The ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

The Strolling Astronomer

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The Strolling Astronomer

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ANNOUNCEMENTS

W.A.A. Convention at Flagstaff. The Western Amateur Astronomers will hold their 1956 Convention at Flagstaff, Arizona. A most important attraction will be observing the planet Mars, which will be not far from a very close opposition, with the famous Lowell Observatory 24-inch refractor. The exact dates of the Convention are still uncertain, we understand, but will probably be August 29, 30, and 31, 1956. The General Chairman of the Convention is Thomas R. Cave, Jr., 4137 Anaheim St.(East), Long Beach 4, Calif.; and the Program Chairman is Thomas A. Cragg, 246 W. Beach Ave., Inglewood 3, Calif. - both very well known in A.L.P.O. circles. The country around Flagstaff presents numerous attractions to the vacationer or the tourist, of which Grand Canyon and Meteor Crater are perhaps the best known. Past W.A.A. gatherings have been singularly enjoyable affairs, and we are sure that the coming one in such an astronomically inviting setting will be even more so.

At this Convention the W.A.A. will present its annual Blair Medal to Dr. Otto Struve, Director of the Leuschner Observatory of the University of California at Berkeley. The medal is given in recognition of outstanding service to amateur astronomy. By his constant encouragement of amateurs all over the world and by his outstanding writing on astronomical subjects in a style suited to understanding by the amateur, Dr. Struve is an outstanding choice for this award.

It has been proposed that the A.L.P.O. should hold a rather informal one-day Convention in conjunction with this W.A.A. Convention. If the W.A.A. meets on August 29, 30, and 31, perhaps the A.L.P.O. can meet on September 1, which is a Saturday. We would very much like to have an A.L.P.O. Convention; and it would be especially good if many of our members can attend, even some from all parts of the country. It was perhaps Mr. Rolland La Pelle, a former President of the Astronomical League, who first suggested that the A.L.P.O. should have a meeting at Flagstaff. Thanks to the kind invitation of the W.A.A., we may now be able to do so. We should very much like to hear from our readers what they think about the suggested Convention and what kind of program they would like to have.

League Convention at Miami. We want to remind our readers of the Tenth Annual Convention of the Astronomical League at the McAllister Hotel in Miami, Florida on July 2 - 5, 1956. A bulletin from Mr. Leonard G. Pardue, 641 Falcon Ave., Miami Springs, Florida shows that the program is shaping up very well. Much attention will be given to what the amateur can do to help track the artificial satellites of the coming International Geophysical Year. Other subjects for expected papers include Mars, the coördination of visual observations of Jupiter and radio noise emission studies, radio astronomy in general,solar observing, the electronic image converter telescope, the moon, and some League history. A number of well-known names are on the program, including those of several professional astronomers. The Convention is open to all who care to attend; and we urge all our readers who can do so to do so. Early registration will help the Convention Committee.

A Uranus-Neptune Section. We have decided to set up a Uranus-Neptune Section in our A.L.P.O. The Uranus-Neptune Recorder is one of our young and enthusiastic members, Mr. Leonard B. Abbey, Jr., 822 S. McDonough St., Decatur, Georgia. All observations of Uranus and Neptune should be mailed to him. It is true, of course, that detail on these two remote planets is difficult in ordinary telescopes and that considerable caution must be exercised in interpreting drawings of such detail. Nevertheless, we have hopes that careful,systematic work may prove rewarding; and Mr. Abbey has already made some attempts at planned, simultaneous studies of Uranus by widely separated observers. All those who are interested in Uranus or Neptune are asked to write to Mr. Abbey; and the participation of members who have even occasional access to large telescopes is especially invited.

Secrets of Space Flight. We are indebted to Fawcett Books , 67 W. 44th St., New York 36, New York for the book with this title by Lloyd Mallan. A paper-bound book, its price is 75 cents only. It is a survey of present research work on rocketry and space flight and related subjects. The book is illustrated with hundreds of photographs (in which several A.L.P.O. members appear incidentally), many of them taken by the author himself during an 18,000-mile trip under military auspices to collect material. Mr. Mallan belongs to the American Rocket Society, the Aviation Writers Association, and the British Interplanetary Society. The style of writing is easy, clear and informative; and we commend the book to all persons interested in rockets or space flight.

Life on the Moon? In an article in the March 1955 issue of The Irish Astronomical Journal Mr. Patrick Moore discusses this fascinating problem; and the views of such a prominent lunar observer must naturally command our attention. Ruling out animal life of any kind under the very harsh lunar environment, the author soon limits attention to possible very simple lunar plants. Mr. Moore is perhaps more conservative than in some of his former writing; he considers even the Linné change to be uncertain, doubts that the Eratosthenes dark areas behave precisely as W.H. Pickering reported, and suggests that recently discovered radial dark bands in many lunar craters were merely overlooked by past observers. He concludes: "At the moment we can do no more than say that while the weight of scientific evidence seems to be rather against the existence of plant life of any kind, it remains an intriguing possibility, and one that we cannot totally ignore."

A New Approach to the Interpretation of the Canals of Mars. An article called "Correlation of the Martian Canal Network" by Mr. Wells Alan Webb in the March, 1956 Astounding Science Fiction does what one might suppose to be almost impossible after so many years of controversy - suggests a novel approach to interpreting the enigmatic canals of the planet Mars. Mr. Webb proposes that we regard the canals as a topological network: the oases are the primary points, the canals are rays joining these primary points, and random intersections of canals are accidental points. It is here of no importance whether the canals follow great circle routes or any other geometric paths; nor does it matter whether they are continuous paths or instead, as Antoniadi and others have reported to be true in views with large telescopes under good seeing conditions, are composed of separate, small details. Employing Trumpler's map of Mars in 1924 for data, Mr. Webb compares the Martian canals regarded as a topological network to both natural and artificial networks including shrinkage cracks on mud flats, spider webs, railroads, and global air routes. On the basis of this comparison Mr. Webb concludes that the canal system must have been created by living animals. These may be extremely intelligent beings, or they may be unintelligent animals who have without design created "fertility paths" between the oases. (Refer also to "Life on Mars - After Ten Years", The Strolling Astronomer, Vol. 8, Nos. 3 and 4, pg. 35, 1954.) Obviously, further experimentation with various kinds of networks is possible as a more detailed test of this idea. It would be good also to try to allow for the imperfect visibility of the canals at our great distance from Mars.

Curiously, Mr. Webb's psychological-mathematical method of investigation appears to have been overlooked by all the classic observers of Mars, even though some of them (such as Lowell and W.H. Pickering) had proven mathematical ability and even though the artificiality of the canals was long very warmly debated.

New Mars Recorder. It is with very great regret that we must report that Mr. D. P. Avigliano cannot continue as our Mars Recorder. His employment no longer leaves him the necessary time for the requirements of this position. We are always sorry when one of our Section Recorders relinquishes his post, but we are especially sorry to lose Mr. Avigliano. We thought his work in analyzing the results of the 1954 apparition really outstanding, and we consider the map of Mars he drew on the basis of our A.L.P.O. work in 1954 one of the best things yet done by the A.L.P.O. We certainly thank Mr. Avigliano very much for the excellent work he carried out as Mars Recorder.

The name and address of the new Mars Recorder are:

Frank R. Vaughn, Jr.
5801 Hammersley Road,
Madison, Wisconsin.

Mr. Vaughn was a very active lunar and planetary observer in 1939-42 and also in the early days of the A.L.P.O. in 1947. In fact, he was the very first contributor of an article to this periodical. He has recently completed a 10-inch reflector and is again actively watching our Solar System neighbors. All observations of Mars during the present important 1956 apparition should be mailed to Mr. Vaughn. An article giving certain general information about amateur work on Mars and instructions for observing this planet is now being planned.

JUPITER IN 1954 - 55: FINAL REPORT

by Robert G. Brookes

This report concludes the work of the observers of Jupiter during the 1954 - 55 apparition, including the observations made during May and June, 1955, Elmer J. Reese's report on rotation periods and other miscellaneous data.

In addition to the names of observers published in the March-April and May-June, 1955 issues of The Strolling Astronomer we have received reports from the following observers:

Name	Telescope	Station
Arthur Dalton	12.5-in. refl.	Edmonton, Alberta, Canada
Eugene Epstein	10-in. refl.	Hollywood, California
Douglas Helm	10-in. refl.	Topeka, Kansas
Kazuyoshi Komoda	21-cm. refl.	Miyazaki City, Japan
A. C. Larrieu	8-in. refl.	Marseille, France
Franklin Loehde	12.5-in. refl.	Edmonton, Alberta, Canada
Ian McLennan	12.5-in. refl.	Edmonton, Alberta, Canada
David Meisel	3-in. refr.	Fairmont, West Virginia.

This makes a total of 44 observers who sent in reports of their 1954-55 observations of Jupiter.

Although we did better in securing transits this apparition than we did in 1953-54 - 747 as compared to 492 - we still fell far short of the mark for which we should strive, which should be at least 2000 transits; perhaps we shall do better in 1955-56, and each observer is urged to make as many transit observations as he possibly can.

Description

The general trend, as reported in the Second Interim Report, The Strolling Astronomer, May-June, 1955, continued through May and June. Figures 2 through 10 show some typical views of the planet as seen by some of our observers.

SEB Disturbance. The SEB became darker and wider as the SEB Disturbance continued to develop. Figure 1 a shows the position of the preceding and following ends of the Disturbance as recorded by Elmer J. Reese on May 2, 1955. The parts of the SEB between approximately longitudes (II) 90° and 270° - not shown on Mr. Reese's drawing - were as dark as the parts shown. The darkening of the SEB was, in general, noted by all the observers who sent in reports. The SEB (the combined components) was, without doubt, the second most conspicuous belt by the end of the apparition. This darkening and broadening of the SEB was caused, in all probability, by the SEB Disturbance. (See Rotation Periods below for further details pertaining to the SEB Disturbance.)

Red Spot Area. The aspect of the RS area seemed to have completed its change from the Spot to the Hollow by June 1, 1955. Figures I b and I c show the changing aspects of that region. By June 1, 1955 (Figure 7) the Hollow appeared fully developed, and Figure I c confirms this. All the reports we have available indicate that the aspect of the RS area remained, constantly, that of the Hollow until Jupiter's conjunction with the Sun.

Belts and Zones. Table I gives the means of the intensity and color estimates of three observers. The intensities are based on a numerical scale of 0 to 10, 0 being for extremely dark markings and shadows and 10 for extremely bright features. The key to the letters used to designate the color estimates is as follows:

Br	- brown	R-br	- reddish brown
Bl-g	- bluish gray	R	- red
Br-g	- brownish gray	T	- tan
G	- gray	W	- white
O-br	- orange-brown	Y-w	- yellowish white
P-g	- purplish gray	Y	- yellow

Table I. Intensities and Colors of Jovian Features, 1954 - 55

	Budine		Haas		Reese	
	I	C	I	C	I	C
RS	—	- -	3.75	—	4. 3	T
RSH	5.0	- -	5.25	—	6. 5	W
SSTeZ	5.2	Y	5. 1	—	- -	—
STeZ	5.2	Y	5. 2	W	5. 2	W
STrZ	5.7	Y	5. 7	W	7. 0	W
SEBZ	5.2	Y	5. 4	W	6. 4	Y-w
EZ	7.0	W	5. 5	W	7. 8	W
NTrZ	5.7	Y	5. 3	W	6. 7	W
NTeZ	5.3	Y	5. 3	W	5. 0	Y-w
NNTeZ	4.5	Y	5. 0	—	4. 6	Y-w
SPR	2.2	- -	4. 5	P-g	4. 0	G
NPR	3.0	- -	4. 4	P-g	4. 0	G
SSTB	3.0	Bl-g	3. 7	R-br	3. 7	G
STB	3.0	G	3. 4	R-br	3. 0	Br-g
SEBs	3.7	R-br	3. 7	R-br	3. 9	O-br
SEBn	2.5	R	3. 2	R-br	2. 9	Br
EB	- -	--	3. 9	Br-g	4. 7	G
NEB	2.2	R	2. 7	R-br	2. 3	R-br
NTBs	- -	- -	3. 7	R-br	- -	- -
NTB	2.7	Bl-g	3. 6	R-br	3. 5	Br-g
NTBn	--	--	3. 4	R-br	- -	- -
NNTB	- -	--	3. 8	R-br	3. 2*	Br-g
NNNTB	—	--	—	—	3. 8	G

*NTBn(?)

A comparison of this table with the table of intensity estimates of the 1953-54 apparition (The Strolling Astronomer, Nov.-Dec., 1954) shows that the estimates of the observers for 1954-55 are not in as close agreement as they were in 1953-54. This might be explained by the fact that Jupiter was much more disturbed during the 1954-55 apparition than during the previous one, and it would thus be more difficult for different observers to arrive at the same values for their estimates.

The order of the decreasing conspicuousness of the belts and zones was, in general as follows: NEB, STB, SEBn, NTB, NNTB, SEBs, SSTB, NNNTB and EB (the combined components of the SEB becoming very nearly as conspicuous as the NEB on several occasions during May-June, 1955); EZ, STrZ, NTrZ, the remaining zones being about the same conspicuousness and following the NTrZ in rank.

Latitudes

Table II gives the results of measurements, made by the Recorder, of three photographs taken by Philip R. Lichtman.

Table II. Zenographic Latitudes

Belt c-center se-south edge ne-north edge	January 5, 1955 3:42 U.T. CM_1 59° CM_2 137°	January 8, 1955 5:45 U.T. CM_1 259° CM_2 311°	February 5, 1955 2:16 U.T. CM_1 236° CM_2 56°

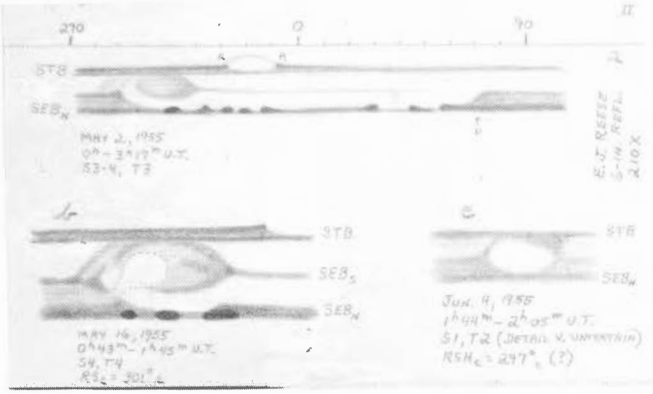

Figure 1.
Drawings of RS-RSH Region on Jupiter by Elmer J. Reese. 6-inch refl. 210X.

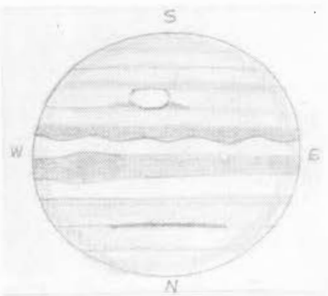

Figure 2. Jupiter.
Owen C. Ranck.
4-inch refr. 150X.
May 2, 1955. 1^h 25^m, U.T.
C.M.$_1$ = 98°. C.M.$_2$ = 1°.
Seeing fair. Sky clear.

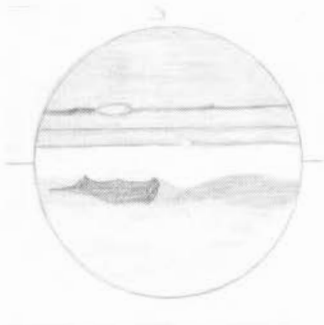

Figure 3. Jupiter.
Leonard B. Abbey, Jr.
6-inch refl. 300X.
May 2, 1955. 1^h 30^m, U.T.
C.M.$_1$ = 101°. C.M.$_2$ = 4°.
Seeing fairly good. Sky clear.

Figure 4. Jupiter.
C. J. Smith.
6-inch refr. 150X.
May 11, 1955. 4^h 5^m, U.T.
C.M.$_1$ = 174°. C.M.$_2$ = 8°.
Seeing poor. Sky clear.

Figure 5. Jupiter.
P. W. Budine.
3.5-inch refl. 125X.
May 18,1955. 1^h 30^m, U.T.
C.M.$_1$ = 104°. C.M.$_2$ = 245°.
Seeing very good. Sky clear.

Belt	January 5,1955	January 8, 1955	February 5, 1955
SSTBc	-52°.8	- -	- -
SSTB. se	- -	-47°.4	- -
STBse	-40 .7	-36 .9	-41°.6
STBne	-30 .5	-30 .5	-33 .4
SEBs se	- - -	-21 .6	- -
SEBs c	-20 .0	- -	- -
SEBn se	-12 .5	- -	- -
SEBn ne	- 7 .6	- -	- -
SEBn c	- -	-10. 1	- 8 .4
NEBse	+9 .9	+6. 7	+8 .2
NEBne	+22 .0	+20. 8	+22 .5
NTBse	- -	+29. 7	+33 .0
NTBs c	+29 .0	- -	- -
NTBn c	+40 .5	- -	- -

The following remarks should be made concerning these latitudes: The measurements were made with a millimeter scale, on which it was possible to estimate to within ½ millimeter; thus, there is a possible error inherent in the measurements. Also, since the measurements were taken from prints there will be another error introduced because of "loss of limb" during the printing and developing procedure. It was impossible to determine to any degree of accuracy just how much "loss of limb" there actually was; thus we cannot state how great an error, because of this loss,was introduced into the deductions.

But, we do not feel that the error is so great that Table II should not be published. For one thing it will give the observer an idea of the relative latitudes of the belts. The results in the Table should not be taken as final until they have been compared with latitudes that have been determined by a more accurate method.

Rotation Periods

(Again we are indebted to Mr. Elmer J. Reese for working out the rotation periods for the Jupiter Section. Mr. Reese deduced the rotation periods of three Jovian latitudinal currents, the Red Spot and finally the SEB Disturbance from a limited number of transit observations. The following section is entirely the work of Mr. Reese.)

The following observers submitted a total of 747 visual central meridian transits for the apparition: P. W. Budine, E. Epstein, W. H. Haas, K. Komoda, A. P. Lenham, E. J. Reese and J. R. Smith. In the tables which follow the first column gives an identifying number or letter to each object. The second column indicates whether the object was dark (D) or bright (W) and whether the preceding (p), center (c) or following (f) end was being observed.

S. Temperate Current (S. edge STB, STeZ), System II

No.	Mark	Limiting Dates	Limiting L	L*	No.Transits	Drift in 30 days
F	Wp	Dec. 23-May 18	72° - 322°	54°	12	-22°.6
A	Wf	Dec. 23-May 2	88 - 351	73	13	-22 .4
B	Wp	Dec. 19-May 5	174 - 82	156	15	-20 .2
C	Wf	Jan. 2-May 5	184 - 102	176	13	-20 .0
D	Wp	Nov. 8-Mar.31	295 - 195	247	13	-21 .0
E	Wf	Nov. 8-May 1	317 - 196	270	16	-21 .0

Mean drift in 30 days -21 .2
Mean rotation period $9^h\ 55^m\ 11^s.6$

*Longitude at opposition.

The long-enduring bright markings in the northern part of the STeZ continue to be

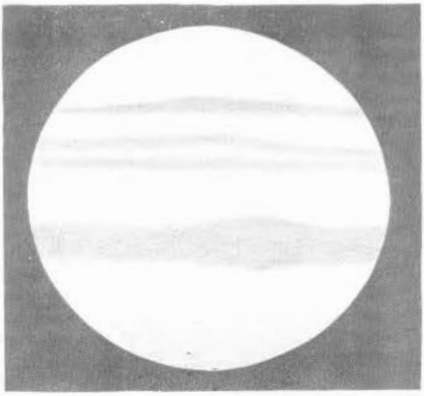

Figure 6. Jupiter.
K. Komoda.
4.5-inch refl. 155X, 230X.
May 23, 1955. $11^h\ 25^m$, U.T.
$C.M._1 = 175°$. $C.M._2 = 275°$.
Seeing poor.

Figure 7. Jupiter.
C. J. Smith.
6-inch refr. 200X.
June 1, 1955. $4^h\ 10^m$, U.T.
$C.M._1 = 249°$. $C.M._2 = 282°$.
Seeing bad.

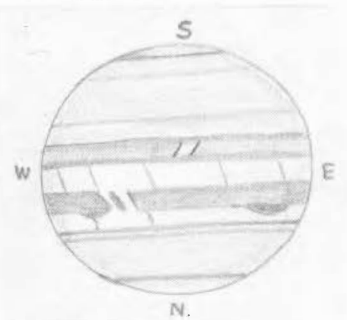

Figure 8. Jupiter.
Owen C. Ranck.
4-inch refr. 150X.
June 5, 1955. $1^h\ 35^m$, U.T.
$C.M._1 = 65°$. $C.M._2 = 69°$.

Figure 9. Jupiter.
Thomas A. Cragg.
6-inch refr. 180X.
June 8, 1955. $3^h\ 25^m$, U.T.
$C.M._1 = 245°$. $C.M._2 = 225°$.
Seeing rather poor. Sky clear.

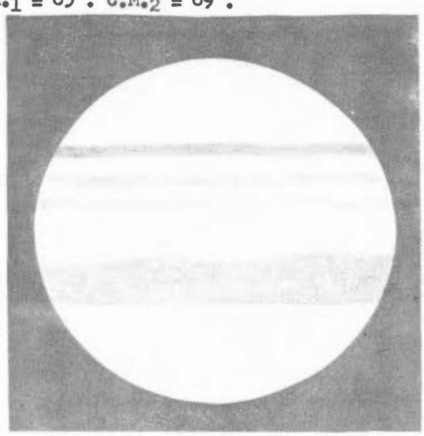

Figure 10. Jupiter.
K. Komoda.
4.5-inch refl. 155X.
June 12, 1955. $11^h\ 5^m$, U.T.
$C.M._1 = 76°$. $C.M._2 = 23°$.
Seeing fair.

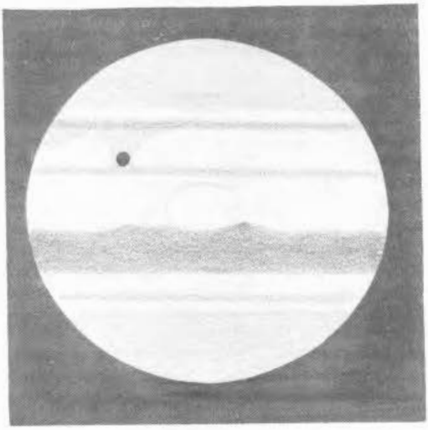

Figure 11. Jupiter.
K. Komoda.
8-inch refl. 231X.
Feb. 11,1955. 13^h 50^m,U.T.
C.M.$_1$ = 167°. C.M.$_2$= 317°.
Seeing fair.

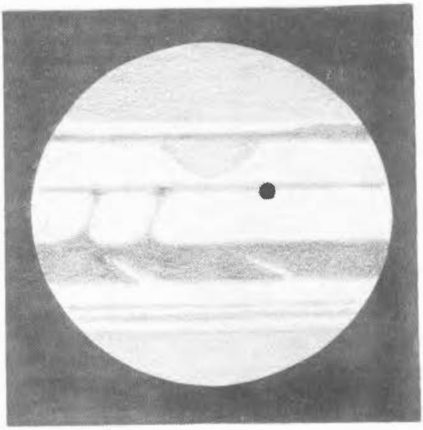

Figure 12. Jupiter.
K. Komoda.
8-inch refl. 181X, 231X, 271X.
Feb. 18,1955. 14^h 3^m, U.T.
C.M.$_1$ = 201°. C.M.$_2$ = 297°.
Seeing fair.

prominent objects. They now appear as bright bays indenting the south edge of the STB. The bays are about 20° or 13,000 miles long.

Red Spot, System II

Mark	Limiting Dates	Limiting L	L.	No. Transits	Drift in 30 days
p.end	Oct. 25-May 16	278° - 292°	282°	39	+ 2°. 1
center	Sept. 25-May 16	289 - 304	294	40	1 . 9
f.end	Oct. 25-May 16	300 - 316	306	41	2 . 4

Mean drift in 30 days +2 .1
Mean rotation period 9^h 55^m $43^s.5$

The mean rotation period of the Red Spot is one of the longest recorded since the beginning of the present century. The Red Spot, which was very dark and prominent in January and February, began to fade late in March and finally gave way to the Hollow near May 16. Transits by Haas and Reese agree in placing the newly formed Hollow several degrees west of the last recorded position of the fading Spot.

Middle of the South Equatorial Belt, System II

No.	Mark	Limiting Dates	Limiting L.	L.*	No. Transits	Drift in 30 days
1	Dp	Feb. 4-Apr. 25	224° - 53°	181°	13	-64°.1
2	Dp	Apr.18-May 5	100 - 62	(205)	4	-67. 1
3	Df	Feb.16-Mar. 24	223 - 214	218	9	- 7. 5
4	Df	Feb. 4-Apr. 2	229 - 229	229	8	0. 0

Mean drift (without nos. 3, 4)-65.6
Mean rotation period 9^h 54^m 11^s

*In the table of rotation periods for the middle of the SEB, the longitudes given in the fifth column are for March 1, 1955. In all the other tables, the longitudes given in the fifth column are for the date of opposition.

The initial outbreak of the seventh major Disturbance to be recorded in the SEB occurred on or shortly before February 4, 1955 near longitude (II) 229°. No. 1 was the preceding end of the Disturbance which swept westward along the interior of the SEB. No. 4, which was the following end of the Disturbance, remained fixed near the longitude of the initial eruption.

North Equatorial Current (S. edge NEB), System I

No.	Mark	Limiting Dates	Limiting L	L.	No. Transits	Drift in 30 days
1	Dc	Feb. 13-May 24	54° - 23°	(63)	6	-9°. 3
2	Dc	Feb. 11-May 6	71 - 41	(81)	6	-10 . 7
3	Wc	Feb. 8-Apr. 20	89 - 60	(98)	4	-12 . 3
4	Dc	Jan. 8-Mar. 31	100 - 80	98	7	- 7. 3
5	Wc	Jan. 8-Mar. 31	189 - 163	186	4	- 9. 5
6	Dc	Jan. 8-Mar. 2	203 - 178	200	4	-14. 2
7	Wc	Feb. 27-Apr. 2	194 - 180	(213)	3	-12. 4
8	Wc	Jan. 8-Feb. 27	240 - 215	236	3	-15. 0
9	Dc	Jan. 8-May 5	249 - 222	247	5	- 6. 9

Mean drift in 30 days -10. 8
Mean rotation period $9^h\ 50^m\ 16^s$

North Tropical Current (N. edge NEB), System II

No.	Mark	Limiting Dates	Limiting L	L.	No. Transits	Drift in 30 days
1	Wc	Jan. 12-Feb. 27	52° - 33°	51°	6	-12°.4
2	Dc	Jan. 8-May 1	254 - 234	253	9	- 5 .3
3	Wc	Jan. 8-Mar. 24	261 - 252	260	5	- 3 .6

Mean drift in 30 days - 7 .1
Mean rotation period $9^h\ 55^m\ 31^s$

A white spot, apparently of short duration, was recorded seven times between February 13 and March 6, when its longitude decreased from 190° to 181°.

Observations and Comments

In the First Interim Report of the 1954-55 apparition we published an account of E. J. Reese's observations of the unusual aspect of the RS area during the fall of 1954 (The Strolling Astronomer, March-April, 1955, pp. 32, 34). And we stated that if Mr. Reese's observations were confirmed we would have on record one of the most unusual RS phenomena since the discovery of the Spot itself. However, no such confirming observations were forthcoming, and it seems as if the large bright oval shown on Figures 14 a and 14 b of the March-April, 1955 Strolling Astronomer was not the RSH but just a large bright cloud that had a marked resemblance to the RSH. This view is supported by Dr. Alexander and Mr. Fox of the British Astronomical Association. Finally, we have the report of Mr. Kazuyoshi Komoda of his observations of the RS area (Yamamoto Circular 1334).

Mr. Komoda starts his report by giving a summary of Mr. Reese's observations of the RS area in the fall of 1954. He continues with an account of his own observations of the RS area. This account follows below as it originally appeared in the Yamamoto Circular 1334:

"Brookes' report depends on three sketches of Sept. 2, Oct. 25 and Nov. 3, 1954 only, and tells nothing of later dates. The writer has obtained 8 sketches, on Dec. 8, 1954, Feb. 11, Feb. 16, Feb. 18, Feb. 23, Apr. 3, Apr. 5 and Apr. 22, 1955 of the Red Spot. Of these the one of Feb. 11, 1955 much resembles that of Reese [Figure 14a, S.A. 9, 3-4], its central meridian being 317°.2 [Figure 11, this report], the Red Spot being past the C.M. In this sketch the above mentioned dusky mass is estimated as 292°.2 in longitude. Reese's drawing shows the white oval in external contact with the dusky mass, while the writer's dusky area is half covered with the white oval without dark fringe. The Red Spot is similarly on its E. side, apparently, covered by the white area. [Reese's drawing of Sept. 2, 1954, shows vaguely a white covering on the E. side.]

"The writer has never observed any extensions at the S. part of the Red Spot, but the large white oval on its W. side made him think it to have been whitened. But, an exact estimation of its position shows it to be somewhat advanced toward the W. On the other hand, the writer's drawing of Feb. 18, 1955 [Figure 12, this report] shows the Red Spot without the Hollow in the center of Jupiter's disk; its colour was noted as light brick red, more or less uniform in colouring and duskiness, so that a sudden change from white to light brick-red colouring was not acceptable.

"There are four drawings of the Red Spot during 1954-55 all of which show practically no changes. Accordingly, as mentioned above, Reese's drawings of Sept. 2 and Oct. 25, 1954, and the writer's of Feb. 11, 1955, show the same phenomenon. It is concluded, that this is not the Red Spot Hollow, but a large white oval, which once disappeared completely and later reappeared. (Its cause and structure remain unknown.)

"The fact that the dusky oval mass is half covered with the white spot indicates that the Red Spot is at comparatively low level among the cloud layers."

FLASHING LUNAR MOUNTAIN

by Brian Warner

On January 24, 1956 at $20^h\ 34^m$, U.T., col. $54^\circ.5$, R. Houghton was drawing the lunar crater Liebig when he was attracted by a flash just east of the area he was studying. The instrument used was a 7-inch reflector at 230X. The flash came from the east wall of Cavendish, just emerging from shadow, and, on closer investigation, it was seen that a peak or mountain mass on the wall was flashing. The writer, elsewhere at the time, was summoned and independently confirmed the flashes-they were so conspicuous that they were seen immediately. Seeing was good, with periods of excellent seeing, and no matter where Cavendish was placed in the field of view, the flashing continued. There were several other peaks in the neighborhood but none of these varied in intensity at all.

The flashes evidently began with a bright glare, and then continued very bright for about 3 minutes; they then slowly faded until at $20^h\ 45^m$ they had disappeared. The frequency of the pulsating was approximately 1½ flashes per second. Between maximum brilliancies the source could be seen as a point of light slightly more intense then the surrounding walls. There were definite indications of reflection from the west wall, of the flashes, and the floor was faintly lit by the glare.

Cavendish and Cavendish E are both fairly bright craters but, so far as the writer knows, they have never before been seen to emit light as they did on the night of January 24. LaHire is the only parallel case, in fact it is very much the same. (Schroeter and Webb saw it flashing like a beacon when on the terminator.)

The cause of the phenomenon is a problem. Light reflected off an irregular inclined surface may possibly produce intermittent flashing but the flashes were rather too regular for this explanation. Light falling onto a symmetrical crystalline surface may also produce the result, but for crystals to form at the summit of a peak or wall must imply some peculiar forces.

We must remember that the moon does not possess an atmosphere; she is not shielded at all from any radiation. How rocks react under such devastating conditions we cannot tell, but it is known that some minerals on Earth do emit electrons when subjected to cosmic rays, or just plain sunlight. Some of these minerals are even "common", zinc sulphide for instance.

Assuming rock stratification on the surface of the Moon it is reasonable to suppose that at a few places one particular type of strata may exist; the summit of a wall is the ideal place to find a rare type of rock. This foregoing attempts to explain the light itself; as for the flashing,that is more difficult. Perhaps the mineral, if it exists, stores its internal potential and then releases it in one burst, a condenser effect. The writer, for one, is subject to having his opinion reversed, but who can tell what the cause is? Perhaps it is merely the Moon-men sending up distress rockets, but one thing is certain, it is not an optical effect.

SUMMARY OF WORK ON MERCURY, 1951 - 56

by Owen C. Ranck

Unfortunately, the evening apparition of Mercury in January, 1956 was unfavorable. The total of observations received was two, both from Thomas A. Cragg. The purpose of this article is to give credit to all who have reported during 1953-56. Those who sent drawings are listed here:

Howard G. Allen, Coatesville, Penna., 6"refl.	2 drawings
R. M. Baum, Chester, England	9 drawings
Thomas A. Cragg, Inglewood, Calif., 6" and 12" refls.	8 drawings
Michael Golub, Los Angeles, Calif.	1 drawing
Lyle T. Johnson, La Plata, Md., 10" refl.	2 drawings
Patrick Moore, East Grinstead, Sussex, England, 12" refl.	2 drawings
O. C. Ranck, Milton, Penna., 4" refr. and 3.5" refl.	14 drawings
J. E. Westfall, Oakland, Calif., 4" refr.	3 drawings

Some of these drawings date back before 1953, but I included them for more comparison.

The Cusps. First, comparing O'Toole's and Antoniadi's maps, O'Toole records both cusps as being bright,each one bordered by a dark band, while Antoniadi gives the south cusp as dark, and the north one brighter, but no bounding dark bands such as have been observed by many A.L.P.O. observers. [Antoniadi's map, which has come to be regarded as the standard map of Mercury, may perhaps most readily be found on pg. 193 of Dr. F. L. Whipple's Earth, Moon, and Planets. His nomenclature is the standard nomenclature for Mercury and is followed by Mr. Ranck in this paper. O'Toole's map, drawn for the April, 1950 evening apparition, was published on pg. 5 of the October, 1951 Strolling Astronomer. - Editor.] R. M. Baum as far back as 1951 recorded the south cusp as blunted during the April apparition, but in all other drawings both cusps were sharp. It is very puzzling to understand what condition can take place on such a planet as Mercury so as to cause such a major change. One cannot attribute the change to resolving power since the effect was observed only during the wide crescent phase, and the cusps were sharp when the crescent was narrower. In this set of nine drawings Baum shows Criophori and Phoenicis rather fused as one marking, and Aphrodites and Atlantis are also prominent in Baum's drawings. In no case are the cusps or the limb areas shown brighter than the main portions of the disc. At this same apparition Johnson found two bright areas on the limb, April 6, 1951, $23^h 49^m$, U.T., using 221X and 300X on a 10-inch reflector. These seem to agree with the positions of Argyritis and Helii Prom. Johnson recorded the north cusp bright, bordered by a dark band unnamed on either Antoniadi's or O'Toole's map, and the south cusp dark, bordered by Persephones. This gives somewhat the effect sometimes observed on Venus. Now with the older drawings "out of the way", let us consider how the cusps have been recorded more recently. In no other case do I find either cusp shown blunted at any phase or by any observer. Cragg found the south cusp bright in 1952, only shaded once; while your Recorder found it bright on three occasions, and shaded twice,during the March apparition of 1952. During 1953 Golub saw both cusps the same as the rest of the disc, but bordered by a dark line (as on O'Toole's map), while Ranck found them consistently dark or shaded. Through 1954 this [south?] cusp was reported shaded, while in 1955 the reports were "bright". All drawings of the north cusp follow the same pettern as those of the southern one, mostly bright and small, with about half of the drawings showing an extended shaded area there. It is the opinion

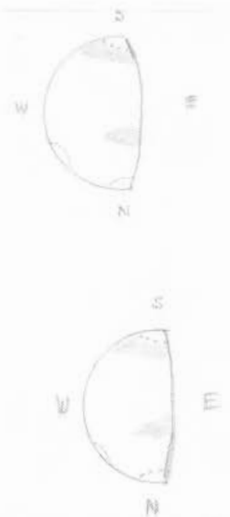

Figure 13. Drawings of Mercury
by Thomas A. Cragg with a 6-inch refl.
Upper: Jan.9,1956,$1^h\ 30^m$, U.T., 104X.
Lower: Jan.10,1956,$1^h\ 35^m$,U.T., 75X.

of the writer that this cannot be caused by frozen deposits building up, and melting, as could be the case on Earth or Mars, and even on Venus if one has an open mind to the subject.

<u>The Bright Areas</u>. The most prominent one through these years seems to have been Argyritis, recorded by Cragg, Johnson, Baum, and Ranck. Next would come Helii Prom., which is visible during the gibbous phase and was seen very small by your Recorder just once at that time. Johnson in 1951 drew a bright area on the southwest limb near the place where Helii Prom. can be seen during the gibbous phase; but Mercury was then a crescent, and Helii Prom. should have been ar ,nd the limb. Johnson must have seen some other, more prominent feature. Cragg recorded a bright streak, which began about the center of the terminator and ran to the west - northwest limb. This is the only record I find of this feature.

<u>The Dark Areas</u>. Here most of the drawings agree fairly well. The rank of the dark marks in the order of decreasing prominence was: Criophori, Persephones, Aphrodites, the dark band around the north cusp (?) , Atlantis, and last of all, Neptuni Vallis. [The comparison here is apparently largely or wholly limited to features visible at evening apparitions.-Editor.] Criophori is shown on about all of the drawings. Cragg saw it as a curved streak on July 1 and 12, 1952. However, all other drawings show this feature as a fairly dark wedge,extending from the terminator. Cragg shows Atlantis (or what I take to be that) and Panos together, somewhat in the shape of a "Syrtis Major" type feature. During the gibbous phase Ranck shows on two drawings Neptuni Vallis, not shown on other drawings. H. G. Allen draws Aphrodites as the most prominent dark feature on the disc.

<u>The Dark Hemisphere</u>. I have not found any hint of any observation of the "night side" of Mercury, as we sometimes see with Venus. Our good friend and Venus Recorder, Dr. Bartlett, told me on two occasions that he had observed the dark side of Mercury. I hope that our Mercury observers will pay particular attention to this matter and will report whenever this feature is observed.

<u>The Terminator</u>. In almost all cases this line has been seen regular by all observers. Cragg recorded it irregular on July 14, 1952. This is the only case I find. There were no "bulges" observed, or brig · "spots" reported in the night hemisphere.

<u>The January, 1956 Apparition</u>. As I stated at the beginning of this little report, I received only two drawings, both from Thomas Cragg. These were made on January 9 and 10, 1956 at $1^h\ 30^m$ and $1^h\ 35^m$, U.T., respectively, with a 6-inch reflector. Mr. Cragg gives the seeing as 2 in both cases on a scale of 0 (worst) to 10 (best). He found both cusps bright, though he recorded these bright areas as very small; and the south cusp was bordered by an extensive shaded area, presumably Persephones as given on Antoniadi's map of Mercury (refer to Figure 13). He records a dark wedge extending from the terminator, about halfway between the mapped positions of Criophori and Aphrodites. By its prominence I presume it to be the former. Due to bad seeing and other conditions, Mr. Cragg reported only one other feature, the bright area Argyritis on the northwest limb (Figure 13).

In closing, I wish to ask all members to make a special effort to observe little Mercury in May, and I will do the same. Besides this, if you are extra ambitious, we will appreciate it if you will take a look at Uranus; and if you find anything there, report to the Uranus-Neptune Recorder, Mr. Leonard Abbey,Jr., 822 S.McDonough St., Decatur, Georgia.

THE VISIBILITY OF THE COMPANION OF SIRIUS IN ORDINARY TELESCOPES

by Chester J. Smith

Next to observing lunar and planetary detail, my most fascinating branch of astronomy is observation of double stars. The reason, I think, which led me into this field is chiefly that there is a challenge to see how well a telescope performs, and also an opportunity to check seeing conditions of the atmosphere itself. Burnham's observation of the companion of Sirius with his 6-inch Alvan Clark refractor when the separation was in the neighborhood of 4.5 seconds of arc always interested me. Having a 6-inch refractor also and with a focal length of 102 inches, I tried several of his most difficult doubles with very good results. The telescope is of my own design and manufacture, and the objective is by Earl C. Witherspoon. The telescope has separated the doubles 33 Pegasi, 78 Pegasi, Tau Cygni, and 1 Delphini with ease under excellent seeing conditions.

Whenever Sirius is in the sky I also always observe him to see whether the companion can be detected. I did so for more than a year without success but was finally rewarded on the night of March 4, 1954 at 10:30 P.M., P.S.T. when Sirius was west of the meridian. Perfect diffraction rings were visible surrounding Sirius, and the eighth magnitude companion was seen. On March 6, 1954, after the meeting of the Eastbay Astronomical Society, five members besides myself tried our luck to see whether we could detect Sirius B. At first there was no sign of it, but after some minutes the companion showed itself to all five members. I rotated the ocular and shifted the telescope to demonstrate to my friends that this image was no ghost but the real thing. All five still agree that they saw the companion. In April of 1955 I again saw the companion and notified the Director of Instruments at Chabot Observatory, where it was also seen with the 20-inch refractor reduced to 14 inches of aperture by the Director, Al Leach, and five members of the Oakland School Department. I have also seen the companion a few times in the early months of 1956.

It does not take any super instrument to show Sirius B but only very good seeing conditions. More observers, I think, would see it if they only took the time to observe more often. I must have observed Sirius 150 times before the companion was first detected. It is not nearly so difficult a double as one might suppose, for I have observed the companion with my 6-inch refractor reduced to 4.5 inches of effective aperture. I think that Tau Cygni, 13 Vulpeculae, and 33 Pegasi put a 6-inch refractor to a much more severe test than does the companion of Sirius. As nearly as I can remember, Sirius B fell on the fifth bright diffraction ring of Sirius A.

Postscript by Editor. First of all, we offer our hearty congratulations to Mr. Smith on a truly outstanding observation. Just how outstanding will perhaps be best appreciated by those who have looked for Sirius B with an aperture of six inches or even somewhat more.

On February 28, 1956 Dr. Hamilton Jeffers of the Lick Observatory wrote Mr. Smith that the "best prediction" assigned to Sirius B in early 1956 a position angle of 105° and a separation of $7''.2$ from its brilliant neighbor. This "best prediction" is from an ephemeris calculated by P. Muller and given in the Journal des Observateurs for December, 1954. We find on pg. 279 of the 1956 A.E.N.A. a separation of 8" and a position angle of 113°, but the latter is a mistake for 103°. The stellar magnitudes are there given as -1.58 and 8.44. Dr. Jeffers states that his last measure of Sirius B was 1953.9 (thus soon before Mr. Smith first recorded this star on March 4, 1954), $116^\circ.5$, $6''.4$, with the Lick 36-inch refractor.

Mr. Frank R. Vaughn, our new Mars Recorder, has confirmed Mr. Smith's observations of the companion of Sirius. He employed a 10-inch reflector with his own mirror and a power of 160X. Mr. Vaughn saw the companion very plainly on January 23, 1956 at $5^h 10^m$, U.T. in extremely bad seeing (0 to 2 on a scale of 0 to 10, with 0 worst and 10 best) and a very clear sky. The separation was estimated at 10"; and a sketch gave a position angle of 110°, both quite without foreknowledge. Mr. Vaughn later confirmed the companion on other dates. He remarks: "I should like to be on record as believing that new and clean optical surfaces are probably responsible for the visibility of Sirius B, rather than aperture, acuity of vision, etc. After all, Sirius is several thousand times brighter than its companion, and a relatively small percentage of scattered light should obliterate it effectively."

We suggest that readers with optically excellent telescopes six inches in aperture and more may find in the companion of Sirius a worthy challenge.

A QUANTITATIVE METHOD FOR DETERMINING AND SPECIFYING ASTRONOMICAL "SEEING"

by William C. Braun

At least for the purposes of the present discussion, let us define the confusion disc of a star, as it appears in the visual telescope, as the image resulting from the integrated effect of the excursions, in the focal plane, of all the images formed by all the "elements of aperture" of the telescope objective. (The term "elements of aperture" is not without its ambiguity, but that its tentative adoption is justified will be evident as the discussion proceeds.)

Now, to measure the diameter of the confusion disc of a star is not easily done by any means with which the writer is acquainted. The method proposed in the present discussion essentially consists of observing and estimating the range of relative motion of two star images formed by two "elements of aperture" of the telescope being used. (The telescope used by the writer is a 6-inch Newtonian reflector of 55 inches focal length. The method of "seeing" evaluation to be described is readily applicable to most telescopes likely to be used by amateur observers, but quite impracticable of application to, say, the 200-inch telescope.)

To provide our "elements", a cardboard mask, which is to be placed over our objective, is prepared. The mask will entirely cover the objective except for two circular holes of 9/10-inch diameter inscribed just inside the edge of the objective and at the extremities of a diameter. (The writer places his mask over the open end of his reflector.)

We proceed to make an observation for "seeing" in the following manner: Without the mask in place direct the telescope to a star of magnitude in the range of first to third (Polaris can sometimes be very conveniently used.) After focussing as critically as possible, with an eyepiece giving about 200 power, place the mask over the aperture. Now the star image will appear as a fairly well-defined disc, of about 5 seconds diameter, and is crossed by a number of sharply defined interference fringes. Next, pull the eyepiece out of focus. Two separate star images, devoid of fringes, will now be seen. If the seeing is not near perfection, these images will be seen to be in relative motion, the extent and rapidity of which is dependent upon the quality of the seeing. Then, while closely observing the motions of the images, carefully readjust the position of the eyepiece until the position is reached where the motions of the images bring them no closer than a bare contact. Now, observe the motions of the images for, say, a half minute, and compare the biggest gap of dark sky between them, that is perceived in the interval of time, with the apparent diameter of one of the discs. In bad seeing this gap will be 5 seconds of arc, or more, and actually is a measure of the diameter of the confusion disc as we have initially defined it. Thus, in the new terminology hereby proposed, one could speak of "2 second seeing", or, "5 second seeing", etc.

If the apertures in the mask are reduced to a diameter of 9/20-inch, the resulting Airy discs will be 10 seconds in diameter. However, observations will have to be restricted to the brightest stars, but there may be a corresponding gain in the sensitivity of the measurements.

It is clear, now, why 9/10-inch and 9/20-inch have been specified as the diameters of the apertures, as it is these apertures which, according to the Dawes limit of resolution, will give Airy discs of 5 and 10 seconds diameter, respectively, making them convenient "yardsticks" for making comparative estimates of size.

It would probably be of interest if experienced observers, who are well acquainted with the conventional "one to ten scale of seeing", would correlate seeing as defined in this discussion with that scale.

Postscript by Editor. Mr. Braun will welcome correspondence, especially from experienced observers, on this method of estimating the "seeing". His address is 225 Willoughby, Las Cruces, N. Mex.

Perhaps some background on the problem of estimating atmospheric "seeing" will be worthwhile for our younger and newer members. The quality of the images of the moon and the planets in our telescopes, and hence the amount of detail that we see upon them, is in part determined by the atmospheric seeing or steadiness. Most planetary and lunar observers estimate this seeing on a scale of zero (worst) to ten (best), apparently learning by experience to base their estimates on the degree of sharpness of the detail. Yet this procedure has the defect that different observers may not make the same numerical estimate of a given degree of seeing, and it is known that differences of two or three units between simultaneous estimates with the same telescope on the same object by different observers may sometimes exist. Also, zero seeing conceived of as the worst possible seeing is a vague and inaccurate idea; nor is ten as the unsurpassable, perfect seeing entirely satisfactory. Thus our zero to ten scale lacks precision at each end. A truly quantitative method of estimating the seeing would thus be welcome, and Mr. Braun has offered us something for profitable and instructive experimentation.

BOOK REVIEWS

The Story of Man and the Stars, by Patrick Moore.
W. W. Norton and Company, New York, 1954, 239 pages. .... $3.95.

Reviewed by J. Russell Smith

Patrick Moore, Secretary of the Lunar Section, British Astronomical Association and co-author with Dr. H. P. Wilkins of the new book entitled The Moon, has given the general reader a fascinating account of man's attempt to fathom the universe.

It is interesting to note that the book is dedicated to one of our ALPO colleagues, Mr. David P. Barcroft, who was a great help to Mr. Walter H. Haas in establishing and developing the ALPO. Mr. Barcroft, an outstanding selenographer, has been honored by a proposal that the name of a crater, formerly known as Dollond B, be changed to Barcroft. Mr. Barcroft, who has built up a rather extensive astronomical library, is now secretary of the ALPO.

Part I, The Past. The author begins with the hazy grey mists of the beginning and rapidly arrives at the point in time where legend and mythology seem to change to true history. This period probably began with King Menes of Egypt about 4000 B.C.

Man wondered about the earth and the heavens but for thousands of years he could do no more than gaze and wonder. Mr. Moore discusses at some length the early beginnings of astronomy in relation to religion, mythology, and superstition; but during the Greek Awakening man came to have a desire to learn, and after the dark ages of science, man began to think. The author continues by discussions related to the influence of Copernicus, Tycho Brahe, and Kepler on the science of astronomy.

With the invention of the telescope and the use of it on the heavens by Galileo, astronomy was beginning to take on a new look.

Part II, The Present. The second part of the volume opens with a general discussion of the great observatories of the world. Our sun and other suns are discussed as well as the island universes. The northern lights, meteors, the moon, and the planets are treated in a general way. This is followed by a consideration of life in other parts of the universe and a review of the flying saucer stories.

Part III, The Future. This part consists of several chapters dealing with space flight, rockets, an artificial satellite for the earth, and some general thoughts about the future of man in the universe.

The book is attractively bound, contains 24 illustrations, and is easy to read. It is rather elementary and would be suitable for the high school student who is interested in the stars.

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The True Book About Worlds Around Us, by Patrick Moore.
Frederick Muller, Ltd., London, 1954. Available from Herbert A. Luft, 42-10 82nd St., Elmhurst, N.Y., 142 pages. ....$1.50.

Reviewed by J. Russell Smith

Mr. Moore, author of a number of excellent books including A Guide to the Planets and A Guide to the Moon, presents a view of the planets in relation to the possibility of life in other parts of the solar system. The book is elementary and quite suitable for the junior astronomer, but it will be found interesting to the adult beginner or anyone else who is interested in the subject of life on the other planets. The author bases his discussion upon information from the leading astronomers of the world. If space travel becomes a reality, everyone will become more interested in life beyond the earth.

The author starts with a review of the origin of life on the earth and considers the fact that animals are dependent on plants for food. After a short discussion of the solar system, the writer considers the conditions necessary for life as we know it. He indicates the narrow range of temperature necessary for life, the dependence upon a suitable atmosphere, the necessity of a solid surfaced planet, and the necessity of a suitable surface gravity.

After a consideration of the conditions on the moon, life as we know it is ruled out on our satellite since the moon lacks sufficient air and the temperature is too hot by day and too cold by night. The author rules out life on Jupiter, Saturn, Uranus, and Neptune because they have large amounts of methane and ammonia gas and the temperature of each must be too low to support life. Pluto is also considered too cold for life to exist.

Mercury could not support life because the side facing the sun is forever too hot, and the opposite side is forever too cold. Venus is described as earthlike in size and weight, but its large amount of carbon dioxide would not allow life as we know it.

Mars, with its seasons similar to those of the earth and its day just one-half hour longer than that of the earth, seems to be the most likely place to find life in the solar system. However, for lack of sufficient oxygen, it seems that the life must be confined to that of the lowly lichens and mosses. The author devotes several pages to a discussion of the canals of Mars but ends with a statement that there is yet much to be explained about them.

The book ends with a short discussion of communication with other worlds, Flying Saucers, and colonies on other worlds.

There are twenty-five sketches by the author, a short reading list, and 12 chapters to be found in this well bound 5" X 7" volume.

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Guide to the Stars, by Hector Macpherson.
Philosophical Library, New York, 1955, 144 pages. ....$2.75.

Reviewed by J. Russell Smith

This volume is the sixth edition, which has been brought up to date, and it contains a new introductory chapter on the history of astronomy. The book is printed in Great Britain for the Philosophical Library. The British astronomer has given the beginner a 140 page book (about 5" X 7") in which he takes the reader through the constellations and other phases of the subject.

Chapter I briefly treats of the history of astronomy by telling of early astronomers, the geocentric theory, the Copernican system, gravitation, and the work of Herschel, and ends with a paragraph on astrology. The author states that it is somewhat surprising that this pseudo-science has shown signs of revival in recent years. That there is still a wide-spread belief in astrology is shown by the continued publication of many astrological "prophesying almanacs", and by the many newspapers which continue to devote space to horoscopes. Dr. Macpherson continues by indicating that even a slight knowledge of astronomy is sufficient to convince us that astrology is a superstition.

Chapter 2 gives an outline of the universe by treating briefly the moon, the sun, the inner and outer planets, the asteroids, meteors, stars, distances and magnitudes of stars, the Galaxy (Milky Way), and the external galaxies. This chapter is an excellent brief presentation of the organization of the universe as seen by present astronomy. Chapter 3 describes the northern constellations and there is a small map of the circumpolar stars at the beginning of the chapter. Chapter 4 describes the stars of winter and presents a small map of the southern sky in winter to aid the beginner. Chapter 5 treats the stars of spring but the author does not give a map of these stars. This is also true of Chapter 6 on the summer stars and Chapter 7, the stars of autumn. Chapter 8 on the southern stars has a small map of the Southern Cross region. This chapter ends with a word about the Magellanic Clouds which were first described by Magellan and named in his honor. Chapter 9, Round the Zodiac, describes the sun's apparent motion, names the zodiacal constellations, describes the moon's phases, motions of planets, and comets and meteors. Chapter 10, Sky Sights, explains eclipses, transits, occultations, the zodiacal light, and the aurora. A page is inserted at the end of this chapter giving the pronounciation of proper names, and this is followed by an adequate index. Following the index there are simple charts of 18 of the principal constellations as well as a Greek alphabet.

In the opinion of the reviewer, the book was intended for one who has no previous knowledge in the subject of astronomy. However, it seems that the book is short on star maps for the purpose of star identification. It is very doubtful that the beginner could, by himself, easily locate many stars and constellations from the maps given in the volume.

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Climate, Vegetation, and Man, by Leonard Hadlow.
Philosophical Library, New York, 1953. 288 pages. ....$4.75.

Reviewed by Donald Lee Cyr

The various facts and theories of climates of the world are presented together with their relationship to vegetation and man. The book itself is very well illustrated and has many excellent half-tone illustrations and clever line drawings.

The various geographical climate regions are described according to latitude. The daily and seasonal variation in climate and other factors which affect climate are explained in a clear manner. In addition to the presentation of elementary subjects, the book contains explanations of a number of local conditions. For example, the chinook winds are explained as follows:

A cold moist wind will ascend when approaching the Rocky Mountains, thereby losing a large portion of its moisture. As the air mass descends on the leeward side of the mountain range, the air mass will be warmed by compression. Since dry air can be warmed more readily than moist air, the resulting "chinook" wind will actually be many degrees warmer than the moist air which originally ascended the mountain range.

The earth is considered as a planet having actual zones of planetary climate.

A polar high pressure area and an equatorial low pressure area almost always exist. In the intermediate latitudes, tradewinds almost always blow. The air circulates from about 30 degrees latitude, to the equator; the air rises and returns at a high level. Somewhat in a reverse manner, air circulates poleward at a high level, descends over the pole and then circulates back toward lower latitudes.

If temperature alone affected air pressure, the polar regions would have high pressure with cold air, and the equatorial regions would have low pressure with warm air. If the earth's rotation alone affected air pressure, the polar regions would have low pressure and the equatorial regions would have high pressure, because of the tendency of the earth's rotation to pile air up on the equator. Since both temperature and the earth's rotation affect pressure, actually the zones of pressure are as follows: equatorial low pressure, 30-degree latitude high pressure, 60-degree latitude low pressure, and 90-degree polar high pressure. Of course this pattern is upset by seasonal effects and by the existence of continents.

A kind of continental breathing is explained to exist in which the continents during the winter receive air at a high level and send air out at a low level. In the summer the circulation is reversed; the air blows into the continents at a low level, is warmed, rises, and then returns at a high level.

Monsoons are explained as an annual variation similar to an onshore breeze during the day and an offshore breeze during the night. A monsoon is the onshore or on-continent breeze during the summer, associated with the low continental pressure zone formed by rising air during the formation of a high pressure zone over the continent, with dry air blowing outward to sea. India and Australia depend largely on the monsoon for moisture and suffer annual drought during the reverse season.

A so-called battle between cold, dense polar air, and warm, light tropical air is aptly described. First the opponents line up, and then the tropical air drives a bulge into the polar air. With the battle in full swing, the polar air tries an encircling attack, and finally is victorious. The polar air rushes in, raising the tropical air mass into a high altitude where it is dispersed.

The effect of climate upon man and vegetation is discussed, beginning with the very cold belt where Eskimos and Lapplanders eke out an existence. In the Arctic region, there is a cold belt characterized by logging operations around the world. The cold temperate belt contains the highly industrialized countries of the world. The warm temperate belt contains the Mediterranean region and the warm continental zones where civilization arose. The hot belt contains the tropical lands which contain as well deserts and monsoon lands.

A number of interesting facts are interspersed to make the book very entertaining. Do you know that -

Grain elevators are nicknamed "prairie cathedrals".
Certain Arctic hot houses exist with electrical warmth generated by windmills.
The tribes of Lapps may be distinguished by the colors of their caps.
The reindeer must be lassoed to be milked.
An eskimo will share caribou meat, but will not share his tea.
The word eskimo means eater of raw meat.
A giraff's tongue can be 18 inches long.
In Britain, a football pitch means a football field.
Cherrapunji in the mountains of Assam is the wettest place on earth. It receives an average of 450 inches of rain a year. In 1861, Cherrapunji was deluged with 905 inches of rain of which 366 inches fell during July.

AN UNUSUAL OPPORTUNITY TO ESTIMATE THE BRIGHTNESSES OF THE SATELLITES OF SATURN

by the Editor

The satellites of Saturn are so much dimmer than the four large satellites of Jupiter that they have never become comparable favorites of the amateur planetarian.

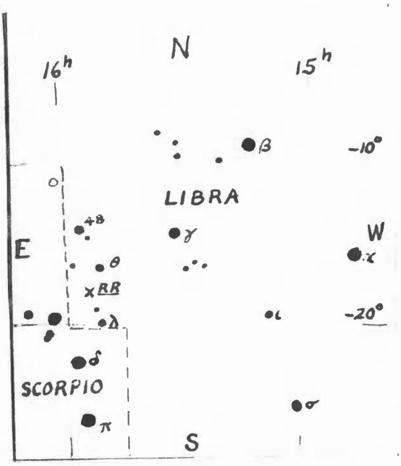
Nevertheless, it can become very interesting to watch these bodies revolve around Saturn, shifting position noticeably from night to night and even from hour to hour for the inner satellites.

Estimates of the brightnesses of the satellites are considered worthwhile, and irregular variations in brightness have been reported. This project is mentioned, for example, on pg. 27 of The British Astronomical Association. Its Nature, Aims, and Methods (often called the B.A.A. Green Book). A severe limitation with brightness estimates of the satellites of Saturn is that usually comparison stars of accurately known stellar magnitudes are not available. Often, then, it is necessary to make step-estimates, assuming, for example, the brightness of Titan, the brightest satellite, to be constant. There will be two times in 1956, however, when Saturn will pass through the region of a variable star, thus affording a splendid opportunity to determine the brightnesses of the satellites by relating them to comparison stars of accurately known stellar magnitudes. Near May 17 and October 4, 1956 the planet will be close to the variable star RR Librae. Each passage through the region of comparison stars will require several days. Since Saturn is at opposition on May 20, one passage will find him very close to opposition, the satellites then naturally being brightest; and in October the planet will be much farther from the earth. We can thus compare the observed differences in the stellar magnitudes of the satellites with the computed ones, which should prove informative and should give an overall check on the accuracy of the work.

The charts on pages 140 and 141 have been very kindly furnished without charge by Mr. Richard W. Hamilton, 15 Fox Hill Lane, Darien, Conn. on behalf of the American Association of Variable Star Observers. We are indeed much indebted to the A. A. V. S. O. for their prompt and generous help with our special project. Readers who might prefer to have charts of their own to use at the telescope can purchase them from Mr. Hamilton for 11 cents apiece. They should obtain both a b chart and a d chart, the latter being of a much smaller region of the sky and showing fainter stars. Figure 14 on pg. 140 was sketched by Mr. Hamilton from an atlas of naked-eye stars and shows the approximate position of RR Librae relative to easily found naked-eye stars. Figure 15 was sketched from the cloth tracing of the A. A. V. S. O b chart. It shows the more immediate vicinity of RR Librae and goes down to fainter stars than does Figure 14. Except for Titan and probably sometimes Iapetus, however, all estimates will have to be made with the help of Figure 16 on pg. 141.

According to Russell, Dugan and Stewart in their Astronomy, the mean opposition stellar magnitudes of the satellites in the order of decreasing brightness are as follows: Titan 8.3, Rhea 10.0, Iapetus 10.1 to 11.9 (brighter west of planet than east of planet), Tethys 10.5, Dione 10.7, Enceladus 11.6, Mimas 12.1, Hyperion 13.0, and Phoebe 14.5. Enceladus is a difficult object for a 6-inch telescope, and Mimas is likely to tax a 12-inch. The visibility of the satellites in 1956 will be adversely affected by light from the widely opened rings, and observers in middle northern latitudes will have the additional handicap that Saturn will be rather low in the sky because of its large southern declination of about -18°. The stellar magnitudes above are intended only as rough guides, and the observer should not expect perfect agreement between them and his own independent estimates. The stellar magnitudes of the satellites necessarily vary with the changing distance of Saturn from the earth and may also vary with position in their orbits (Iapetus very conspicuously so varies).

To identify the different satellites and to avoid confusing them with stars of similar brightness may be a matter of some difficulty since they look exactly like stars in ordinary telescopes. Identification can be effected with the help of the tables on pp. 494-502 of the 1956 American Ephemeris and Nautical Almanac. The chart of the apparent orbits of seven of the satellites on pg. 493 may also prove helpful. The apparent orbit of Iapetus is given on pg. 35 of the 1956 Handbook of the British Astronomical Association. It is not, however, necessary to identify the satellites in order to make useful estimates of their brightness. Each suspected satellite can be temporarily assigned a letter by the observer, and a sketch may then be made to show the location relative to Saturn of each such lettered suspected satellite. Identification will follow later with the help of the Ephemeris, even by someone other than the observer.



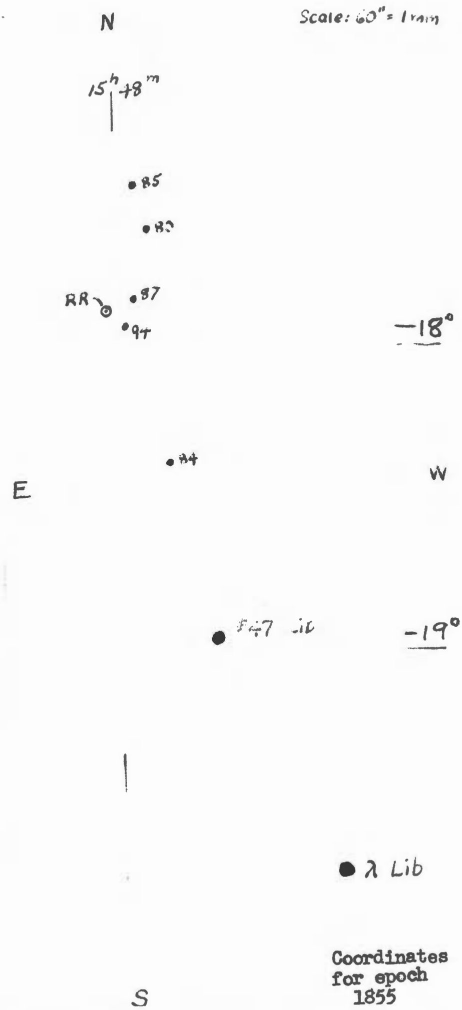


Figure 14 (above). Sketch of Naked-Eye Stars near the Variable Star RR Librae.

Figure 15 (right). Sketch from the Cloth Tracing of the A. A. V. S. O. b Chart of the Variable Star RR Librae.

These two sketches kindly furnished by Mr. Richard W. Hamilton on behalf of the American Association of Variable Star Observers.

The method of making the estimates is probably known to most of our readers. Using Figure 16, we shall find two comparison stars, one brighter than the satellite and one dimmer, or occasionally a comparison star equal to the satellite. The brightness of each comparison star is given on Figure 16 to the tenth of a magnitude, but the decimal point is omitted. The brightness of the satellite is then estimated to the tenth of a magnitude. For example,Titan might be found to be bracketed in brightness by the 8.0 and 8.7 comparison stars but to be a little closer to the 8.7 star. If we decide that it is 4/7 of the way from the 8.0 star to the 8.7 star, we would report its brightness as 8.4. Perhaps Enceladus would fall between the 10.9 and the 11.9 stars. If we decide that it lies 8/10 of the way from the 10.9 star to the 11.9 star, its magnitude is 11.7.

We appeal to A.L.P.O. members to make as many sets of estimates of the brightnesses of the satellites of Saturn as they can while it is near RR Librae. Several sets might be made on each favorable night. The observations should be sent to our Saturn Recorder, Thomas Cragg, 246 W. Beach Ave., Inglewood 3, Calif. There should be reported along with each estimate what comparison stars were used since these have sometimes turned out themselves to be variables.

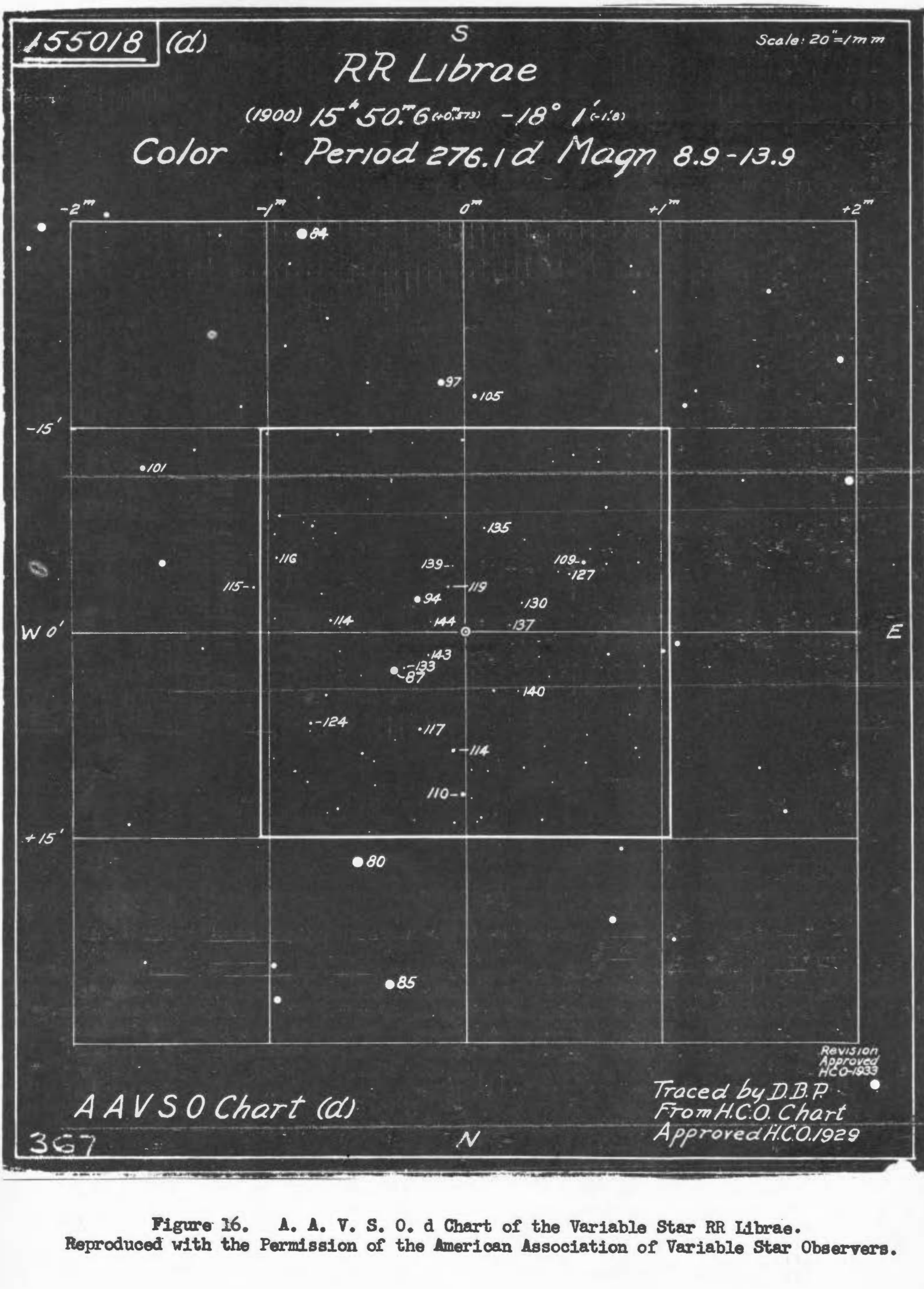


Figure 16. A. A. V. S. O. d Chart of the Variable Star RR Librae. Reproduced with the Permission of the American Association of Variable Star Observers.

Finally, it would seem only ordinary courtesy to repay the A. A. V. S. O.'s assistance to us in this project by making some estimates of the brightness of RR Librae. Once the field is found, the estimate can be made very quickly (one estimate a night will be very adequate). We request each participating observer to estimate RR Librae as part of this project. These estimates of RR Librae will be forwarded to the A. A. V. S. O. if they are sent either to Mr. Cragg at the address above or to the Editor at 1203 N. Alameda Blvd., Las Cruces, N. Mex.; they may also be submitted directly to Mrs. Margaret Mayall, 4 Brattle St., Cambridge 38, Mass.

OBSERVATIONS AND COMMENTS

Concerning Possible Charged Lunar Dust Particles. In letters dated February 23 and March 6, 1956 Mr. Harry C. Stubbs, Milton Academy, Milton, Mass. has made an interesting suggestion, which we should like to pass on to our readers. We quote: "Would it not be possible for fine dust particles[at the lunar surface] to pick up an electric charge, either from the protons known (?) to be coming from the sun or from the relatively unimpeded ultra-violet radiation striking the moon's surface? The former seems a more adequate cause, but I am not qualified to go into that aspect of the matter quantitatively. If such a charge were acquired, it would seem possible that considerable quantities of dust might be suspended above the surface by electrical repulsion: possibly the final discharge and collapse of the 'cloud' might be accomplished by ultra-violet light, or simply by its scattering broadcast over the surface until it reached an area of opposite charge. It seems likely that the surface itself would be a poor enough conductor to maintain a considerable charge difference for reasonable periods of time. A lunar magnetic field, if there is one, would influence strongly the place and energy of arrival of solar particles and might account for any tendency for such phenomena to be seen more often in certain places, such as Plato, than others - though of course observational selection would also contribute to this phase of the matter. If, at any time, an equilibrium were reached for a few days or even a few hours between charging by incoming particles and rate of dissipation of a cloud over the moon's surface, the absorbing band seen in occultations would be explainable, as would the fact that the band is not seen against the dark limb of the moon. [Mr. Stubbs here refers to the dusky band sometimes reported across the face of a planet being occulted at the bright limb of the moon. It has perhaps been chiefly remarked at occultations of Jupiter. Its width has been estimated as several seconds of arc; therefore, if it is due to lunar dust particles, these must lie several miles above the surface of the moon.]

"If this notion has not been presented before, I'd appreciate its being considered by physicists able to look into its quantitative aspects, which I am not qualified to do ....

"I don't suppose observations of the phenomena in question are yet numerous enough to try establishing correlations between them and such things as terrestrial magnetic storms or the presence of large sunspot groups; but if enough material is ever collected, such a study might be fun. To carry the same notion to an extreme, a really large supply of data might ..... give some clue to the lunar magnetic field, which would presumably influence the point of arrival of such solar particles. I am perfectly aware that a great deal more material from the observers is needed before serious discussion of the point is in order, naturally. It seems to be the sort of thing the A.L.P.O. can certainly furnish !"

Mr. Stubbs' charged dust particles may be worth our careful thought as a possible explanation of apparent obscurations of lunar surface markings. These obscurations have been verified by outstanding lunar observers again and again in Plato and elsewhere. They have usually been imputed to local lunar atmospheric veilings, and yet it is most difficult to see how the lunar atmosphere can be even locally dense enough for this purpose. Thus a different interpretation is very welcome.

Gassendi. This splendid ring-plain is on Section XX of the Wilkins map. Drawings have been received from P. M. Hackett with a 10-inch reflector on July 1, 1955 at colongitude 42°.8, from P. W. Budine with a 3.5-inch reflector on August 30, 1955 at colongitude 55°.5, and from Richard Miller with a 4-inch reflector on November 26, December 25, and December 26, 1955 at colongitudes 48°.2, 41°.4, and 63°.4 respectively. Colongitude is the lunar eastern longitude of the sunrise terminator, measured all the way around from 0° to 360°, and indicates the solar lighting of the moon. These views of Gassendi were all early morning ones. Hackett was surprised to find the shadows of two of the west wall peaks to be much lighter than the rest of the west wall shadow. These two peaks lie near the middle of the west wall, and their shadows in Hackett's view reached almost to the central mountains. He suggests that they may have been lightened by sunlight reflected from the west slopes of these central mountains. Perhaps others would like to try to confirm this appearance. Budine and Miller have noted a very dusky area near the north wall, perhaps identical with the triangular wedge of shadow shown on Durrad's splendid drawing on pg. 287 of Goodacre's Moon. Their area is circular, however. Budine remarked a brilliant peak just north of the enclosed triangular area in the east wall of Gassendi. A number of bright spots, probably hills, and ridges were drawn on the floor; but these sketches do not show any of the clefts in Gassendi.

Messala, Geminus, Cleomedes, Vieta, and Burckhardt. The lunar crater Messala, on Section XIII of the Wilkins map, was drawn by Richard Miller with a 4-inch reflector at 130X on December 31, 1955 at colongitude 116°.3, thus soon before sunset. Three small circles in the southwestern part of the floor were of uncertain topographical nature; some observers in the past have shown them as craters, and others have shown them as mounds. The shadows on Miller's drawing suggest that they are mounds. A straight black line a little northwest of the center of the floor may be part of a mapped cleft. Miller found the western half of the floor darker than the eastern half, as if it were not level.

The lunar crater Geminus, on Section XII of the Wilkins map, was drawn by Richard Miller with a 4-inch reflector at 130X on December 31, 1955 at 114°.1. There was an apparent mound in the center of the floor, described by Wilkins and Moore on pg. 199 of their Moon as "a rounded hill with a craterlet on its summit." The west inner wall of Geminus was very white under sunset lighting.

William Weaverling drew Cleomedes and Burckhardt with a 6-inch reflector at 96X on December 31, 1955 at colongitudes 114°.1 and 114°.8 respectively. He apparently recorded in Burkhardt what Goodacre describes on pg. 210 of his Moon as "a large ridge or undercliff at the S.W. end" of the floor. Weaverling drew Vieta (Section XX of Wilkins map) on December 27, 1955 at 64°.1, 6-inch reflector at 96X. He found the northwest rim to be the highest part of the wall, as others have done.

Unusual Appearance in Aristarchus. It is one of the riddles of the moon that from time to time leading observers report unusual or abnormal appearances in areas with which they are thoroughly familiar. Often these appearances are so strange that one wonders whether changing solar lighting can possibly account for them. We here wish to report a good example of such an apparent lunar change witnessed by a very active observer, Dr. James C. Bartlett, Jr. in the crater Aristarchus on August 18, 1954. Figure 17 is the drawing he made at the time. Dr. Bartlett writes in part: "The apparent abnormalities consist of the following:

"(1) The brilliant blue-violet glare, very much resembling the violet fringe seen with very high powers on the bright limb, which affected the crest of the N.W. and W. walls and the outer glacis. In the drawing this is indicated by the letters B V. You will also note, however, that the power used - 150X on a 5-inch - is only 30X to the inch and is therefore moderate. Moreover, no such glare appeared upon the limb; nor did I see it even with 300X.

"(2) The shadow-black streak crossing the floor in the south, labelled σ in the sketch. This is extremely difficult to interpret for the lighting; but was definitely present as given and appeared sensibly black.

"(3) The equally black triangular marks just N. and S. of σ respectively, and a black mark apparently on the crest of the S.W. wall at the beginning of σ.

"(4) The faint presence of only two of the wall bands, marked θ and ι in the sketch.

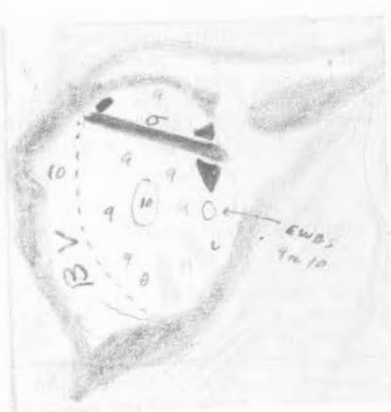


Figure 17. Lunar Crater Aristarchus.
James C. Bartlett, Jr.
August 18, 1954. $4^h 35^m$, U.T.
5-inch reflector. 150X.
Colongitude = $140^\circ.2$

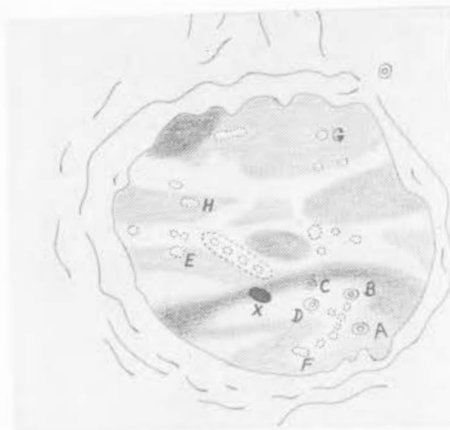


Figure 18. Chart of the Lunar Walled Plain Archimedes by Elmer J. Reese. Based on Visual Observations in 1953 with a 6-inch Reflector and on Mount Wilson Photograph H 8 and Lick Photographs M 3, M 4, and M 6.

"(5) The apparent haziness over the crater - definitely local to Aristarchus - which could not be resolved by any change of focus.

"The spot marked E W B S is the bright spot on the inner east wall which has long been known."

At $140^\circ.2$ it is close to lunar noon on Aristarchus. The Editor has observed this crater near this lighting a number of times and must say that he finds the appearance in Figure 17 exceedingly peculiar. We invite our readers to compare this drawing to other drawings and to photographs near this lighting. Better still, observe the crater at the telescope about four days after full moon.

The numbers on Figure 17 are estimated intensities on a scale of zero (shadows) to ten (most brilliant marks).

Archimedes. Figure 18 is a chart of the dark-floored plain Archimedes by Elmer J. Reese. It should be a convincing example, if any be needed, that good lunar work can be performed with apertures as small as 6 inches. Most of the light streaks on the floor are a continuation of bright rays associated with Autolycus and are best seen under high lighting. The dark spot X was observed by Reese as the most prominent feature on the floor on February 22, 1953 at colongitude $9^\circ.1$ (thus about a day after first quarter). The photographs used in constructing Figure 18 do not show Spot X. We commend highly the method here employed of basing a chart of a lunar region on both drawings and photographs. The eye will still show more than it is possible to photograph, but photographs can provide accurate positions for the coarser marks and needed confirmation of some of the visual detail.

Bullialdus. W. Hartmann made a drawing of this lunar ring with a 2.4-inch Unitron refractor on June 30, 1955 at colongitude $29^\circ.9$. Sunrise shadow covered almost half of the floor. Hartmann noticed a curious grayness of the north inner wall adjacent to this shadow. This portion of the wall is shown to be somewhat hilly on L. F. Ball's drawing at slightly higher lighting opposite pg. 80 in Patrick Moore's Guide to the Moon. Hartmann suggests that his small telescope resolved these hills imperfectly and that there was an integrated effect of grayness from the bright hills and the intervening shadows. The Editor has often seen similar gray slopes under low lighting, and perhaps a similar explanation applies.