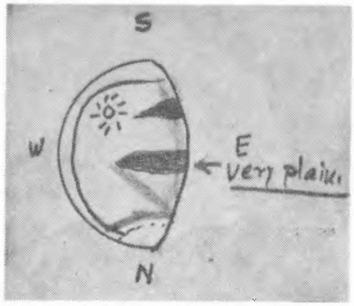

FIGURE 26. Venus.
O. C. Ranck.
August 7, 1957.
$23^h\ 30^m$ U.T.
4-inch refr. at 120X.
S=5. T=3.

FIGURE 27. Venus.
Steve Almen.
November 20, 1957.
$0^h\ 00^m$ U.T.
6-inch refl. at
213-284X.
S=5. T=4.

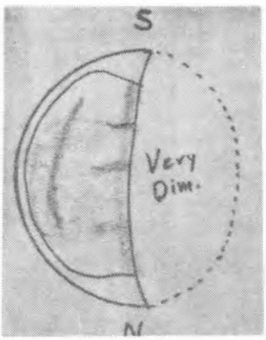

FIGURE 28. Venus.
O. C. Ranck.
November 20, 1957.
$22^h\ 40^m$ U.T.
4-inch refr. at 120X.
S=4. T=4.

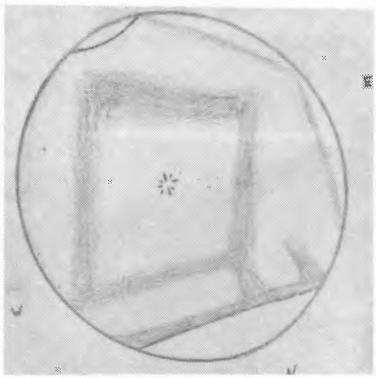

FIGURE 29. Venus.
Stephen E. Stoessel.
July 17, 1958.
$9^h\ 47^m$ U.T.
6-inch refl. at 200-256X.
S=5 to 4. T=3.

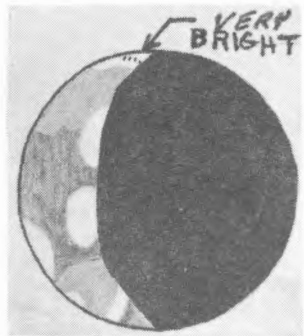

FIGURE 33. Venus.
L. J. Robinson.
December 27, 1957.
$0^h\ 20^m$ U.T.
10-inch refl. at 190X.
S = 2. T = 4.

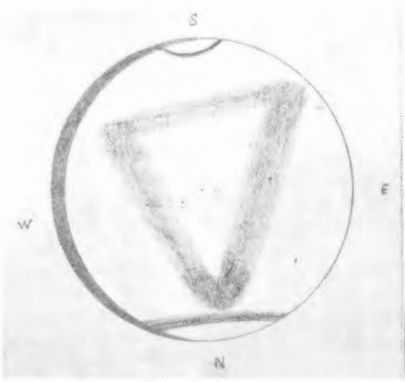

FIGURE 30. Venus. Stephen E. Stoessel. September 8, 1958. $10^h\ 35^m$ U.T. 6-in. refl. at 200X. S=5. T=3.5.

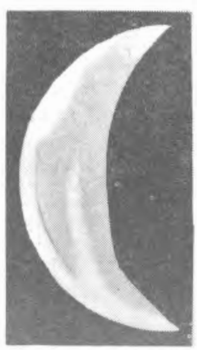

FIGURE 31. Venus.
J. D. Bestwick.
December 24, 1957.
$15^h\ 20^m$ U.T.
12-in. refl. up to 500X. S=7. T=4.

FIGURE 32. Venus.
J. D. Bestwick.
January 5, 1958.
$15^h\ 40^m$ U.T.
12-in. refl. up to 500X.
S=6. T=4.

August 7, October 5, and November 10, 1957. Martens saw it on July 10, July 14, July 23, July 24, and August 6, 1957. Sinotte reported it for July 6, July 7, July 8, July 10, July 17, July 19, July 20, July 21, July 25, August 1, August 2, August 4, and August 5, 1957. A drawing by Hartmann, on August 7, appears confirmatory.

Fortunately we have 6 dates in this series which are parallel. Figure 12 is by Stephen Sinotte for July 10, 1957. This drawing may be compared to Figure 13 by Charles Martens. The close resemblance is obvious, particularly in the large, dark central spot common to both observers. Figure 14 is by Mike Kaiser for August 1, 1957. Figure 15 is by Stephen Sinotte. The two are virtually identical in general appearance, but differ significantly in the relative positions of the central hub. In the Kaiser drawing this spot is displaced toward the east; in the Sinotte drawing it is centrally placed. Kaiser observed at $2^h\ 10^m$; Sinotte, at $2^h\ 20^m$. Figure 16 is also by Kaiser. Figure 17 is by Sinotte. Kaiser does not show the connecting lines and dark spots, unusual features in the Sinotte drawing; but otherwise correspondence is very good. Figure 18 again is from Kaiser. Figure 19 is from Martens. The important feature of both drawings is the location of the central spot a little south of center. It should be noticed that some of these observations are parallel in date but by no means in time. Figure 20 is from Kaiser. Figure 21 is from Hartmann. Specific agreement is poor, chiefly perhaps because Hartmann shows the streaks as broad and diffuse while Kaiser shows them as thin lines (one is here reminded of the difference between Antoniadi and Lowell). However, the central hub occurs in both drawings; and both agree on radial streaks coming from this hub. The Hartmann drawing shows the hub displaced towards the west as compared to the Kaiser drawing; but whether this could be taken as evidence of rotation cannot be determined because of uncertainty as to Hartmann's time. As given, this reads $24^h\ 52^m$, August 7, to $0^h\ 07^m$, August 8. Now $24^h\ 52^m$ would actually mean $0^h\ 52^m$, <u>August 8</u>. It seems likely, therefore, that the correct time was $23^h\ 52^m$, August 7, to $0^h\ 07^m$, August 8. In the October 5 Kaiser-Johnson drawings, though the U.T. date is the same, the actual interval between the drawings is some 22 hours. Notwithstanding, the general agreement as to the presence of a spoke system is very good.

Unfortunately, there are very few parallel observations by other workers for the dates involved, but it is important to consider such as we have. Our first pair is for August 1 between Kaiser and Hartmann (Figures 14 and 22). Here there is complete disagreement, though the difference <u>may</u> be a measure of the time interval--about 19 hours--between the two observations. We may next compare O. C. Ranck to Stephen Sinotte for July 8 (Figures 23 and 24). The time interval here is much more comparable--$1^h\ 50^m$--but it cannot be said that there is any specific agreement. On the other hand it may be significant that both observers agree on streak systems as the characteristic markings. Ranck and Sinotte next compare for July 10 (Figures 25 and 12). Here again there is no specific agreement, but again agreement as to the existence of streak markings. Ranck remarks that he is sure of the objectivity of his streaks after comparing his drawing to a photograph made by the B.A.A. dated May 10, 1956, in which, according to Ranck, the same streaks are shown and in the same places. Figure 26, also from Ranck, is for August 7. This should be compared to the Hartmann and Kaiser drawings for that date (Figures 20 and 21). Only a 10^m interval separates the Ranck and Kaiser drawings, but here there is virtually no agreement even in general terms. Both Kaiser and Hartmann feature a radial arrangement of the streaks; but Ranck shows them chiefly as two broad bands parallel to the apparent equator, though he does indicate one radial streak running from the N. cusp cap to a point perhaps a trifle west of center of the gibbous disc. On October 1 Johnson shows a radial streak system (unfortunately the Johnson drawing is not photographically reproduceable), while Ranck shows a less clearly integrated streak system. Finally one may compare Almen and Ranck for November 20 (Figures 27 and 28). Here again the only agreement is that the characteristic markings are streak markings. Johnson, for the same date, shows the streaks arranged as radial bands.

The evidential value of the striking Johnson, Kaiser, Martens, and Sinotte series for the existence of an objective spoke system must therefore remain inconclusive, though the inference is that for the 1957 evening apparition the characteristic markings reported by nearly all of the observers were streak markings, whereas in some years the characteristic markings are large, vague, shadowy spots. This may indicate a real difference, perhaps related to some change in wind pattern or relative opacity of the Venusian atmosphere. We may further infer that to four of the observers these streaks appeared to be integrated into a definite system. To others, notably O. C. Ranck, they did not, though perhaps it is significant that on several occasions Ranck speaks of suspecting a systematic arrangement just beyond his powers to resolve. Ranck also remarks that in the 1957 apparition streak markings were more certain to him than at any previous time. C. L. Johnson, on the other hand, while admitting to the streaks thought that their integration into a spoke system was illusionary.

Continuing into the 1958 morning apparition, with far fewer observations, streak markings nevertheless remain the characteristic types; and O. C. Ranck records virtually nothing else. The spoke system, however, is suggested only once or twice, Ranck observing an approach to it on August 19, 1958, at 15^h 00^m U.T. and Stoessel recording what may have been an imperfect glimpse on August 5, 1958, at 9^h 55^m.

Stoessel exhibits some curious examples of the way in which faint linear markings may suggest integration into definite geometrical patterns (Figures 29 and 30). Moreover, one of the patterns, the triangle, was observed to recur.

The Cusp-Caps. The surprising predominance of streak markings in the 1957-58 apparitions is matched by an opposite uncertainty as to the intensity and visibility of the caps. O. C. Ranck, an assiduous observer, frequently found them lacking and in general noted little difference in intensity between the N. and S. caps when visible, though he thought the S. cap rather consistently the larger of the two. This was the general experience of all of the observers, and F. C. Wykes called specific attention to their varying visibility. During the inferior half of the 1957 evening apparition, Wykes found the N. cap more often visible than the S. cap; but up to March 7, 1958, in the morning apparition he found no caps visible at all. Past that date he found their visibility to be very variable. The conclusion seems inescapable that both caps were much less conspicuous than in other years on record.

The bordering cusp-bands seem to have been more often visible than the caps themselves, though often invisible too. The N. cusp band was observed rather frequently--an unusual feature.

Dusky caps were observed in the 1957 apparition twice; once by O. C. Ranck, August 13, 1957, N. cap; once by Gary Wegner, November 5, 1957, S. Cap. In the 1958 morning apparition O. C. Ranck reported a dusky N. cap on the following dates: January 19, March 8, March 10, April 14, and August 2. A dusky N. cap was also reported on December 26, by C. L. Johnson. O. C. Ranck was the only observer to report a dusky S. cap, April 13 and August 19, 1958.

Mention should also be made of several observations (1957) of R. M. Baum's "Schiaparelli Vallis" by C. L. Johnson. Returns of this feature suggested a short rotation period to Johnson.

Terminator. Irregularities in the terminator were observed at various times by Bestwick, Kaiser, Ranck, Richards, Robinson, Smith, and Wyngaard. These took the usual forms of slight indentations, bulges, or sinuosity in the gibbous phase.

Special mention must be made of two observations by Bestwick, on December 24, 1957, and January 5, 1958, in which the terminator near the N. cusp is markedly flattened (Figures 31 and 32). This aspect may be compared to the drawing by L. J. Robinson, December 27, 1957 (Figure 33).

Analysis of 386 drawings for the 1957-58 apparitions shows the S. cusp-cap indentation, as a recognizeable feature, in only 7 of them. All 7 are from the 1957 evening apparition, and the earliest indication of this feature is on a drawing by W. K. Hartmann for September 3. Hartmann, however, was not completely certain of it. All of the others occur in December, excepting for an observation by Cruikshank on November 29. The only observers to show this feature were D. P. Cruikshank, Joel Goodman, W. K. Hartmann, and Tim Wyngaard. There is no indication of the feature in the 1958 morning apparition.

The north cusp indentation, always seen much less frequently, was reported by only three observers: Goodman, Stoessel, and Wyngaard, totalling 4 drawings. It was observed twice in November and twice in December. It is not indicated on any 1958 morning apparition drawing.

Venus attained Greatest Elongation East on November 18, 1957, at $7^h 00^m$ according to A.E.N.A. Almen drew a straight terminator on November 9, 19, 20, and 21. C. L. Johnson found the terminator sensibly straight as early as October 29, and on November 1 described it as "exactly" so. O. C. Ranck was not sure of straightness until November 10; T. J. Richards, November 3. Richards concludes, with some uncertainty, that observed dichotomy probably occurred on November 6. T. J. Richards also took a number of photographs of the planet; and assuming a linear decrease in phase, he found a photographic date for dichotomy of November 16, which, as he observes, "...is very close to the theoretical date, November 18."

A curious feature of Mr. Richards' observations is a pronounced lag between calculated and observed phase for the whole period between Superior Conjunction and shortly after Greatest Elongation East. This lag was such that the measured phase was consistently less than the calculated phase, with an extreme difference of 10% for September 12, 1957. The two quantities did not agree until December 2; but thereafter the lag reappeared, agreement being temporarily reached again on December 22.

Richards seems to have been the only observer to use observed terminator irregularities in an attempt to deduce the rotation. Using a terminator bulge near the assumed equator of the disc in connection with certain streak markings, Richards observed returns which indicated a period of 15.58 days (sidereal). He regards this value as only approximate, and remarks that it can be said with certainty only that the period is 16 days plus or minus 2 days. Richards calls attention to an article appearing in Southern Stars, March, 1958, by P. A. Read, who also found a period of 15 days from observations of terminator inequalities and of periodicity (returns ?) "in the appearance of the south cusp-cap."

Craig L. Johnson, basing himself on personal observations of Schiaparelli Vallis, concluded that the rotation was much shorter--"... perhaps a few days, but certainly less than the usual figure of 1 month that is quoted."

Theoretical dichotomy in the morning apparition of 1958 occurred on April 8 at $23^h 00^m$ according to A.E.N.A. Observations at hand are too few to be evidential, but F. C. Wykes recorded a straight terminator on April 12 and O. C. Ranck not until April 14.

In a following Report for Venus in 1959 filter results will be discussed together with notes and samples of photography of the planet, space not permitting the treatment of these subjects here.

THE SEVENTH CONVENTION OF THE A.L.P.O. IN HAVERFORD, PENNSYLVANIA

By: Clark R. Chapman

The Seventh Convention of the A.L.P.O. was held over the Labor Day Weekend, September 3-5, 1960, with the Astronomical League on the quiet, stately campus of Haverford College, in Haverford, Pennsylvania, an outlying suburb of Philadelphia. The host societies were the Rittenhouse Astronomical Society and the Amateur Astronomers of Franklin Institute. Great appreciation should be expressed for the efforts of Mr. Edwin F. Bailey, of the Franklin Institute, who as General Chairman was instrumental in making the convention a great success.

More than two hundred amateur astronomers attended the convention from all over the country, even from as far away as Hawaii and Puerto Rico. Among the several dozen A.L.P.O. members who attended were seven staff members: Walter Haas, Downey Funck, Geoffrey Gaherty, Jr., Leonard Abbey, Jr., Philip Glaser, Phillip Budine, and David Meisel.

The weather could not have been much better for the convention. The days were mostly sunny and not too warm, and the nights were fair and cool (perhaps even somewhat chilly!) The clear night skies permitted observing from the campus with homemade telescopes as well as with the ten-inch refractor of the Strawbridge Memorial Observatory on the Haverford campus. Cloudy weather was a minor disappointment, however, to a few hardy individuals who hoped to see the initial phases of the total lunar eclipse early Monday morning, September 5, 1960.

The first sessions were the Astronomical League Business Session and the General Session held in the morning and early afternoon, respectively, on Saturday, September 3. Directly after the General Session, the convention was treated to an impressive and artistic film, "The Universe," compliments of the National Film Board of Canada.

Following a brief recess, the Junior Session was held with Tim Wyngaard as Chairman. Among the papers given was a comprehensive survey of all human factors relating to amateur astronomical research by Minick Rushton. George Doschek and Jim Mullaney suggested work on an accurate and logical list of deep sky objects arranged as to finest, good, fair, poor, or difficult objects. The last paper in the session, accompanied by color slides, was given by Tim Wyngaard, describing his experiences on the eclipse expedition to the Canary Islands last October (see <u>Str. A.</u>, Vol. 14, Nos. 5-6, pp. 85-88.)

One of the highlights of the convention was the full-day bus tour on Sunday. Six packed buses took practically everyone at the convention to the Franklin Institute, the Edmund Scientific Company, the Spitz Laboratories, and the Sproul Observatory at Swarthmore College. The bus route went past Independence Hall, the Betsy Ross House, and other places of interest in Philadelphia, and went into three states (Pennsylvania, Delaware, and New Jersey.) At the Franklin Institute, we were treated to a Fels Planetarium show and a movie in the Nickelodeon on making a telescope. Afterwards, a brief tour through the museum took us past the Foucault Pendulum, through a giant replica of the human heart, and to the Observatory on the roof where a few lucky persons were treated to a view of sunspots and solar prominences through the large solar telescope there.

The Edmund Scientific Company served the attending amateurs a delicious steak dinner which was followed by a tour of the premises. In the big planetarium dome of the Spitz Laboratories we were shown a brief but fascinating demonstration of two new Spitz planetariums, not yet on the market. One planetarium had a unique method of projecting the planets on the dome, and the other has apparently solved the problem of making stars look realistic by concentrating the light in a very small point. After touring the Spitz Laboratories we were served a buffet supper. Already nearly two hours behind schedule, the buses left Spitz after dark for Sproul Observatory at Swarthmore College, where we were shown the 24-inch refractor and the comprehensive library of the Observatory.

The A.L.P.O. Session was held from 9:00 to 12:00 on the morning of Monday, September 5, 1960; and many thought it the best of all the interesting sessions. The following papers were given during the A.L.P.O. Session:

FIGURE 34. Philip R. Glaser (left) and Phillip W. Budine at Astronomical League National Convention at Haverford College, Pennsylvania, September 3-5, 1960. Photograph by Carlos E. Rost.

FIGURE 35. Buses loading for tri-state astronomical tour on September 4, 1960, during League Convention. Photograph by Carlos E. Rost.

FIGURE 36. Dining Hall Building on Haverford College Campus. Photograph by Carlos E. Rost.

1. "Uranus-Neptune Section Report No. 3," by Leonard B. Abbey, Jr.
2. "The Lunar Meteor Project and the Future," by Robert M. Adams (summarized by Clark Chapman in the absence of the author).
3. "Amateur Observations of Saturn," by Phillip W. Budine.
4. "The Future of the Mercury Section," by Geoffrey Gaherty, Jr.
5. "An A.L.P.O. Venus Month," by William K. Hartmann.
6. "Some Informal Remarks about Jupiter," by Philip R. Glaser.
7. "Possible Effects of Comets on Starlight," by David D. Meisel.
8. "On the Variation of the Phase of Venus from Theory," by Minick Rushton.
9. "Amateur Research," by William E. Shawcross.
10. "An Appeal for Tolerance for Unorthodox Thinking," by Eugene Spiess (read in the absence of the author by Walter H. Haas.)
11. "The Lunar Training Program of the Montreal Centre," by George Wedge.
12. "An Outlook of the Nature of Comets," by Francisco Aniceto Lugo (summarized in the absence of the author by Lewis Dewart.)
13. "The Moon and Ourselves," by Carlos E. Rost.

The talks by Leonard Abbey, Robert Adams, Phil Budine, and Geoffrey Gaherty discussed the past and future work of their respective Sections. Bill Hartmann, who was appointed the new Venus Recorder during the convention by Mr. Haas, talked about a program he is working out that hopefully will determine whether the dusky features seen by many observers on Venus are real or not. Phil Glaser talked about the 1960 apparition of Jupiter and a few of the highlights, including the return of the Red Spot and a new quiescent SEB_s spot. The other papers were all equally well-done, and together with the interesting comments by Walter Haas, helped to make the A.L.P.O. Session an enjoyable one for all.

The exhibits during the convention were located in the building right next to Roberts Hall, where the paper sessions were held. The exhibit that attracted the most spectators was undoubtedly the A.L.P.O. Display, thanks to the hard work of David Meisel who arranged the hundreds of drawings and photographs turned in to him into a magnificent exhibit. The excellent contributions by Takeshi Sato, R. R. de Freitas Mourao, John Westfall, Carlos Rost, Paul Knauth, Phil Budine, Joseph Vitous, and others greatly enhanced the A.L.P.O. exhibit.

The finalé of the convention was the Honor Dinner, which was held Monday evening in the dining hall of Haverford College. The main course was prime ribs of beef. The evening was highlighted by a fascinating talk given by Dr. Louis C. Green, Professor of Astronomy at Haverford College, on "Rockets, Satellites and the New Astronomy." Following the dinner, Walter Haas presented our hard-working Comets Recorder, David D. Meisel, with an A.L.P.O. Award Pin. Mr. Meisel has turned the Comets Section into the clearing house for all amateur cometary observations in the United States, and publishes announcement cards on comet discoveries and observations. As Mr. Haas mentioned in the presentation speech, at the rate Mr. Meisel is working on improving and enlarging the Comets Section, it won't be long before we will have to call the A.L.P.O. the "Association of Lunar, Planetary and Cometary Observers" or possibly even the "Association of Cometary, Lunar and Planetary Observers"!

All in all, the Seventh A.L.P.O. Convention with the Astronomical League was a grand success and fun for all; and I am sure that we are all eagerly looking forward to the next A.L.P.O. conventions. In 1961 these will be held with the Astronomical League at Detroit on July 1-3 and with the Western Amateur Astronomers at Long Beach, California, on August 24-27.

We are, of course, grateful to the Astronomical League for having made possible our Haverford convention and several earlier ones.

Postscript by Editor. The following persons contributed to the A.L.P.O. Exhibits at San Jose and at Haverford in 1960: Phillip W. Budine, Clark Chapman, Charles M. Cyrus, Lewis Dewart, Geoffrey Gaherty, Jr., P. R. Glaser, William K. Hartmann, Carlos M. Jensen, Lyle T. Johnson, Paul Knauth,

FIGURE 37. Informal group at Astronomical League National Convention at Haverford, Pennsylvania. Left to right: Leonard B. Abbey, Jr., Chandler H. Holton, League President, Charles H. LeRoy, Walter H. Haas, Wilma Cherup, League Executive Secretary, and Minick Rushton. Photograph by Carlos E. Rost.

FIGURE 38. Carlos E. Rost presenting paper at Seventh A.L.P.O. Convention at Haverford. Photograph by Lyle T. Johnson.

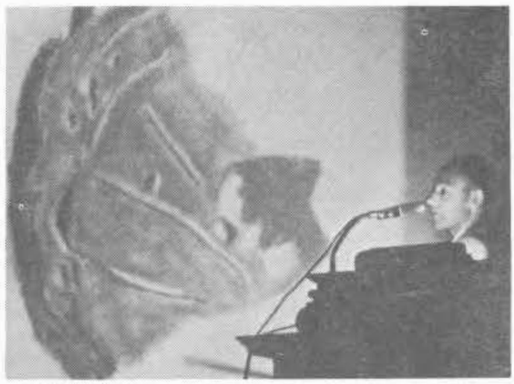

FIGURE 39. George E. Wedge of the Montreal Centre presenting paper and discussing slide at Seventh A.L.P.O. Convention. Photograph by Lyle T. Johnson.

FIGURE 40. A.L.P.O. Exhibit during Convention at Haverford. Exhibit assembled and arranged by David D. Meisel. Photograph by Lyle T. Johnson.

FIGURE 41. Lewis Dewart reading paper by Francisco Aniceto Lugo of Caracas, Venezuela during Seventh A.L.P.O. Convention. Photograph by Lyle T. Johnson.

Kazuyoshi Komoda, A. C. Larrieu, Alan McClure, Patrick McIntosh, David Meisel, R. R. de Freitas Mourao, Toshihiko Osawa, Hans Pfleumer, Owen C. Ranck, Carlos E. Rost, Tsuneo Saheki, Takeshi Sato, Joseph W. Sullivan, II, Clyde W. Tombaugh, and George E. Wedge.

GREAT LAKES REGION 1960 CONVENTION

By: Joseph Maple

On Saturday and Sunday, July 30-31, 1960, 141 amateur astronomers from the Great Lakes Region met in Detroit, Michigan, for their Annual Convention.

The main speaker was Dr. Orren Mohler, Assistant Director of the University of Michigan McMath-Hulbert Solar Observatory, whose topic was: "Some Recent Results of Solar Research." Other papers were given by G. Diederich, "Bode's Law Modernized"; S. Maran (U. of M.), "Results of Visual Meteor Observation"; R. Moler, "My Schmidt Camera"; D. Allison, "Flying Saucers and Their Origin"; V. Valasco, "Preparation for 1980"; J. Pagacz, "The Home Made Radio Telescope"; J. Gondol, "Project Green Man"; and last, but certainly not least, Thomas A. Cragg's paper, "Great White Spot on Saturn," from A.L.P.O.; also Dr. Walton Cole gave a slide-illustrated talk entitled "From Galaxies to Man."

The Convention visited the Enrico Fermi Atomic Reactor Plant in Monroe, Michigan. At the banquet Dr. Ted Ward of Michigan State University challenged the delegates with his talk, "The Timely Ursa Legends."

On display at the Convention were telescopes of all types including the tube assembly for a 16" reflector, a radio telescope, an especially interesting satellite exhibit, and a globe of Mars. Also exhibited was a unique mirror-grinding machine and a display of astronomical photographs.

New officers for the coming year are: R. Lloyd, Chairman (Detroit); F. Sutter, Vice Chairman (Miami Valley); K. O'Connor, Secretary (Detroit); C. Hurless, Treasurer (Lima).

As the Conventioneers left on Sunday afternoon, all agreed that C. D. Marshall, Convention Chairman, and his hard working committee had set a standard for Regional Conventions for many years to come.

Postscript by Editor. We shall carry in the next issue some details on the coming 1961 Astronomical League Convention in Detroit.

BOOK REVIEW

The Planet Venus, by Patrick Moore. 151 pages, cloth. Faber and Faber, Limited, London. Price $3.75. Second Edition. 1959.

Reviewed by: Carlos E. Rost

As pointed out by the author of this excellent treatise in the Foreword to this Second Edition, it is certainly true that humanity has apparently let its imagination fly too far, mainly by wondering about Mars as the only possible "abode of life," as the famous Percival Lowell emphasized, never stopping to think for a moment about our really nearest neighbor, the planet Venus, as another possible abode.

Even though the book is really a compilation of the latest known facts about Venus, the author certainly has presented all these facts in a compact, yet, very easily digestible, encyclopedia-style book, which is of great value not only to any beginner but likewise to any professional astronomer. In its easily understandable character Mr. Moore keeps continuously the attentive interest of the reader; and the sequence of data

FIGURE 42. Presentation of an A.L.P.O. Award, a sterling silver chain necktie clasp, to David D. Meisel (right) by Walter H. Haas at Honor Dinner during Astronomical League National Convention at Haverford College, Pennsylvania, September 3-5, 1960. Award made in recognition of Mr. Meisel's original and outstanding work as A.L.P.O. Comets Recorder. Photograph by Frank Delaney.

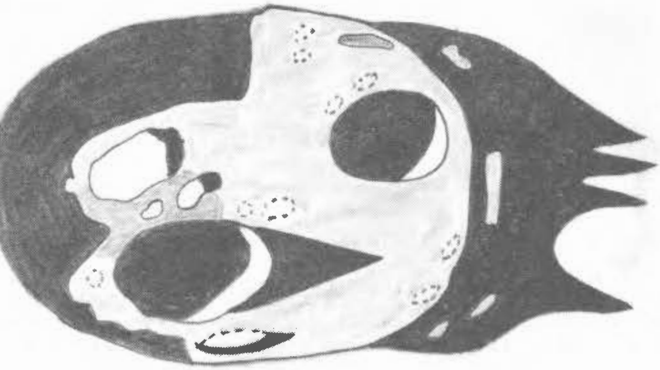

FIGURE 43. Lunar Crater Cassini. Phillip W. Budine. November 8, 1959. $0^h\ 55^m$, U. T. 4-inch Unitron refractor. 214X. Seeing 7. Transparency 4. Colongitude = 358°.8.

FIGURES 44, 45, 46. Photographs of Mars by Hiroshi Kuratani of the Toyama Municipal Observatory, Japan. 16-inch reflector with 10-inch eccentric stop. Tri-X film used with Walz R2 Filter. Contributed by Takeshi Sato.

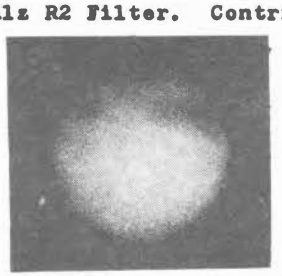

FIGURE 44. Mars. Nov. 5, 1958. 13^h48^m,U.T. CM=116°.

FIGURE 45. Mars. Nov. 23, 1958. 15^h24^m, U.T. CM=342°.

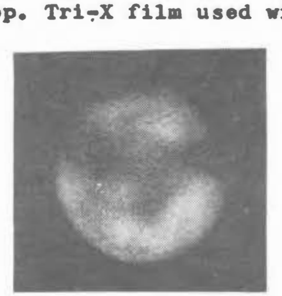

FIGURE 46. Mars. Nov. 25, 1958. 12^h55^m, U.T. CM=287°.

presented throughout the book really makes one's imagination most willing to keep on reading with certain curiosity, not only for regarding this planet a twin of our own Earth in many respects but also for the many thought-provoking parts of the book such as Chapter XV--"Life on Venus."

I should, incidentally, mention the fact that water vapor has recently been detected in this planet's atmosphere and also that there are several projects which intend to use the latest techniques employed with radio-telescopes for a deeper research study, which no doubt is going to bring many new advances in our knowledge of Venus.

The book is carefully and well organized. The first chapter starts the book with an elementary reference as to what the planet meant to the early astronomers and the problem raised by its phases, so similar to those of our own Moon. The second chapter is an interesting comparison between the Earth and Venus, physically speaking, and is again a thought-provoking treatment. Chapter III deals with the mechanics of the planet--its movements around the Sun and the apparent increase in size as it goes throughout its phases from Superior Conjunction to Inferior Conjunction, and presents an understandable account of the facts. Chapters IV to VII, inclusive, give the reader an accurate idea of what he can expect to see through his telescope, with numerous fine illustrations and excellent photographs. Possibly this could be the most intriguing part for anyone's desire to observe the planet with a well-constructed instrument and a serious tendency towards research work. In Chapter VIII some astrophysics is dealt with; but the general reader will, no doubt, understand that such is a true necessity to be included in this treatise, and here again there is once more a thought-provoking treatment, in this case very appropriate for the professional astronomer. The ever-present problem of the planet's rotation is fully treated in Chapter IX. The "canals" of Venus, like those of Mars, is an interesting topic referred to in Chapter X. The "Ashen Light" of Venus is another interesting physical problem, discussed in Chapter XI. It is well known that in our Solar System there is a total of 31 known natural satellites. The suspecting of the existence of a Venusian moon by several observers of the planet is discussed in an interesting manner in Chapter XII, which is entitled "The Phantom Satellite"; and the fascinating reports from keen observers keep the reader's eager interest. To the experienced observer of transits, occultations, and other phenomena of Jupiter's satellites, Chapter XIII also offers a topic of natural interest to the observer who seriously likes the mechanics of celestial bodies. Quite interesting speculations about the nature of the surface of the planet and a comparison with the surface of our Moon are well presented in Chapter XIV--"The Surface of Venus." Another no less interesting and thought-provoking topic is dealt with in Chapter XV, the last of this fascinating monogram--"Life on Venus."

With the numerous references given at the end of every chapter, and the valuable tables given throughout Appendices 1 to 3, inclusive, besides useful suggestions for the practical and serious observer given in Appendix 4, the book is highly recommended, not only for the beginner and for the professional but as a sound and profitable work either as a school textbook or for inclusion in any observer's library.

CURRENT VENUS SECTION PROJECTS

By: William K. Hartmann

I would like to begin by thanking Professor Haas and Dr. Bartlett for their help and encouragement, which led to my assumption of the post of Venus Recorder. Washington is not the only place where a transfer of authority takes place occasionally, and such a transfer in the Venus Section took place at the beginning of the current apparition. Unfortunately, therefore, a paper on current plans was not available at the beginning of the apparition; but it is hoped that observers will benefit somewhat by these belated notes.

Most of us are acquainted with Dr. Bartlett's fine statistical studies of the Venus Section records. It is hoped that such studies can be continued. Thus, we will encourage routine observations but at the same time invite attention to some specific programs designed to obtain some particular information. The whole program, then, goes like this:

1. Routine observations: Observations made at any time are welcome. Estimates of the intensity of various markings are invited on the following continuous scale: 0 (sky black) to 10 (brightest). Geoffrey Gaherty has kindly supplied forms for submitting Mercury and Venus Section drawings, and these forms are available from the Recorders of both sections.

2. Date of dichotomy: This is the most straightforward of our special programs. We hope that each observer can make an estimate of the date of observed dichotomy (when the terminator is judged to be exactly straight) from his observations. If we can get a number of such estimates, we ought to be able to get a good, solid result on the observed date of dichotomy, which has been observed to vary from the predicted date.

3. Estimates of conspicuousness of markings: A new scale is proposed to study the visibility of the dusky markings. This scale is not to be confused with the intensity scale. Venus presents the problem that on many drawings we show markings that we are not too sure really do exist. This conspicuousness estimate is an attempt to measure how the observer feels about the reality of the markings he shows on his drawing. The rating is made on a continuous 0 to 10 scale with the following numbers used as guideposts:

0, nothing at all seen or suspected.
3, nothing certain, vague suspicions.
7, markings suspected strongly.
10, markings certain.

Note that these figures just calibrate the scale; all numbers from 0 to 10 are valid ratings, however. To make the usage of this scale clearer, let us specify that the observer rates at least the most conspicuous markings. Thus, each observation should be accompanied by at least one rating indicating the most easily visible markings. Studies of such ratings may help us learn about visibility of markings versus telescope aperture, possible changes in visibility over periods of time, etc.

4. Drawing comparison program: A major problem with Venus is whether or not people are really observing genuine markings on it. Thus, we would like to get a program going where on certain prearranged dates observers make simultaneous observations of Venus. These will be compared in an effort to test for a significant amount of confirmation of markings. An additional idea of rather uncertain value has been tacked on to this program. Since we don't know what degree of confirmation is significant, we would like to have some standard of comparison. This is to be supplied by what I call an "imaginary drawing." An imaginary drawing is made by conjuring up in your mind a set of imaginary details of the same general sort that you typically see on Venus. For example, if you tend to see streaky marks, make imaginary drawings with streaky marks. That is, try not to make them too fantastic! Now each real observation should be accompanied by an imaginary drawing made for the same phase. Thus, all the real drawings for a certain date can be compared with the more or less random imaginary drawings for that date. If there is considerably more agreement among the real drawings than among the imaginary drawings, then we have some evidence that something, presumably genuine Venusian (will too many people hate me if I use that word?) markings, is causing the observers to agree.

As a first trial for this program we are setting these dates and times for simultaneous drawings in the United States and neighboring countries: All Friday and Saturday evenings from Dec. 16, 1960, to Feb. 4, 1961. All drawings should be underway at 6:30 P. M. by standard zone time. This plan would give four sets of drawings from the East to the West Coasts

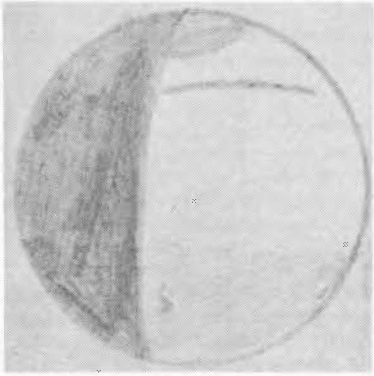

FIGURE 47. Venus. William J. Westbrooke. January 2, 1960. $15^h\ 10^m$-$15^h\ 21^m$, U.T. 4-inch refl. 167X. S=10. T=5.

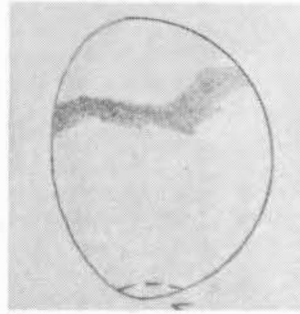

FIGURE 48. Venus. Craig L. Johnson. January 3, 1960. $17^h\ 15^m$, U.T. 4-inch refl. 46X, 135X, 295X. S= -3 to +2 (Tombaugh-Smith). T= 5-.

Readers are invited to compare these independent drawings.

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spaced an hour apart, thus allowing, as a bonus, a check on possible rotational or atmospheric shifts of markings over this period.

A recent indication that markings on Venus can be confirmed by independent observers is seen in Figures 47 and 48. Here drawings by William J. Westbrooke and Craig L. Johnson, made about 26 hours apart, may tend to confirm an east-west streak in the southern hemisphere. Such observations indicate the desirability of a simultaneous observation program, which we hope to get underway this apparition. Interested observers can begin at once by making drawings at the suggested times. Forms for submitting the real drawings, forms for the imaginary drawings, and further information are available from the Recorder.

The programs outlined here are somewhat short-term in nature. We will see how they turn out, and by next apparition we may have changes to make. In the meantime, I will look forward to receiving current observations.

TRANSIT OF MERCURY - PRELIMINARY REPORT

By: Geoffrey Gaherty, Jr.

The transit of Mercury across the Sun on November 7, 1960, was observable over most of North America under clear or partially clear conditions. At this writing (November 16), seventeen reports have been received; these are summarized in the table below.

Location	Observer(s)	Observations Made
Bothell, Wash.	G. Wegner	Clouded out.
Buffalo, N. Y.	C. R. Chapman	Timed contacts 2, 3, 4. Photographs.
Denver, Colo.	K. Steinmetz B. Van Nattan H. Fiske B. McDowell B. Spencer J. White	Timed contacts 3, 4. Photographs, movies.

Location	Observer(s)	Observations Made
Des Moines, Ia.	D. P. Cruikshank	Clouded out.
Edinburg, Tex.	P. R. Engle W. H. Haas G. L. Kraus	Timed contacts 2, 3, 4. Micrometric measures of diameter of Mercury.
Houston, Tex.	P. Knauth E. Pressler J. Beauchamp J. Lomax	Timed contacts 2, 3, 4.
Idaho Falls, Idaho	R. R. Lee	Clouded out.
Las Vegas, Nev.	T. C. Constanten	Timed contacts 3, 4.
Leavenworth, Wash.	Stuart & Stanley Emig	Timed contacts 3, 4.
Milwaukee, Wisc.	D. C. Ramthun	Timed contacts 2, 3, 4.
Montreal, Que.	K. Chalk	Timed contacts 2, 3, 4.
Montreal, Que.	F. J. DeKinder	Contacts clouded out. Mercury's position plotted.
Montreal, Que.	G. Gaherty	Timed contacts 1, 2. Photographs.
Rosemere, Que.	K. R. Brasch	Timed contacts 2, 4.
Rosemere, Que.	C. Papacosmas	Timed contacts 2, 4. Photographs.
St. Lambert, Que.	J. Low	Timed contacts 1, 2, 3. Photographs.
San Jose, Calif.	L. Anthenian	Contacts clouded out.

Unusual phenomena were reported by L. Anthenian, G. Gaherty, W. H. Haas, and J. Low; but there is no confirmation between observers.

I would appreciate it if all unreported observations of the transit were submitted to me as quickly as possible so that a complete report can be prepared.

ANNOUNCEMENTS

The Very Best of the Season. The Editor wishes to take this opportunity to wish to all members of the A.L.P.O.

A VERY MERRY CHRISTMAS

and also

A MOST HAPPY NEW YEAR.

The Strolling Astronomer in the Library of Congress. Through the kind assistance of Mr. David W. Rosebrugh, one of our charter members, we have been able to place in the Library of Congress a complete file of The Strolling Astronomer from Volume 1, Number 1 to Volume 14, Numbers 5-6. More recent issues are being mailed to the Library of Congress as they are published so that the file will remain up to date. We are naturally extremely glad to have our periodical available in the Library of Congress and express our thanks for this successful arrangement to Mr. Rosebrugh and to the staff of the Library of Congress. Our members will share our pleasure over this situatioh. The set given had been Mr. Rosebrugh's own.

Price of reprints of articles. We have had occasional expressions of interest in securing reprints of articles in The Strolling Astronomer. The following prices have been quoted by Mr. J. Edwin Harvey, Editor and Publisher of The Mercedes Enterprise, Mercedes, Texas:

	Per 100
2 pages (same side) same negative as in the issue--printing on 1 side of sheet	3.75
4 pages, (same setup as in issue) 2 sides	5.75

		Per 100
2 pages rearranged with only article wanted appearing and others eliminated--new negative, one side of paper only		6.75
4 pages same as last item, 2 sides printed		9.75

Mr. Harvey has been publishing this magazine from the September-October, 1959, issue to the present. His prices, of course, apply only to articles in such recent issues; nor can these be kept in stock indefinitely. We urge interested members to consider purchasing reprints; perhaps authors would sometimes like to request a supply in advance when they submit their articles.

In Memoriam. We have learned with sorrow of the death of W. I. Abbott of Dallas, Texas, on March 7, 1960. The Editor had met Mr. Abbott several times at astronomical gatherings near Dallas or Fort Worth and had greatly enjoyed knowing him.

Born at Carrollton, Missouri, 70 years ago, Mr. Abbott graduated from the University of New Mexico in 1930 with a degree in electrical engineering. He later served as engineer and inspector of the Federal Communications Commission Office at Dallas. As a sailor on the U.S.S. George Washington in World War I, he published "The Hatchet," the first daily newspaper ever printed at sea. Mr. Abbott retired five years ago but remained astronomically very active. He played key roles in the Texas Astronomical Society and the Dallas Moonwatch Station. He had been a member of the A.L.P.O. since 1955. We extend our sympathies to his family and friends in their loss.

OBSERVATIONS AND COMMENTS

Photographs of Mars. Readers are invited to examine Figures 44, 45, and 46 on p. 185, photographs of Mars during its 1958-9 apparition. Depending somewhat on how successfully the fainter markings are reproduced, these may give a good idea of what is likely to be possible photographically on Mars now with the larger instruments ordinarily available to amateurs. Of course, the angular diameter will be less than two years ago, the tip of the axis will be more northerly, and the Martian season will be later. One readily recognizes on these photographs such features as Mare Sirenum, Solis Lacus, Syrtis Major, Sinus Sabaeus, and Pandorae Fretum and, less readily, Mare Hadriacum, the whitened Hellas, the two Forks of Aryn, Thoth-Nepenthes canal (old terminology), and others. We congratulate Mr. Kuratani on the fine quality of these photographs.

Cassini. Students of this lunar crater should note Mr. Phillip Budine's drawing here published as Figure 43 on p. 185.

Concerning Lunar and Planetary Intensity Scales: Mr. Elmer J. Reese on August 14, 1960, wrote as follows: "The brief note on intensity estimates being sent to you in another envelope had already been sealed when I happened to read Mr. Both's article on Mars in The Strolling Astronomer, Vol. 14, pp. 99-102. I was not happy to learn that Mr. Both is recommending the 'inverse' intensity scale for his Mars Section. The 'direct' scale adopted by the Lunar and Jupiter Sections could be standardized just as easily as the 'inverse' scale to meet the needs of the Mars Section. Actually, I have no particular reason for preferring the 'direct' scale to the 'inverse' scale, but it seems to me that one or the other should be used exclusively by all sections to minimize confusion.

"Also, I question the usefulness of selecting as a datum point the apparent surface brightness of the night sky background in the vicinity of the planet when estimating the intensity of any small area on the disc. Contrast effects would make such estimates worthless unless a special perforated screen were used to isolate the areas being compared. Most of us have

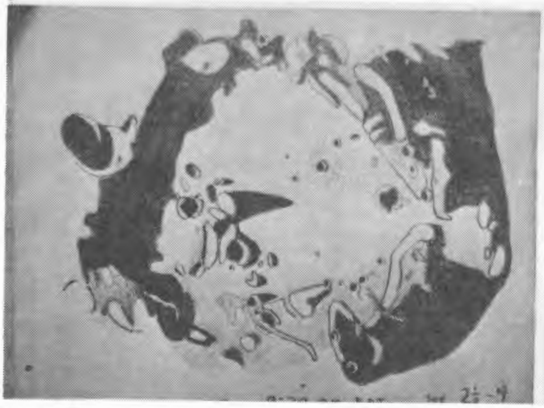

FIGURE 49. Lunar Crater Walter.
Clark R. Chapman.
October 10, 1959. $0^h\ 0^m-2^h\ 0^m$, U.T.
10-inch Cave refl. 260X.
S=2.5-4. T=4, with a few clouds.
Colongitude = 5°.6 at 1^h.
Brightest areas are outlined with dark lines.

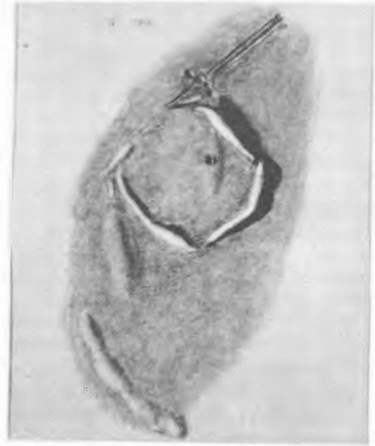

FIGURE 50. Lunar Crater Wallace.
Alika K. Herring. April 5, 1960.
$4^h\ 30^m$, U.T. 12.5-in. refl.
375X. S=8-3. T=5. Colongitude=13°.6. Drawing incomplete because of worsening seeing.

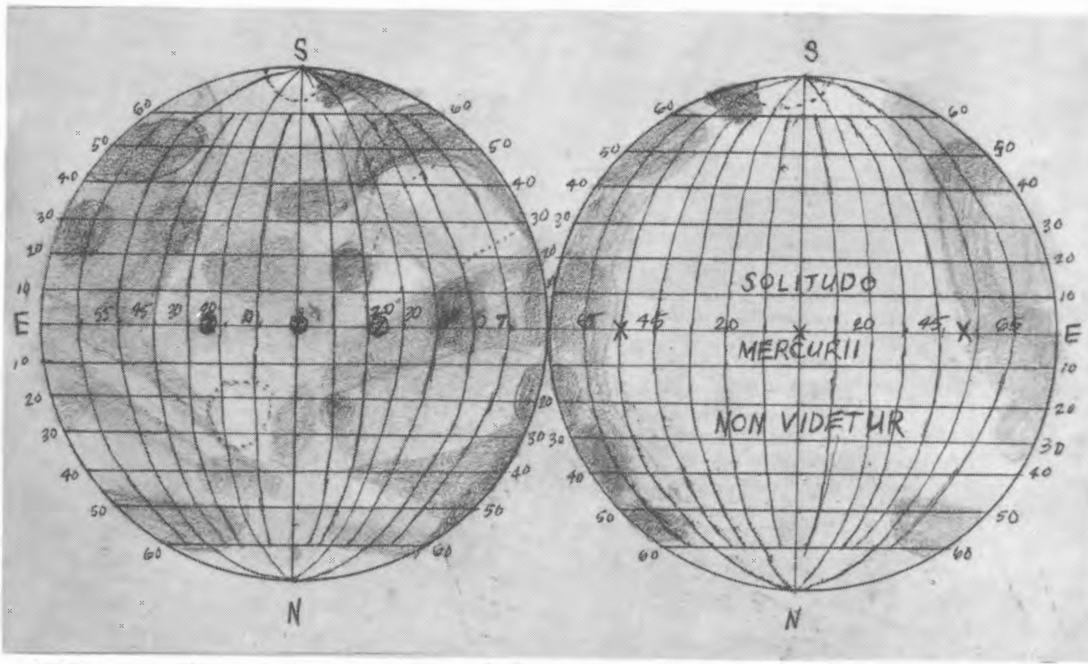

FIGURE 51. Map of Mercury in 1956-60 by Mr. Gary Wegner, Bothell, Washington. Orthographic projection of sun-turned (left) and sun-averted (right) hemispheres at mean libration in longitude. Employed 10-inch Cassegrain reflector and other, smaller telescopes. Dashed lines are boundaries of bright areas. The Z's along the equator on the left hemisphere are the limits of the zenithal sun; and the X's along the equator on the right hemisphere are the limits of eternal darkness, according to Mr. Wegner. The map thus attempts to depict the libratory zones completely.

seen Jupiter's fourth satellite bright on the night sky but black as shadow against the bright disc of the planet. Surely there are suitable areas of more stable intensity right on the surface of Mars to serve as intensity guides."

Readers may wish to give some thought to these ideas from a very advanced observer. The Editor would urge adherence to these policies:

1. For the present each A.L.P.O. Section Recorder will determine what intensity-scale is to be used in his Section, and observers will adhere to it. Mr. Reese's remarks above will not change the practices which Mr. Both sees proper to enforce in the Mars Section.

2. Section Recorders and advanced observers should give some thought to achieving the best intensity scale for our A.L.P.O. work. Should such a scale be "direct" or "inverse"? How many units should it have, ten or some other number? Should "zero" be a value at one end of the scale? Is it desirable to use a single scale for all planets and for the moon as well?

3. Active observers should pass on to Section Recorders and to the Editor their feelings about intensity-scales and their ideas for making improvements. Actual use will thus be the real test of ideas in this field.

Walter. Figure 49 on p. 191 is a drawing by Mr. Clark Chapman of the lunar crater Walter under low morning illumination. The observer regards this observation as "very careful and accurate." It will be noted that he spent fully two hours in making this drawing.

Wallace. Mr. Alika Herring has written as follows about the lunar formation drawn in Figure 50 on p. 191: "Seeing conditions, which had previously been very good, began to deteriorate quite rapidly almost as soon as this drawing was begun. The sketch is therefore incomplete, and represents only a very few minutes work on the formation. And while I ordinarily would not submit such an unfinished drawing for publication, I feel that an exception may be warranted in this instance as I was able to record certain details that might be of interest to other observers.

"Among these is the curved chain of small craterlets lying near the south corner of the formation. While this chain may be detected on several of the very excellent Mt. Wilson, Lick, and Yerkes photographs of the area which are to be found in the new Photographic Lunar Atlas published by the University of Chicago Press, it appears only as a small white marking and the true nature of the feature is not readily apparent from the photographs alone. Of particular interest, however, are the two parallel clefts which extend from this crater-chain towards the southeast. These fine clefts lie within, and are coincident in direction with one of the great bright rays originating at Copernicus, and as far as I have been able to ascertain, have not been previously reported. These clefts are extremely delicate, and are of course far below the resolution of the above mentioned photographs. I hope that other observers will attempt to confirm them.

"Other details which were seen, but not drawn because of the lack of time, were other low ridges in the vicinity in addition to those shown, another small crater-chain lying northwest of the ring, and a number of exceedingly minute crater-pits on the floor of the formation as well as on the adjacent surface. Presumably these tiny pits lie within the numerous small white spots which can be seen in the area under higher lighting.

"Wallace normally appears somewhat to resemble a horseshoe, open to the southwest, and with walls that are low but apparently continuous, and distinctly rounded on the northeast or base of the shoe. However, on this occasion the formation exhibited a definitely 'squarish' aspect, with the sides orientated in a NE-SW and NW-SE direction. The walls themselves were clearly seen to consist of a discontinuous series of low ridges, with only the most vestigial traces of them remaining on the southwest."

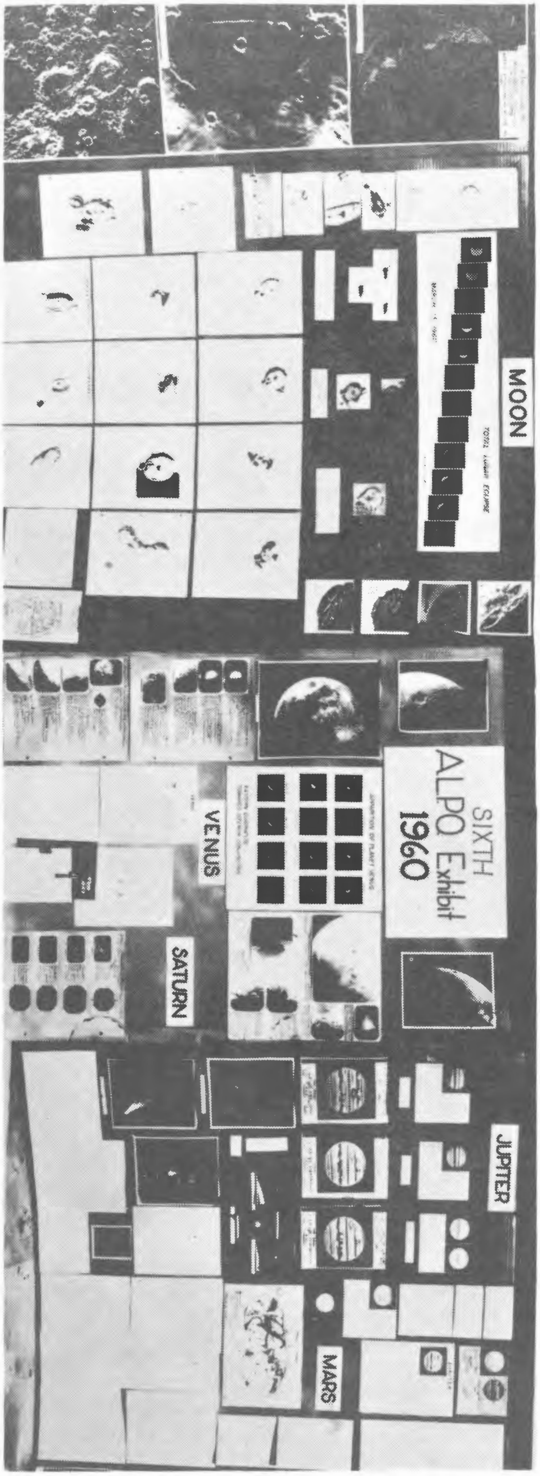

FIGURE 52. Composite photograph of A.L.P.O. Exhibit at Sixth A.L.P.O. Convention at San Jose, California. August 24, 1960. Contributed by Jack Borde.

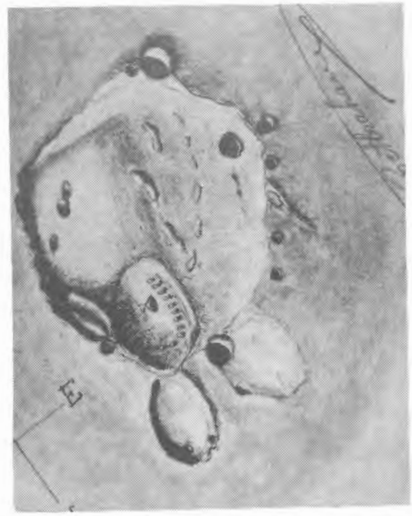

FIGURE 53. Janssen and Fabricius. Robert Abraham. May 30, 1960. 20^h 30^m, U.T. 3-3/4-inch refr. 120X. Colongitude = $333^{\circ}.1$.

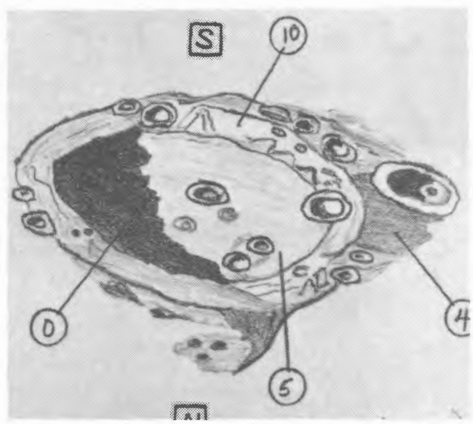

FIGURE 54. Lunar Crater Scheiner. Phillip W. Budine. Dec. 5, 1954. 23^h 30^m, U.T. 3.5-inch Skyscope refl. 125X. S = 8. T = 3. Colongitude = $38^{\circ}.4$.

FIGURE 55. Aristarchus. Charles M. Cyrus. 10-inch refl. 323X. October 28, 1955. 0^h49^m -1^h9^m,U.T. S=4-7. T=4.5. Colongitude =$54^{\circ}.2$.

Map of Mercury. Attention is invited to Mr. Gary Wegner's map on page 191. It may be compared, for example, to the maps by Schiaparelli and Antoniadi on pages 192 and 193 respectively of F. L. Whipple's Earth, Moon, and Planets and also in Antoniadi's La Planète Mercure, with the map by Donald O'Toole on page 5 of The Strolling Astronomer, Vol. 5, No. 10, October, 1951, and with the map by W. H. Haas accompanying his article "A Ten-Year Study of Mercury and its Atmosphere," Popular Astronomy, Vol. 55, p. 137, March, 1947. Mr. Wegner is the first, to the Editor's knowledge, to show both the sun-turned and sun-averted hemispheres at perihelion or aphelion on an orthographic projection, usually only the sun-turned hemisphere being represented. All regions alternately visible and invisible with the sun's changing and considerable libration in longitude can thus be shown, but it must be realized that years may elapse between favorable presentations of features farthest from the mean terminator on the normally averted hemisphere. Mr. Wegner says of his map that it "shows detail which is easily visible to a skilled observer with amateur instruments during the twilight when contrasts are much better than during the daylight." The Editor would strongly endorse the importance of observing Mercury when the background sky illumination makes contrasts in tone greatest.

Janssen and Fabricius. Mr. A. C. Larrieu of Marseille, France, has contributed the lunar drawing of these objects here shown as Figure 53 on p. 193. He especially directs attention to the "round chain of little objects" in Fabricius. Though poorly represented on many maps of the moon, this feature is described on pp. 335-336 of Walter Goodacre's The Moon. It is shown very plainly as a chain of hills in G. P. Kuiper's recent Photographic Atlas, where the amount of detail present greatly exceeds what appears in Figure 53 and presumably what is within the reach of an aperture of 3-3/4 inches. Indeed, drawing correctly everything shown in Janssen and Fabricius on these photographs would be a major task. Goodacre regards this chain of ridges as the remnants of an inner double wall for Fabricius, an aspect shown very well by Taruntius and perhaps one key to the riddle of the formation of the lunar surface.

Brilliant and Colorful Display of Northern Lights on November 13, 1960. In a letter dated November 20, 1960, Mr. Elmer J. Reese of Uniontown, Penna., latitude about 40°N., communicated the following description:

"The greatest and most beautiful display of the northern lights that I have ever seen was visible here during the wee hours of Sunday morning, November 13. The climax of the display lasted from 1:05 to 1:35 A.M., E.S.T. I have seen many brilliant auroral displays in previous years, but the two great displays this fall exhibited colors much stronger than I previously would have thought possible. Until now I might have suspected the presence of some artistic liberties in the beautiful paintings of the polar lights by William Crowder. At one time near 1:25 A.M. the entire sky resembled a multi-colored flag with stripes radiating from a blood red corona to all points of the horizon. The center of the corona was at Declination 20° N. and Right Ascension 4^h 35^m. About every fourth ray was of a deep red color. The intervening rays were either blue, creamy white, or yellow-green. Although the rays did not reach the southern horizon, pulsating bands at their bases were visible well below the constellation of Lepus."

A.L.P.O. Maps of Mars for Sale. It always adds much interest to observations of Mars to have available for study and comparison maps of the planet. (Of course, the intelligent observer will realize that the planet is not likely to conform exactly to the appearance on a past map and that he should never use a map to force and bias his telescopic studies.) Among recent maps are those drawn by Mr. Frank Vaughn as our Mars Recorder for the apparitions of 1956 and 1958-9. These are based upon hundreds of drawings and observations by members of the Association of Lunar and Planetary Observers. These two maps may be purchased from:

Walter H. Haas
Pan American College Observatory
Edinburg, Texas, U.S.A.

The prices are:

1958-9 map....................$1.00
1956 map...................... 0.75
Both maps..................... 1.50

To be of most use in studying the Red Planet during the best part of the current 1960-61 apparition, these maps should be ordered promptly.

Scheiner. Lunar observers may wish to study Figure 54 on p. 193 as an example of a lunar drawing with a small telescope. The numbers shown are intensities on the usual scale of 0 (black shadows) to 10 (most brilliant features). Scheiner is 70 miles in diameter, according to Goodacre and Wilkins, and lies southeast of Clavius.

Aristarchus, Herodotus, and Schroeter's Valley. Figure 55 on p. 193 shows the popular lunar crater Aristarchus at a lighting when the floor is still almost wholly covered by morning shadow. Mr. Cyrus writes of this observation: "Herodotus was examined closely while the sketch of Aristarchus was made. The floor of Herodotus was half covered with shadow, and the south end of this shadow fell across the floor of the crater to the foot of the east wall. No white spot, like the one reported by Wilkins and Bartlett, was seen on the floor of Herodotus. Fine clefts near Herodotus and Aristarchus, as discovered by Wilkins in 1950, were looked for very carefully under good conditions without success. Hundreds of tiny hills could be seen on the south side of Schroeter's Valley."

It should be noted that Mr. Cyrus used an aperture of 10 inches for these lunar observations, and it is proper to mention that he is a very experienced observer.

Suspected Lunar Dome in Mare Serenitatis. On August 1, 1959, Dr. Joseph Ashbrook wrote in part as follows: "With my 10-inch reflector, I have been keeping systematic records of domes or suspected domes encountered during my lunar height observations. One suspected dome might be mentioned, seen 1959, July 26. 319, U.T. [Dr. Ashbrook is using a decimal fraction of a day.] It is in eastern Mare Serenitatis, with rectangular coördinates Xi=+.150 and Eta=+.510, about 2/7 of the way from Caucausus Alpha to Linné B. Linné C is close to its southwest edge. The object is large and elongated north-south, the long diameter being about 20 miles. Although the shading appeared to be that of a dome, it is possible that the appearance might be due to the irregular streakiness of the Mare floor. Perhaps you (or some reader) already know more about this feature and its proper interpretation."

We should be extremely glad to have A.L.P.O. members follow up this observation and to report to us their results. The object will be seen to good advantage about a day before First Quarter. It will be important, of course, to make such a study with the suspected dome very close to the sunrise terminator. Good drawings will be welcome. Investigations should be made of height, slope, diameter, and possible summit craterlet.

A Future High Altitude Observatory. A number of A.L.P.O. members have expressed interest in the future High Altitude Observatory in Mexico being planned jointly by Pan American College, Edinburg, Texas, U.S.A., and the Instituto Tecnológico, Monterrey, Nuevo Leon, Mexico. The development is being carried on by a civil association, the Sociedad Panamericana para la Investigacion Astrofisica (Pan American Society for Astrophysical Research), incorporated under the laws of Mexico. This society has a governing board composed of five members from Mexico and five from the United States. The first President of the society is Professor Paul R. Engle, the Director of the Pan American College Observatory. The site being developed is the top of Infiernillo Mountain, elevation 10,391 feet, about 100 miles south of Monterrey and near the mountain town of Galeana. Land for the future Observatory has been given to the Sociedad Panamericana by Mr. Daniel Hibler, owner of El Pablillo Ranch. Many other persons have assisted and are assisting in various ways; but special mention should be made of Engineer José Emilio Amores, Director of the School of Engineering of the Instituto Tecnológico, and of Dr. Rodolfo Castillo Bahena, Head of the Department of Physics there.

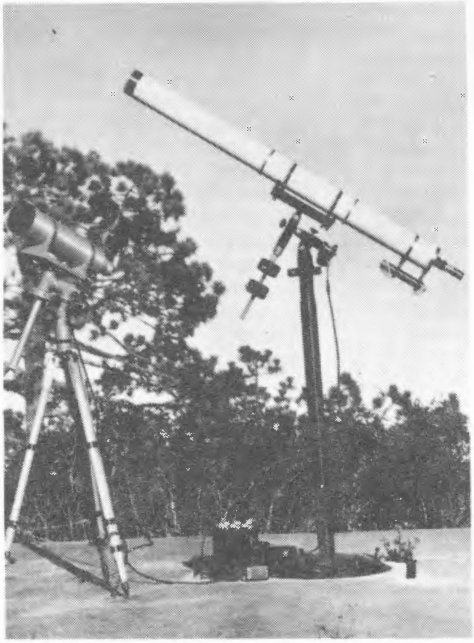

FIGURE 56. Cement pad on top of Infiernillo Mountain, Mexico, the site of a future High Altitude Observatory. Telescopes temporarily on pad are Prof. Paul R. Engle's 5-in. F:5 R.F.T. refractor and Dr. William P. Blocker's 4-in. F:15 refractor. These instruments and other equipment now stored near site. Photograph by Paul R. Engle in late Nov., 1960.

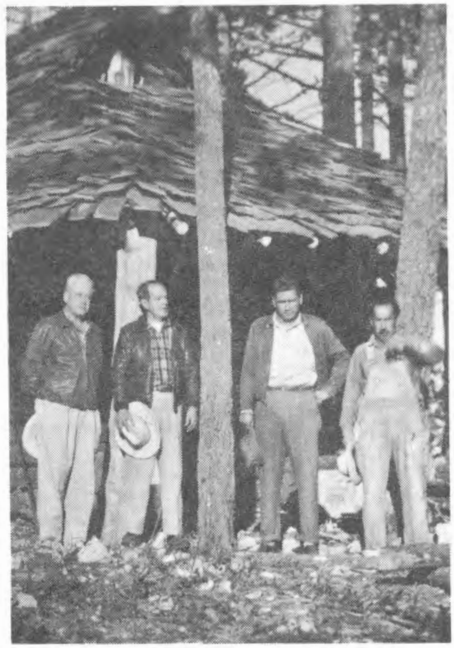

FIGURE 57. Personnel cabin near top of Infiernillo Mountain, Mexico. Left to right: Daniel Hibler, who gave land for Observatory; Engineer Gabino Pérez Pagola from Instituto Tecnológico of Monterrey; and driver and electrician from Instituto Tecnológico. Photograph by Paul R. Engle in late Nov., 1960.

The principal instrument is to be a 40-inch reflector. Infiernillo is well covered by trees and has fairly gradual slopes so that topographical conditions for good seeing appear favorable. The mountain is far from towns in an isolated region. Preliminary studies suggest very good transparency, a large number of clear nights, and nearly constant temperature during most of the night. What little has so far been done to study the seeing has been <u>extremely</u> encouraging.

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

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