The ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

The Strolling Astronomer

VOLUME 8, NUMBERS 11 AND 12 NOVEMBER - DECEMBER, 1954

In This Issue

THE STROLLING ASTRONOMER
1203 North Alameda Street
Las Cruces, New Mexico

ANNOUNCEMENTS

Solar Division Bulletin. We lunarians and planetarians must always have some interest in the sun, upon whose radiation all planetary activities are basically dependent and without whose light we would not even see our favorite celestial bodies. Therefore, we should like to direct attention to the Solar Division Bulletin, published each month by the Solar Division of the A.A.V.S.O. The Editor is Mr. Harry L. Bondy, 43-58 Smart St., Flushing 55, New York. The Bulletin is mimeographed and consists of four to eight pages. Our own Thomas Cragg is a regular contributor. Subjects discussed include current solar activity (including graphs of sunspot-numbers), solar terminology, books and articles of importance to the solar student, a solar cooker recently developed by the National Physical Laboratory of India, and, needless to say, the eclipse on June 30, 1954. We congratulate Mr. Bondy on a helpful and informative Bulletin.

Orb. We acknowledge with pleasure the receipt of a complimentary copy of this "quarterly scientific review" from the Editor, Mr. G.E.B. Stephenson, 124 Duchy Road, Harrogate, Yorkshire, England. Orb is a mimeographed periodical and is written for the amateur. In the issue we have there is an article on photographing minor planets, a table of periods of artificial satellites at different distances from the center of the earth, some notes on current behavior of several famous variable stars, and even a report of a "flying saucer" (published without editorial comment). We think that many of our readers would enjoy Orb.

1955 Astronomical League Convention. The next National Convention of the Astronomical League, of which the A.L.P.O. is an Affiliate Member, will be held at the University of Washington in Seattle, Washington on July 1-4, 1955. A highlight of the gathering will be a visit to the Dominion Astrophysical Observatory at Victoria, British Columbia. The Convention Chairman is Mr. Norman C. Dalke, 3640 Densmore Ave., Seattle 3, Washington. Registration fees of $1.00 ($1.50 after May 1, 1955) may be sent to the Office of Short Courses and Conferences, University of Washington, Seattle 5, Washington. Those wanting a registration and also reservations on the campus should send $5.20 ($5.70 after May 1). There will be the usual astronomical papers and exhibits and, perhaps best of all, the opportunity to meet old friends and to make new ones.

1955 W.A.A. Convention. The Seventh Annual Convention of the Western Amateur Astronomers will be held in Yosemite National Park, California on August 19-21, 1955. The host societies will be the Central Valley Astronomers (Fresno), the Sacramento Valley Astronomical Society, and the Stockton Astronomical Society. There will be a large exhibit including photographs from large observatories, model radio telescopes, and equipment made by or for amateurs. There will be the usual papers and a star party. The Convention Chairman is Mr. Carl W. Anderson, 2581 Avalon Drive, Sacramento 21, Calif. Persons wishing to be put on the mailing list to receive further information should write to Mrs. Arthur S. Leonard, 815 Douglass Ave., Davis, Calif.

Concerning the Pole of Rotation of Venus. What may be the final solution to this long-standing and very vexing problem has been announced by Dr. G. P. Kuiper in The Astrophysical Journal for November, 1954. It is based on a series of daytime photographs of Venus in violet light with the McDonald Observatory 82-inch reflector. These showed alternate bright and dark band-markings nearly perpendicular to the terminator, reminding us of the belts and zones of Jupiter and Saturn and confirming F.E. Ross' 1927 results with the Mount Wilson 60-inch reflector. On the reasonable assumption that the bands are parallel to the equator of Venus and with the help of a globe on which bands were artificially marked, Dr. Kuiper concludes that the plane of the equator of Venus is tilted 32 degrees to the plane of its orbit, with an uncertainty of perhaps two degrees. For the earth this tilt, which causes our seasons, is 23.5 degrees. Dr. Kuiper infers from the stability of the bands that the period of rotation of Venus is a few weeks at most.

We might note that a tip of 32 degrees would mean that the bright cusp-caps seen by many visual observers cannot be centered on the poles of rotation since these will often be a considerable distance from the phase-cusps.

NOTE ON THE 1954 A.L.P.O. MAP OF MARS

by D. P. Avigliano

Twenty-six new names appear on the 1954 A.L.P.O. map of Mars. These were, for the most part, given to features that had been previously seen but that had not previously been named. In cases where different names had been given to the same feature, what appeared to be the most appropriate of these names was chosen. The following is a list of the new names as shown on the 1954 A.L.P.O. map of Mars. Following each name is given the approximate longitude at which the feature may be found on the map.

1. Lex F. (5°)
2. Hydrae S. (30°)
3. Nixis (30°)
4. Clytaemnestrae L. (47°)
5. Nectaris P. (60°)
6. Puls (87°)
7. Por (87°)
8. Ra (93°)
9. Peri F. (95°)
10. Iunonius (115°)
11. Albis L. (140°)
12. Nesis F. (140°)
13. Athos (155°)
14. Eleus (170°)
15. Bidis (180°)
16. Mosa (245°)
17. Nodus Laocoontis (250°)
18. Thoana Palus (250°)
19. Melos (270°)
20. Iseum F. (272°)
21. Ceos (317°)
22. Zeos Po. (324°)
23. Charis (325°)
24. Lysa F. 330°)
25. Elusa F. (337°)
26. Aes F. (356°)

It will be noted that the new name, Charis (No. 23), has been given to the region formerly known as Hellespontus, and that the name, Hellespontus, has been shifted to the lighter central area between the Yaonis Fr. and the above mentioned, Charis. This change was made because the whole area is now generally termed the Hellespontus region and because of this it was thought best to call the most central of these areas, Hellespontus.

The large dark area where the canal, Nectar, enters the Mare Erythraeum has been termed, Nectaris Palus (No. 5).

As the area that has been called, Ara, was not seen as separated from the Hammonis Cornu, the whole deep lighter zone between the Deltoton Sinus and the Sabaeus Sinus has been termed, Hammonis Cornu.

An attempt has been made to give generic terms (such as, Lacus, Fons, etc.) to all of the oases; this too was done to avoid confusing them with the canals. The term, Lucus, used by Lowell in connection with many of the oases has in all cases been changed to the similar word, Lacus. It is suggested that our observers in future reports on Mars use the generic terms when writing about any certain oases.

Note by Editor. We recommend the 1954 A.L.P.O. map of Mars in the highest terms. No student of Mars should be without it. The amount of detail shown compares favorably with the classic maps of Lowell and Antoniadi. The map may be ordered for $1.00 postpaid from Mr. D. P. Avigliano, 678 W. Manzanita, Sierra Madre, Calif.

JUPITER: THE 1953-54 APPARITION

by Robert G. Brookes

Three Interim Reports of the 1953-54 apparition have been published in The Strolling Astronomer (Vol. 7, No. 12; Vol. 8, Nos. 1 & 2 and 9 & 10). These should be read in conjunction with this Report so that the reader may form a more complete picture of Jupiter in 1953-54.

Observers

Jupiter was fairly well observed during the 1953-54 apparition by 26 observers who submitted a total of 395 full disc drawings in addition to a number of satellite and sectional drawings. These drawings have made it possible to form a picture of the general appearance of the Giant Planet during the apparition. However, the lack of transit observations has prevented us from presenting a complete picture of the motions of the various Jovian currents.

There follows below the complete list of observers and the number of full disc drawings submitted by each. Other types of observations will be commented on in the text of the report:

Name	Telescope	No. of Drawings
Leonard B. Abbey, Jr.	6-in. refl.	26
R. M. Adams	$3\frac{1}{4}$ and $4\frac{1}{3}$-in. refrs. 10-in. refl.	18
Howard G. Allen	6-in. refl.	4
D. P. Avigliano	6, 8 and $12\frac{1}{2}$-in. refls.	55
Richard Myer Baum	9-in. refl.	(Setellite Drawings)
Philip W. Budine	$3\frac{1}{2}$-in. refl.	14
Helene Calamaras	6-in. refl.	3
Thomas Cragg	12-in. refl.	3
Charles Cuevas	6-in. refl.	2
Charles M. Cyrus	10-in. refl.	8
Eugene Epstein	10-in. refl.	(Transits)
Edwin J. Gilmore, Jr.	6-in. refl.	12
Alika K. Herring	8-in. refl.	1
Lyle T. Johnson	10-in. refl.	(Photographs)
Kazuyoshi Komoda	8-in. refl.	29
A. C. Larrieu	8-in. refl.	-
Alan P. Lenham	$3\frac{1}{4}$-in. refr. 6 and 9-in. refls.	35
Eugene A. Lizotte	$3\frac{1}{2}$ and 6-in. refls.	19
A. C. Montague	$4\frac{1}{4}$-in. refl.	1
Toshihiko Osawa	6 and 18-in. refls.	19
Edgar M. Paulton	6-in. refl.	1
Owen C. Ranck	4-in. refr.	46
Elmer J. Reese	6-in. refl.	2
J. Russell Smith	8 and 16-in. refls.	1
E. P. Wallner, Jr.	6-in. refl.	2
John E. Westfall	4-in. refr.	94

General Description

The 1953-54 apparition of Jupiter was essentially a quiet one. The conspicuousness of the belts was not so strong as in the previous 1952-53 apparition. Some of the zones appeared brighter than in the previous apparition. Also, there was less activity recorded as taking place on the Giant Planet.

Before we proceed to the description of Jupiter in 1953-54 we will give here, for the benefit of the beginner, the key to the terminology and abbreviations used in this report. Figure 1 is a schematic drawing of Jupiter showing all the main belts and zones that are usually seen, and also the areas of the two systems of longitude are indicated.

The numerical intensity scale used is as follows:

10 - very unusually bright	4 - dusky
9 - extremely bright	3 - dark
8 - very bright	2 - very dark
7 - bright	1 - extremely dark
6 - slightly shaded	0 - black, shadow
5 - dull	

The colors usually seen and their abbreviations are as follows:

White - W
Gray - G
Brown - Br

Yellow - Y
Orange - O
Red - R

Blue - Bl
Ochre - Oc
Reddish-Brown - R-Br

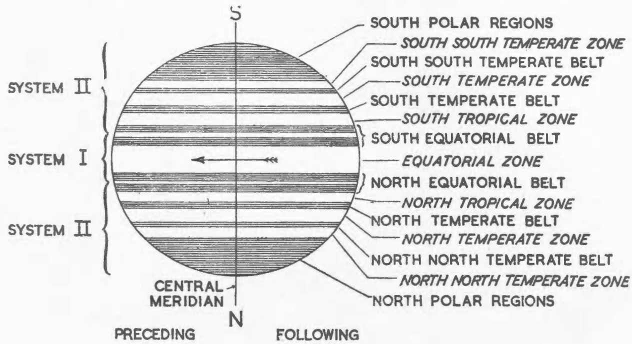


Figure I
Key to Standard Nomenclature of Jovian Belts and Zones

Belts. Table I shows the intensities of the belts as estimated by three of our observers using the numerical scale listed above. Since there was very little change in the intensities of the belts during the apparition we have listed the means for the entire period of each observer's estimates. D. P. Avigliano made a total of 451 estimates during the months of December, 1953 and January-February, 1954. Thirty-seven of the estimates made by Phillip W. Budine during March and April, 1954 were used. Mr. Budine's color estimates are listed along with his intensity estimates. A. P. Lenham made 23 sets of estimates (the exact number of individual estimates is not known) during the period October, 1953 through April, 1954.

Table I. Estimates of Intensities and Colors

Belt or Zone	Avigliano's Estimates no.	Mean	Budine's Estimates no.	Mean	Lenham's Estimates no.	Mean
SPR	27	4.1	-	-	-	5.1
SSTeZ	10	4.9	4	5.6-Y	-	-
SSTB	10	4.1	1	4.0-G	-	4.9
STeZ	27	5.7	4	5.0-Y	-	5.9
STB	27	3.4	4	3.4-Bl-G	-	4.4
STrZ	27	5.8	3	5.2-Y	-	5.9
SEBs	27	4.0			-	4.3
SEB Z*	27	4.6	4	2.8-R-Bl	-	-
SEBn	27	3.1			-	3.2
RSH	4	3.7	-	-	-	-
EZ	27	6.9	4	7.1-W	-	8.0
NEB	27	3.1	4	2.5-R-O	-	2.7
NTrZ	27	6.1	4	5.9-Y	-	6.8
NTB	27	4.5	1	4.0-G	-	4.2
NTeZ	27	5.8	4	5.1-Y	-	5.7
NNTB	17	3.8	-	-	-	4.6
NNTeZ	17	5.4	-	-	-	-
NNNTB	11	4.4	-	-	-	4.5
NNNTeZ	11	4.7	-	-	-	-
NPR	27	4.1	-	-	-	5.2

* The zone between the two South Equatorial Belts.

Table I demonstrates the reliability of the number scale used for estimating intensity adopted by the A.L.P.O. With the exception of two cases - the SEB and the EZ - the estimates of these three observers at widely separated stations were within one whole number of each other. Budine evidently estimated the SEB components and intervening brighter zone as a single, broad belt.

A total of nine main belts was recorded during the apparition; they were in the order of their decreasing conspicuousness: NEB, SEBn, SEBs, STB, NNTB, NTB, NNNTB, SSTB and EB. This order is not in agreement with Table I, but the results of other observers not using the number scale had to be taken into consideration and the above order is the result. Moreover, a thin and dark belt may be less conspicuous than a broader and lighter one.

In addition to the above belts the following "auxiliary" belts were seen: Ranck recorded the SSTB as being a very fine double on May 6, 1954, 0:45 U.T., CM_2 114°. On December 25, 1953 at 18:30 U.T., CM_2 18°, Lenham observed a belt between the SEBs and the STB. Cragg reported the SEBs as being double on two occasions during October and November, 1953 (The Strolling Astronomer, Vol. 7, No.12). The NEB was recorded as being double on a number of occasions. Ranck saw the NEB as being triple on several occasions during April and May, 1954. Lenham saw a belt just north of the NEB (not the NTB) on January 4, 1954, 18:30 U.T., CM_2 213°; and at the same time he observed a belt north of the NNNTB.

The South Temperate Belt. This belt was very dark and broad in some longitudes and very dim and narrow in other longitudes. The following end of the dark section was observed to fluctuate between the longitudes (II) 30° to 80°, approximately; the preceding end of the darker section was not sharply defined and faded gradually into the dimmer section of the belt. Drawings made by K. Komoda depict this phenomenon beautifully; Figure 2 shows the contrast

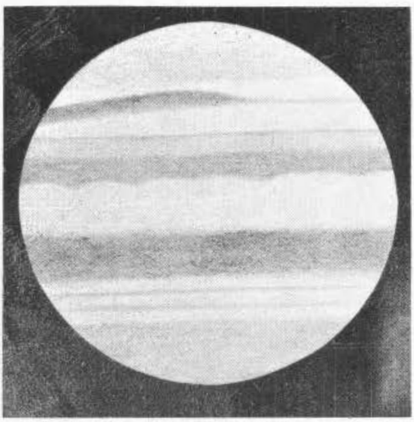


Figure 2. Jupiter.
K. Komoda.
8-inch reflector. 181X.
February 5, 1954.
13 hrs., 50 mins., U.T.
$C.M._1$ = 300°.
$C.M._2$ = 41°.

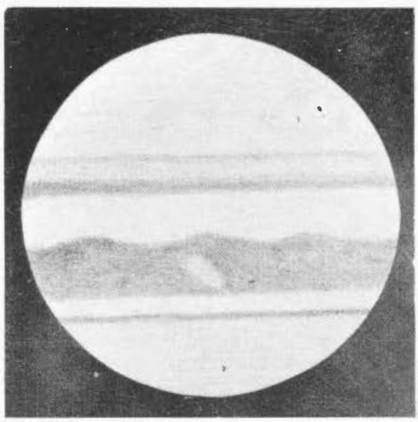


Figure 3. Jupiter.
K. Komoda.
8-inch reflector. 181X.
March 29, 1954.
11 hrs., 27 mins., U.T.
$C.M._1$ = 137°.
$C.M._2$ = 201°.

between the two sections of the STB, and Figure 3 shows the STB area completely blank. These two drawings illustrate very well the extremes displayed by the STB during the apparition. (Figure 2, The Strolling Astronomer, Vol. 8, Nos. 1 & 2 also shows the contrast between the two sections of the STB). At times this belt displayed a complicated structure near the RS area (Figure 4, The Strolling Astronomer, Vol. 8, Nos. 1 & 2). At times the STB was rather dark and conspicuous in all longitudes. The color of this belt was usually recorded as being gray. The gray tone fluctuated from a very light to a very dark gray. The following end of the darker section was recorded by K. Komoda on one occasion (January 7, 1954, 14:10 U.T., CM_2 78°) as being very intense, approximately 1 or 2 on the number scale.

The South Equatorial Belt. The SEB after fading, somewhat, during the early months of the apparition became stabliized and remained the second most conspicuous belt on the planet. This effect was contrary to the expectations of some observers, viz., K. Komoda who had predicted (Tanakami Astronomical Circular Letter, # 1173)that the belt would fade by the summer of 1953 after its rise to prominence following the SEB Disturbance of the 1952-53 apparition. The SEBn was the more intense of the two components; it displayed a number of dark spots that in many instances were connected by festoons to similar spots on the S. edge of the NEB. The SEB, both the components and the space between, was recorded as being rich orange or orange brown in color.

The Equatorial Band. Some observers observed a fully developed belt at this latitude; others observed only fragments of a belt, while others failed to see anything in the EZ that would resemble a belt. The EB has already been discussed in The Strolling Astronomer, Vol. 8, Nos. 1 & 2. This feature was the last belt in the order of conspicuousness and was a faint gray tone in color.

The North Equatorial Belt. This belt remained broad and dark all during the 1953-54 apparition. Dark spots on its south edge were connected at times to similar spots in the SEBn by festoons. Streaks and wisps of a light gray color were seen to extend from some of the dark spots on the S. edge of the NEB to the faint fragments of the EB. The NEB was usually seen as being dark brown and occasionally as having traces of red or deep orange.

The remaining belts and the North and South Polar Regions displayed little or no change and were of a neutral gray color.

Zones. The EZ and the NTrZ were the brightest zones on the Giant Planet during 1953-54. The EZ was bright white containing some light gray wisps extending across the zone from the NEB to the SEBn and from the NEB to the fragments of the EB. The NTrZ and the STeZ were also white. The STrZ was dull and yellow during the first months of the apparition (July to December, 1953); but it brightened somewhat during the later months of the apparition. The rest of the zones were shades of yellow (see Table I). The long-enduring brighter sections of the STeZ are still in existence (see Rotation Periods below and The Strolling Astronomer, Vol. 8, Nos. 1 & 2).

The Red Spot Hollow. The aspect of the RS area has remained that of a Hollow all through the 1953-54 apparition. Reese describes the Hollow as ".... a pale yellowish-white oval completely surrounded by a dark border which touched the STB on the south and the SEBn on the north." The general appearance of the area has remained unchanged since the end of the 1952-53 apparition. Reese comments further about the intensity of the interior of the Hollow: " The interior of the Hollow grew somewhat duller and yellower after January 1, 1954. From July to December (1953) its intensity was about 5.2, while from January to March (1954) its intensity was about 4.4 and its color was a very dull yellow-ochre." Mr. Reese found that the length of the Hollow was 20° and that the surrounding dark border increased its length to 30°. The RSH was centered at longitude (II) 275° at opposition on December 13, 1953, an increase of 6° from the previous opposition. For the appearance of this area see The Strolling Astronomer, Vol. 7, No. 12, Figures 1 and 2, Vol. 8, Nos. 1 & 2, Figure 4, and Figure 4 of this Report.

Figures 5, 6 and 7 will further illustrate the appearance of Jupiter to our observers.

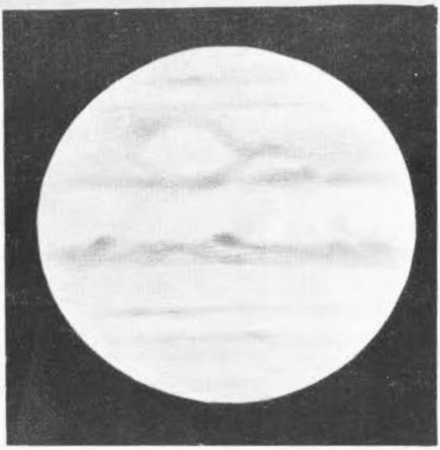


Figure 4. Jupiter.
T. Osawa.
18-inch reflector. 170X.
December 14, 1953.
12 hrs., 15 mins., U.T.
$C.M._1 = 152^{\circ}$.
$C.M._2 = 297^{\circ}$.

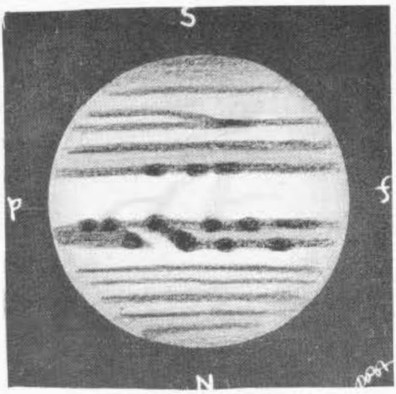


Figure 5. Jupiter. D. P. Avigliano.
Mount Wilson 6-inch refractor. 321X.
April 23, 1954. 4 hrs., 30 mins., U.T.
$C.M._1 = 224^{\circ}$. $C.M._2 = 100^{\circ}$.

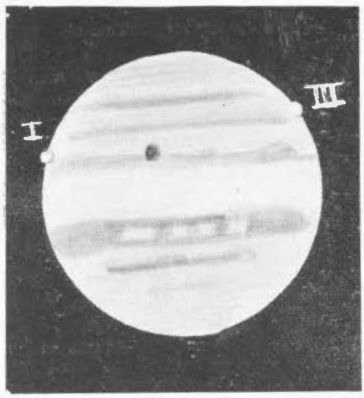


Figure 7

JUPITER
J. E. Westfall
May 6, 1954
03:20U.T.
4"Refr. 180X & 360X.
S - $3\frac{1}{2}$; T - 3.
C.M.(I) 71°(II) 208°.

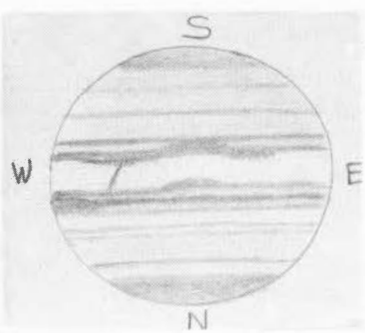


Figure 6. Jupiter.
O.C. Ranck.
4-inch refractor. 180X.
May 22, 1954.
1 hr., 0 mins., U.T.
$C.M._1 = 348^{\circ}$.
$C.M._2 = 4^{\circ}$.

Rotation Periods

(E. J. Reese has taken the Jupiter Section transit records and by incorporating them with his own records - a total of 492 transits, with Mr. Reese contributing the majority of them - he has determined periods for five currents. This section of the Report is entirely the work of Mr. Reese.)

Eight observers contributed a total of 492 transits for the apparition. This number is not nearly enough from which to obtain reliable rotation periods for all the various currents on Jupiter; hence, periods for only five currents have been determined for 1953-54.

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

No.	Mark	Limiting Dates	Limiting L.	L.*	No. Transits	Drift in 30 days
A	Wf	Aug.30 - Feb.10	70° - 322°	1°	10	-19.8°
2	Wf	Jan.19 - Mar. 6	20 - 348	-	4	-20.9
B	Wp	Nov.11 - Feb. 6	94 - 32	71	6	-21.4
C	Wf	Nov.11 - Mar. 6	118 - 36	97	8	-21.4
D	Wp	July 26 - Feb.6	270 - 135	172	6	-20.8
E	Wf	July 26 - Jan.9	292 - 179	198	10	-20.3
F	Wp	Aug.30 - Jan.31	49 - 307	337	6	-19.9

Mean drift in 30 days -20.6

Mean rotation period $9^h\ 55^m 12.^s5$

* Longitude at opposition.

The rotation period of this current has been steadily increasing since 1945 when, according to the observations of W. H. Haas, it was as short as $9^h\ 55^m\ 2^s$. The long-enduring markings in the STeZ are once again identified by the same letters used previously (The Strolling Astronomer, Vol. 8, pp.16, 17).

Red Spot Hollow, System II

RSHp		July 26 - Apr. 25	256° - 268°	265°	20	$+1.3^\circ$
RSHc		July 26 - Apr. 13	267 - 278	275	18	+ 1.3
RSHf		July 26 - Mar. 5	277 - 289	285	20	+ 1.6
D.Border p		Dec. 11 - Apr. 13	260 - 262	260	6	+ 0.5
D.Border f		Oct. 31 - Jan. 31	287 - 294	290	7	+ 2.3

Mean drift in 30 days + 1.4

Mean rotation period $9^h 55^m\ 42.^s5$

S. Tropical Current (STrZ), System II

1	Wf	Sept.17 - Dec.8	190° - 68°	60°	3	-44.7°
2	Wc	Aug. 23 - Nov.4	304 - 304	-	4	0.0

Rotation period no. 1 $9^h 54^m\ 40^s$
Rotation period no. 2 $9^h 55^m\ 41^s$

These two drifts are based on very few transits and are included only because they fit in nicely with the periods found in recent years for the STrZ both preceding and following the Red Spot region (The Strolling Astronomer, Vol. 7, p.130).

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

1	Dc	July 26 - Oct.21	48° - 66°	-	4	$+6.2^\circ$
2	Dc	July 26 - Dec.11	87° - 105	105°	6	+ 3.9
3	Dc	Nov. 15 - Feb.19	244 - 265	250	7	+ 6.6
4	Dc	Sept.30 - Dec. 8	283 - 304	305	7	+ 9.1
5	Dc	Sept.30 - Dec. 8	321 - 331	332	5	+ 4.4

Mean drift in 30 days $+6.0^\circ$
Mean rotation period $9^h 50^m 38^s$

The mean period of $9^h 50^m 38^s$ is longer than any other mean period which has been recorded for this current since the apparition of 1903-04 when the Jupiter Section of the British Astronomical Association obtained $9^h 50^m 49^s$.

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

1	Wc	Jan.23 - Feb.11	126° - 122°	-	4	-6.3°
2	Dc	Jan. 3 - Feb.25	139 - 129	-	10	-5.7
3	Dc	Oct.16 - Dec.11	285 - 270	270°	9	-8.0

Mean drift in 30 days -6.8°
Mean rotation period $9^h 55^m 31^s$.

A very prominent outbreak of three dark and two bright spots was followed by D. P. Avigliano and E. J. Reese during January and February. The spots were located on the north edge of the NEB between longitudes (II) 115° and 150°. These spots were well shown nearing the western limb on a drawing by Avigliano on January 15 (The Strolling Astronomer, Vol.8, p. 8, Fig. 5).

Latitudes

A number of measurements of four of Jupiter's belts were secured by the Recorder from L. T. Johnson's photographs (see below: Photographs). From these measurements the Zenographic latitudes of the edges of the belts were deduced. The means of the results are given in Table II. The latitude of the N. edge of the NEB is rather far north and might be in error because of the difficulty of determing the exact edge of the belt due to the haziness of the photographs. This remark would also apply to the other measurements.

Table II

Zenographic Latitudes

	1953-54 Measures of Photographs (Brookes)		1952-53 Measures of Photographs (Reese)		1952-53 Eye Estimates (G. Ruggieri)	
	No.of Measures	Mean Latitude	No.of Measures	Mean Latitude	No.of Ests.	Mean Latitude
NNNTB	-	-	2	44.6°N.	10	43.8°N.
NNTB	4	38.7°N.	2	36.2 N.	5	33.8 N.
NTB	-	-	2	25.1 N.	10	24.0 N.
NEB-N.edge	10	22.8 N.*	2	14.5 N.	10	14.4 N.
NEB-center	10	15.7 N.	2	10.8 N.	-	-
NEB-S.edge	10	8.7 N.	2	7.0 N.	12	7.1 N.
SEB-N.edge	10	6.3 S.	2	7.7 S.	7	10.0 S.**
SEB-S.edge	10	21.1 S.	2	21.3 S.	13	21.9 S.**
STB-N.edge	4	34.4 S.	2	32.2 S.	-	33.0 S.

*This value is high. A check through the Jupiter Memoirs of the British Astronomical Association revealed that only once was the latitude of the N. edge of the NEB anywhere near the above value. In 1922 the mean latitude of the N. edge of the NEB was given as 22.0°N. During 1953-54 on four occasions the deduced latitudes of the N.edge of the NEB were very high:

August 22, 1953	9:42 U.T.	CM_2 347°	Latitude 24.5° N.
January 27, 1954	3:58 U.T.	132	26.8 N.
February 10, 1954	2:11 U.T.	10	27.5 N.
February 11, 1954	2:17 U.T.	163	24.8 N.

If we leave these values out and find the mean of the six remaining values, the Zenographic latitude for the N. edge of the NEB is 20.8° N.

** Ruggieri's estimates for the centers of the SEB belts.

Table II also gives the Zenographic latitudes of Jupiter's belts in 1952-53 from two sources:

1. The means of Reese's measurements of two photographs, one L. T. Johnson photograph and one Palomar Mountain photograph.

2. The means of Ruggieri's eye estimates.

This information is given chiefly to bring to the reader's attention the "eye method" of estimating the latitudes of Jupiter's belts. The following excerpts are copied verbatim from the Journal of the British Astronomical Association, Vol. 64, No. 7, pp. 293, 294:

> "A belt's latitude can change appreciably in the course of a few apparitions and may not even be stable throughout a single apparition, while even at a particular date it may not be the same in all longitudes, since parts of belts can be sharply curved or slanting. Remembering this, one would not expect a very close correspondence between the mean latitudes for 1952-53 obtained by Ruggieri and those derived in quite a different way by Reese. Their agreement is therefore very striking and inspires great confidence in the correctness of their results.
>
> ....
>
> "The lack of a micrometer need not deter observers with suitable telescopes from estimating belt latitudes and it is hoped that other members of the Section possessing large or medium-sized instruments will try Ruggieri's method of eye-estimation at the telescope. An explanation of the method (based on that in Osservazioni di Giove nell opposizione 1952-53, 4) is given below:
>
> (1) Assuming the width of the E. Z. to be 10 units, the observer estimates in these arbitrary units the widths of all the other zones and belts, paying no regard for the moment to the situation of the centre of the disk.
>
> (2) He then with the greatest accuracy possible estimates the exact position of the centre of the disk in relation to the N. and S. edges of the E. Z., e.g. he might estimate that the centre of the disk was at 4/10 of the distance from the S. edge to the N. edge of the E. Z.
>
> (3) Then as a check the observer calculates the position of the centre from the figures he obtained in observation (1), e.g. if he had found the belts and zones south of the E. Z. gave a total width of 24 units and those north of the E. Z. totalled 22 units, the polar semi-diameter of Jupiter would be $(24 + 10 + 22)/2 = 28$ units, and hence the centre would be 4 units north of the S. edge of the E. Z., which agrees in this example with the figure independently obtained in observation (2).
>
> (4) If the figures for the position of the centre obtained from (2) and (3) differ they should be discarded and the whole process be repeated two or three times if necessary. If the figures agree the distances of all belt centres or edges north or south of the centre of the disk should be calculated as decimals of the polar semi-diameter. Then the latitudes can be calculated from the following

formulae (kindly supplied by Mr. B.M. Peek):

1. Ratio of major to minor axis of Jupiter = 15/14 = 1.0714, the figure required to allow for polar flattening.

2. $\sin\theta$ estimated distance from centre of disk to edge (or centre) of a belt divided by the estimated polar semi-diameter. This gives the value θ for that edge (or the centre) of that belt.

3. $\beta' = \theta + 1.0714\ D$

   D* being the Zenocentric declination of the earth taken from the current Nautical Almanac. This gives the value of β'.

4. $\tan\beta'' = 1.0714 \tan\beta'$.

   This gives the value of β'', which is the required Zenographic latitude."

   *D $= D_{\oplus}$ in the American Ephemeris and Nautical Almanac.

It is hoped that some of our A.L.P.O. members will employ Mr. Ruggieri's method of estimating the latitudes of Jupiter's belts. If the observer is unable to apply the mathematical formulae, he should send the results of his observations to the Recorder, who will then do the calculations.

Photographs

Lyle T. Johnson sent in a series of phtoagraphs that are very good, perhaps not so good as the 1952-53 Jupiter photographs he made; but for a telescope of 10 inches in aperture they are good. There follows below a list of the photographs and Mr. Johnson's comments:

"All photographs were made with a 10-inch modified Gregorian reflector, some directly at the F/18 focus and some with a Gramatzki Barlow lens giving an equivalent focal length of about 500 to 530 inches."

1. August 10, 1953; 11:23-11:25 U.T. CM_1 18.8° - 20.0°, CM_2 46.0°-47.2°. Barlow lens used, ¼ sec. (?) exposure on Super Tomic film. Difficult to distinguish between grain and fine detail.

2. August 12, 1953; 11:42 -11:45 U.T. CM_1 346.1° - 347.9°, CM_2 357.7°-359.5°. Barlow lens used, 1 sec. exposure on Super Tomic film. Several dark spots in SEB and NEB. Apparently some festoons running N.W. to S.E. in EZ.

3. August 16, 1953; 9:26 U.T. CM_1 174.4°, CM_2 156.3°. Barlow lens used, 1 sec. exposure on Micro-File film developed for 2 hours in D-76-F. Festoon in EZ W. of C.M.

4. August 16, 1953; 9:36-9:38 U.T.; CM_1 180.5°-181.7°, CM_2 162.3°-163.5°. Barlow lens used, ½ sec. exposure on Micro-File film developed for 2 hours in D-76-F. Light spot in STeZ. Dark spot N. edge NEB W. of C.M.

5. August 22, 1953; 9:42-9:43 U.T. CM_1 51.0° - 51.6°, CM_2 347.0°-347.6. Barlow lens used, ½ sec. exposure on Super Tomic film. Grain confusing and no fine detail distinguished.

6. August 25, 1953; 9:25-9:28 U.T. CM_1 154.2°-156.0°, CM_2 67.3°-69.1°. Barlow lens used, 2 sec. exposure on Micro-File film developed for 2 hours in D-76-F. Some fine detail visible through streaks of a mechanical nature.

7. August 25, 1953; 9:35 U.T.; CM_1 160.3°, CM_2 73.4°. Barlow lens used, 1 sec. exposure on Micro-File film developed for two hours in D-76-F. Black spot N. edge NEB, E. of CM.

8. September 28, 1953; 10:49-10:53 U.T.; CM_1 173.1°-175.6°, CM_2 186.4°-188.8°. Barlow lens used, ½ sec. exposure on Plus-X film developed in Super Tomic developer. Dark spot in STB, E. of CM.

9. October 10, 1953; 9:47-9:50 U.T.; CM_1 230.5°-232.3°, CM_2 252.6°-254.4°. Barlow lens used, ½ sec. exposure on Super Tomic film. Detail in SEB[spot E. of C.M.] ,NEB [S.edge uneven] and EZ [festoons].

10. January 27, 1954; 3:53 U.T.; CM_1 315.8°, CM_2 128.0°. 1 sec. exposure on Micro-File film, film placed at prime focus, developed in D-11. Apparently some detail in EZ but hard to distinguish from grain.

11. January 27, 1954; 3:59 U.T.; CM_1 319.3°, CM_2 131.5°. 1 sec. exposure on Micro-File film placed at the prime focus, developed in D-11. Considerable small detail visible.

12. February 10, 1954; 2:11-2:12 U.T. CM_1 303.5°-304.1°, CM_2 9.5°-10.1°. ½ sec. exposure on Micro-File film, placed at the prime focus, developed in D-11. There seems to be considerable detail in EZ, NEB and SEB but grain is troublesome.

13. February 11, 1954; 2:17 U.T.; CM_1 105.1°, CM_2 163.4°. ½ sec. exposure on Micro-File film placed at the prime focus, developed in D-11. Apparently best of series this year. Considerable detail repeats again but grain still causes some confusion.

Satellite Phenomena

The general appearance of the satellites has already been discussed in *The Strolling Astronomer*, Vol. 8, Nos. 1 & 2 and 9 & 10. There have been no reports of satellite shadow irregularities this apparition.

Alan P. Lenham submitted a number of satellite magnitude estimates; they are as follows:

Satellite Magnitude Estimates

Date	U.T.	I	II	III	IV
Dec. 12, 1953	19:47	5.3	5.4	5.0*	5.7
Dec. 12, 1953	23:05	5.3	5.4	5.0	5.9
Dec. 25, 1953	17:00	5.3	5.4	5.0	5.9
Dec. 31, 1953	18:15	5.3	5.3	5.5**	5.8
Jan. 3, 1954	18:45	5.3	5.8	5.0	5.6

* III arbitrarily assigned the value 5.0 magnitude.
** III appeared dimmer than usual; thus it was assigned a lower value.

Elmer J. Reese also made a number of satellite magnitude estimates employing two methods. The first assumed I to be constant at 5.5 magnitude; the results of this method are as follows:

Date	U.T.	I	II	III	IV	Remarks
1953						
July 26	8:15	5.5	5.7	5.3	6.1	
Sept.17	7:00	5.5	5.5	4.9	6.0	III Yellow, I-Y, II-W, IV-G.
Sept.30	6:39	5.5	-	5.3	6.1	
Oct. 13	4:00	5.5	5.6	4.9	5.9	III is 0.3 mags. brighter than unidentified star north of Jupiter.
Oct. 31	4:10	5.5	5.3	5.0	5.7	

Date	U.T.	I	II	III	IV	Remarks
1953						
Nov. 3	4:30	-	-	-	-	I & II are close together just west of planet, I is larger, yellower and very slightly brighter than II which is pure white.
Nov.11	5:00	-	-	-	-	III & II are close together west of planet. III is twice as large as II and 0.7 mags. brighter.
Nov.15	3:00	5.5	5.7	5.4	5.9	
Nov.22	4:00	5.5	5.7	5.3	5.9	
Dec. 3	2:35	-	5.7	5.1	5.7	II assumed at mag. 5.7.
Dec. 8	1:10	5.5	5.7	5.1	6.0	IV is 0.6 mags. brighter than unidentified star N. of III.
Dec. 9	0:00	5.5	5.8	5.2	5.9	
Dec. 9	2:10	5.5	5.8	5.2	5.9	
Dec.31	1:00	5.5	5.5	5.5	5.9	
1954						
Jan. 1	23:45	5.5	5.5	5.1	5.8	III & I - Y, II & IV - W.
Jan. 9	0:30	5.5	5.6	5.2	5.9	
Jan.23	0:00	5.5	5.7	5.3	6.1	III - Y-O, I -Y, II -W.
Jan.23	23:45	5.5	5.7	5.1	5.8	
Jan.29	3:25	5.5	5.6	5.0	6.0	IV pale Bl-W, III & I -Y as G5 star, II W. as F5 star.
Jan.31	0:15	5.5	5.8	5.3	6.2	
Feb. 7	23:00	5.5	5.6	5.1	5.9	
Apr.25	0:48	5.5	5.6	5.3	6.1	

The second method Reese used was to compare the magnitude of the satellites to the magnitude of known stars. His results are as follows:

Date	U.T.	Satellite and Estimated Mag.	Comparison Stars and Mag.
1953			
Sept.17	7:00	IV - 6.5	175H' - 6.5
1954			
Jan. 1	23:45	IV - 6.1	108 Tauri - 6.2
Jan. 18	1:00	III - 5.1	Iota Tauri - 4.7 103 Tauri - 5.5
Jan. 18	1:00	IV - 6.2	105 Tauri - 6.0, 330B-6.3 99 - 6.0, 315-B - 6.3

Mr. Reese also made a number of observations of satellite phenomena. These observations are listed by U.T. in the following table. (The terminology used in the column under the heading Phenomenon is the same as in the American Ephemeris and Nautical Almanac. For those who may not have A.E.N.A. the meaning of the notation is as follows: the Roman numerals refer to the satellite observed, Ec - eclipse, Oc - occultation, Sh - shadow, Tr - transit, E - egress, I - ingress, D - disappearance, R - reappearance):

Date	Phenomenon	1st Cont.	2nd Cont.	t_o	t_c	$t_o - t_c$
1953						
Sept.30	II. Ec. R.	6:18.8	-	6:21.0*	6:20.6	+ 0.4
	II. Oc D.	-	6:32.5	6:30.3*	6:32	- 1.7
Oct. 16	II. Tr. E.	8:13.9	8:18.4	8:16.1	8:18	- 1.9
	I. Tr. I.	8:38.1	8:41.4	8:39.7	8:42	- 2.3
Dec. 3	II. Ec. D.	-	3:03.5	3:01.3*	3:02.2	- 0.9
	I. Sh. E.	4:26.9	4:29.5	4:28.2	4:29	- 0.8
	I. Tr. E.	4:42.7	4:46.0	4:44.4	4:45	- 0.6
	III. Ec. D.	-	4:51.2	4:45.3**	4:45.6	- 0.3
Dec.11	I. Oc. R.	-	3:44.7	3:42.8**	3:44	- 1.2

Date	Phenomenon	1st Cont.	2nd Cont.	t_o	t_c	$t_o - t_c$
1954						
Jan. 2	I. Tr. I	-	3:54.8	3:53.0**	3:54	- 1.0
Feb.10	I. Tr. I	1:42.5	1:46.3	1:44.4	1:46	- 1.6
	I. Oc. D.	22:59.5	23:03.5	23:01.5	23:04	- 2.5
Apr.13	I. Tr. I.	0:34.0	0:38.1	0:36.1	0:37	- 0.9

Average	$t_o - t_c$	2nd. Cont. - 1st Cont.
I	$-1^m.4$ (8 obs.)	$3^m.6$ (8 obs.)
II	-1.0 (4 obs.)	4.5 (1 obs.)
III	-0.3 (1 obs.)	11.8 (1 obs,)

t_o time of phenomenon taken as mean of first and second contacts, unless marked:

* time of phenomenon observed directly; i.e., at half phase.
** time of phenomenon obtained by applying ½ of the mean interval between contacts to one observed contact.

t_c time of phenomenon as predicted in A.E.N.A.

I would like to take this occasion to thank each of the 26 observers who contributed to the Jupiter Section of the A.L.P.O. during the 1953-54 apparition. Regardless of the number of observations submitted by each of the observers their helpful interest is very much appreciated. I look forward to a closer association with each of our regular observers during 1954-55, and extend an invitation to everyone to join the ranks of the active observers of Jupiter.

WHY THE "LIGHT" WAS SEEN IN HERODOTUS

by D. W. Rosebrugh

The article "Herodotus - A Light that Failed" in the July-August 1954 issue of The Strolling Astronomer by Dr. James C. Bartlett, Jr., was fascinating. A possible explanation of this phenomenon has occured to me. On Jan. 24, 1955 this note was sent to Dr. Bartlett and he has suggested that it might be worthwhile to submit it to the readers of The Strolling Astronomer for their consideration. There are some features of this explanation which are rather speculative because they involve the rather complicated geometry of multiple reflections from uniformly spaced and oriented crystals about which the writer can only guess, but perhaps some of my fellow lunarians who have had more experience with crystals can fill in the details. On the other hand there may be some fatal flaw in my proposed explanation.

Let us examine the question in a general way. Dr. Bartlett inquires on page 94 "Was I simply deluded after all?" We can answer this in the negative. He also suggests that the spot must have been on the floor. With this we can agree. He raises the question as to whether the spot was self-luminous. It is evidently not self-luminous now, and it seems doubtful whether it was in 1950. Will the spot ever again appear as bright as it was when he saw it? Probably yes, when the conditions with regard to colongitude and especially with regard to the moon's libration both north and south and east and west are as they were on June 27, 1950.

The theory as to the cause of the bright central area can be stated in a few words. What Dr. Bartlett saw was the reflection of a limited portion of the brilliantly illuminated inner side of the east wall of Herodotus as reflected by a field of rock crystals. For various reasons this reflection leaves the moon as a narrow cone of light, like a searchlight beam. Only when this beam of light points straight at the earth can the phenomenon be seen.

Now let us consider the details. It may clarify them to refer to Dr. Bartlett's drawing Figure 7 on page 92 of the July-August 1954 issue. Imagine ourselves on the western side (left in Fig. 7) of the bright central spot. Upon examination we find that it is a circular "lake" of feldspar crystals. Each of the crystals presents several facets protruding above the generally level area of rock but the remainder of each crystal is imbedded in the general mass of underlying feldspar. The reflections from the surfaces of the crystals may be multiple. There is a good deal of shading of each crystal by its neighbors on the north and south so that only light that comes from the east can, as it were, "enter the reflecting system." In effect the crystal faces amount to myriads of little mirror faces each strongly tilted towards the east, though the reflections may be multiple, perhaps like those occurring at the two faces of a roof prism, though in roof prisms the reflections are internal, while in the crystals the reflections are from external surfaces.

It is easy to see why the beam of light which is reflected to the earth is comparatively narrow in an up-and-down dimension (as referred to the moon). First, the brightly lighted inner face of the eastern wall does not appear to be very extended in a vertical direction as we view it from the edge of "Crystal Lake". It is a dozen miles away; and while it half surrounds us as it extends from north through east to south, it is merely a wall of light on the horizon. Hence it cannot send out a very widely dispersed reflection in an up-and-down direction. A second possibility is that perhaps the crystal faces can only receive and transmit a rather narrow beam of light because each crystal partly shades its neighbor both with regard to incident and reflected light. Now we also imagine that the beam of light which is reflected to the earth is comparatively narrow in a sidewise, north-and-south (as referred to the moon), dimension as well. Here the writer is on more speculative ground because of his lack of familiarity with crystalline reflections. However, several causes are possible. First, as above, owing to shadows, reflection angles and so forth, it may be impossible for the field of crystals, as oriented, to accept and reflect light from any portion of the wall except the one limited area towards which the field of crystals is "pointed". Second, the terrain may be such that low ridges on the north and south sides of Crystal Lake may prevent light reaching it from anything but the limited part of the crater wall lying roughly to the east (right on Dr. Bartlett's figure).

We conclude therefore that it is possible that the rays of light reflected by Crystal Lake may leave the moon in a rather slim beam like the rays of a searchlight.

The following general discussion may serve to explain certain seeming difficulties. In his youth the writer spent his summers on the shores of Lake Huron. The coast is quite rocky and there are many feldspar faults, perhaps 30 feet wide and hundreds of feet long in the granite and gneiss surface rocks which form most of the bare rocky shores. These feldspar faults are quite shiny if viewed from a suitable angle, but if viewed from other angles they appear darker than the surrounding rock. Admittedly these faults are far smaller in extent than Crystal Lake which scales at 3 miles in diameter on Dr. Bartlett's sketch, but they do at least suggest that the writer's theory is a possibility.

At one time the writer picked up a small boulder of feldspar. From every direction but one it was a dull, dirty pink, but when held in a certain way it shone like a mirror. It was a little hard to see why; but an examination showed a myriad of tiny facets, all acting like mirrors, all pointing one way. It is the writer's recollection that these crystals shielded each other in part, so that the whole effect was confined to a narrow angle.

When the sun is shining over the eastern wall of Herodotus (from the right on Dr. Bartlett's sketch) at the time of old moon, onto Crystal Lake why do we not see an intensely bright reflected beam of sunlight? Presumably such a beam does exist but the angles are such that this beam passes at each lunation above, or more likely below, the earth. Why does Crystal Lake not seem extremely brilliant when the floor of Herodotus is in full sunshine? The answer is that the sun is beating down on a field of relatively dull pink crystals which are not as light colored as granite except when definite reflections from their crystal surfaces are reaching the eye.

If the phenomenon again becomes visible to any lunarian it might be instructive to try viewing it through a piece of polaroid. If polarization is shown, it would be almost a certain proof that the phenomenon is one of reflection off something of a shiny nature. If the reflections are internal, as they might be in quartz crystals, or if the angle of reflection is not sufficiently glancing there might be little or no polarization, however.

If the writer's explanation should win general acceptance then a suitable name for the area, in which Dr. Bartlett concurs, might be "Crystal Lake".

SOME OBSERVATIONS OF JUPITER IN 1952-53 BY K. KOMODA

by Elmer J. Reese

We have received a notebook containing many excellent observations of Jupiter in 1952-53 from Mr. K. Komoda of Japan. Unfortunately these observations did not arrive in time to be included in our report for that apparition which was published in the September 1953 issue of The Strolling Astronomer. A very brief summary of Mr. Komoda's observations follows:

SEB Disturbance

Prior to mid-October the SEB was very faint or invisible (Figure 8). Numerous drawings show nothing but a barren expanse of whiteness from the NEB to the STB. Such was the case on October 19, 1952 at $15^h 51^m$ U.T. when the longitude (II) of the central meridian was 197°. However on October 24 at $14^h 25^m$ (Figure 10) a very dark spot shaped like a horse-shoe was visible in the latitude of the SEB at 198° (II). This dark disturbance subsequently expanded (Figure 11) and by mid-December the SEB was almost as conspicuous as the NEB in some longitudes (Figure 13). The tiny black spot which Mr. Komoda observed in the SEB at 134° (II) on October 2 (Figure 8) was very probably associated with the secondary disturbance reported by Mr. W. E. Fox in the Journal of the British Astronomical Association, Vol. 63, p. 345. It is especially gratifying to have Mr. Komoda's confirmation of the peculiar distribution of color in the SEB from mid-December to early February (The Strolling Astronomer, Vol. 7, p. 126). The SEB was observed to be cool-gray in color on December 10 at 35° (II) and again on December 12 at 333° (II). (Both of these longitudes were between the Red Spot and the preceding end of the SEB Disturbance.) This belt was described as decidedly warm in color on January 7 at 155° (II) and on February 11 at 1° (II). (Both of these longitudes fall between the preceding end of the disturbance and the longitude of the initial outbreak of the disturbance.)

The Red Spot

Mr. Komoda also found that the aspect of the Red Spot changed remarkably as the SEB disturbance progressed. Early in the apparition he described the Red Spot as a dusky brick-red area of uniform intensity (Figure 9). However, as the SEB became darker, the interior of the Spot became brighter while much dusky material appeared to pile up along the preceding edge of the Spot giving it an unusual appearance (Figure 12). Transit observations on three dates in October make the Red Spot 22° long with its center at 267° (II).

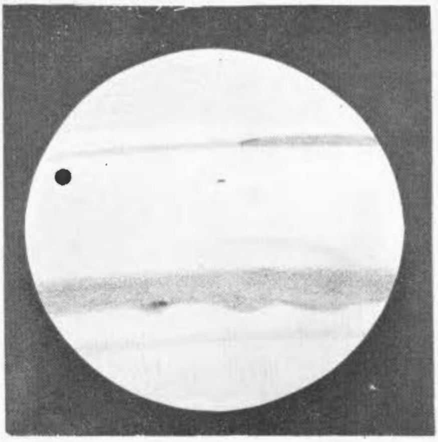


Figure 8. Jupiter. K. Komoda.
8-inch reflector. 203X, 305X.
October 2, 1952.
15 hrs., 7 mins., U.T.
C.M.$_1$ = 247°. C.M.$_2$ = 134°.

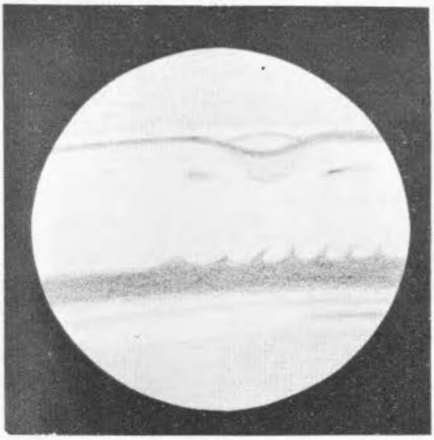


Figure 9. Jupiter. K. Komoda.
8-inch reflector.
October 17, 1952.
15 hrs., 39 mins., U.T.
C.M.$_1$ = 117°. C.M.$_2$ = 249°.

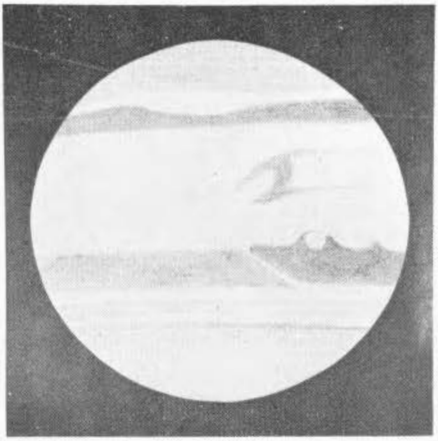


Figure 10. Jupiter. K. Komoda.
8-inch reflector.
October 24, 1952.
14 hrs., 25 mins., U.T.
C.M.$_1$ = 98°. C.M.$_2$ = 177°.

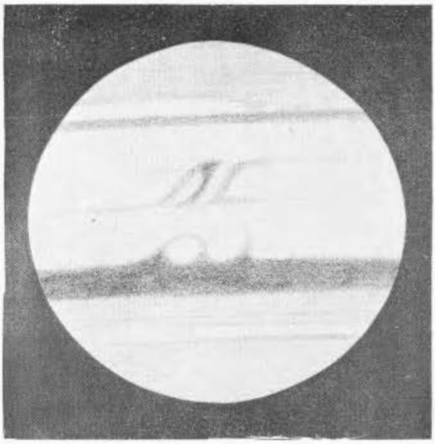
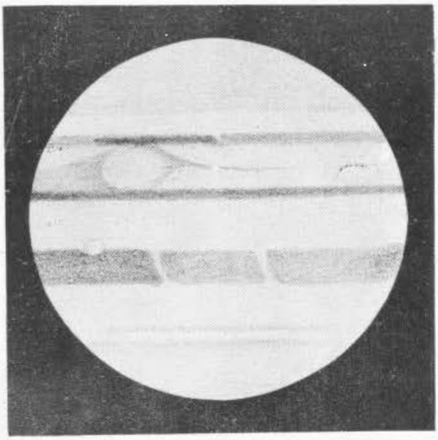


Figure 11. Jupiter. K. Komoda.
8-inch reflector. 203X.
October 29. 1952.
13 hrs., 55 mins., U.T.
C.M.$_1$ = 150°. C.M.$_2$ = 191°.



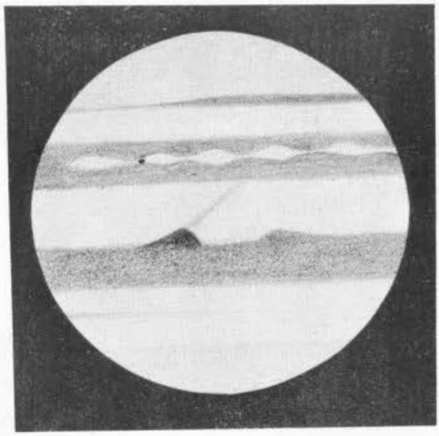


Figure 12. Jupiter. K. Komoda.
8-inch reflector. 203X.
December 14, 1952.
14 hrs., 15 mins., U.T.
$C.M._1 = 230^\circ$. $C.M._2 = 280^\circ$.

Figure 13. Jupiter. K. Komoda.
8-inch reflector. 145X, 203X.
December 23, 1952.
14 hrs., 5 mins., U.T.
$C.M._1 = 205^\circ$. $C.M._2 = 186^\circ$.

COMMENTS CONCERNING CRAGG'S OBSERVATION OF THE RED SPOT ON NOVEMBER 27, 1954

by E. J. Reese

Many of us dream of scrutinizing our favorite celestial object through the eyepiece of one of the world's great telescopes, but for Thomas A. Cragg (our Acting Saturn Recorder) this dream is a reality. We have just received a truly remarkable observation of Jupiter's Red Spot made by Mr. Cragg with the famous 100-inch reflector on Mt. Wilson (Figure 14). This observation is unique in showing two long, thin cloud-like streaks extending in an east-west direction across the Red Spot and visible for considerable distances beyond the boundary of the Spot. The bright streaks were clearly at a higher level in the Jovian atmosphere than either the Red Spot or the bright cloud layers of the

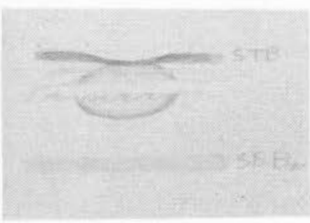


Figure 14. Jupiter. Thomas A. Cragg.
Mt. Wilson 100-inch reflector.
600X (about).
November 27, 1954.
9 hrs., 0 mins., U.T. (about).
$C.M._2 = 232^\circ$ (about).
Date, time, and C.M. uncertain.

South Tropical Zone. In other respects the Red Spot was quite normal. The Red Spot frequently displays very dark condensations at its extreme preceding and following ends. If these dark condensations existed on November 27 they could not be seen because of the overlying cloud.

Would the clouds have been visible in an ordinary sized telescope? If they could have been seen in a small telescope, we must conclude that the clouds were most unusual because no similar features are recorded in the Reports of the British Astronomical Association Jupiter Section from 1912 onward. Many diffuse patches have been seen from time to time apparently obscuring portions of the Red Spot, but never a distinct "stratus cloud" extending all the way across the Spot. W. F. Denning observed a bright east-west streak across the middle of the Red Spot on April 9, 1886; however this streak was apparently an inherent feature of the Spot since it ended abruptly at the dark condensations marking the preceding and following ends of the Spot. If the clouds which Cragg observed could NOT have been seen in a small telescope, then we might presume that such clouds are fairly common but are too delicate to be seen with the apertures usually employed by the planetary observer.

The bow which Cragg observed in the STB along the south border of the Red Spot was probably caused by one of the long-enduring STeZ bright areas (The Strolling Astronomer, Vol.8, p. 16). Our charts show that the bright area, D-E, was in conjunction with the Red Spot on November 27, 1954, both features being at longitude (II) 290°. It is interesting to compare Cragg's drawing with the Mt. Palomar photograph SP-22 which shows the bright STeZ area, F-A, in conjunction with the Red Spot.

Note by Editor. It is unfortunate that Mr. Cragg did not immediately record the date and time of his observation because he made it in an odd moment during the regular programs of the Mount Wilson 100-inch reflector. This information should always be recorded with each and every lunar and planetary observation. However, the date does not differ by more than a day or two from November 27, 1954. It appears quite certain that the feature drawn actually is the Red Spot because we know of no other similar-looking feature on Jupiter present near November 27.

BOOK REVIEWS

by Walter H. Haas

A Guide to The Planets, by Patrick Moore. W. W. Norton and Co., Inc., New York, 1954. 238 pages, 7 color plates, 22 black-and-white plates, 33 figures. . . . . $4. 95.

Mr. Moore has presented us with a worthy successor to his excellent and entertaining A Guide to The Moon. One could scarcely wish for a more genial "guide" in a tour of our Solar System; and it is a great pleasure to find a book about the planets by a regular and outstanding observer of their surfaces. Mr. Moore is the Secretary of the Lunar Section of the British Astronomical Association, a member of the Council of the B.A.A., and a member of the Société Astronomique de France. We are proud to claim him as a member of the A.L.P.O. The well-chosen plates include drawings by British, American, and German observers; and those in natural colors by Mr. L. F. Ball of Mars, Jupiter, and Saturn are truly lovely.

The book opens with a general description of the planets and of theories of the origin of the system from the classic nebula of Laplace down to the modern views of von Weizsäcker. Most of the book is then given over to a description of the planets in turn, going outward from the sun. Mercury, Mr. Moore points out, may well be both the hottest and the coldest planet with one face in eternal sunlight and the other in perpetual night. For the cloud-covered Venus, Mr. Moore proposes two physical pictures: first that of a dusty, lifeless desert world and second, if less probable, that of a humid world with dense vegetation. The earth and the moon are mentioned in their turn. The author favors some kind of volcanic process to explain the origin of the lunar formations and believes that the moon is not so dead and changeless as her morticians have pronounced her. As regards the true aspect of the canals of Mars, Mr. Moore cites the observations at the Pic du Midi with the 24-inch refractor by Dr. Dollfus, who under perfect conditions found the linear features dissolved into a fine structure of spots and patches. There is a delightful chapter on "The Martian Base" of future centuries, if necessarily speculative. Mr. Moore suggests that the first expedition to Mars may be on its way by the year 2100 and that the moon will have been conquered by that time. Indeed, the theme of possible space flight is a recurrent one in the book; and the author thinks that Man is now at the crossroads, with the choice of using his scientific advances either for his own self-destruction or for the great adventure of visiting other worlds. The chapter on Jupiter gives an unusual amount of material about the four large satellites. Unexplained variations in the brightness of Uranus are mentioned, and it is suggested that the surface of this remote planet may really be rather active. Several appendices contain some very useful information for the beginning amateur planetarian, hints about observing, brief descriptions of useful work, and planetary literature.

Mr. Moore is a staunch advocate of very large telescopes for the best results in lunar and planetary work, a preference which this reviewer heartily endorses. It appears significant and convincing that the author's liking for large telescopes rests upon observations by Dr. H. P. Wilkins and himself with the Meudon 33-inch refractor and the Cambridge 25-inch refractor. He has no use for the reduced-aperture stops used by some observers: "I have made extensive lunar and some planetary observations with the Meudon refractor, which was the instrument used by Antoniadi for nearly all his important work; but although the skies of France are not nearly so transparent as those of Arizona, and the Meudon telescope is larger than Lowell's, there has never been any necessity to stop down the aperture" (pg. 61). He further says on pp.61-62: "On March 1, 1953, under excellent atmospheric conditions, I drew Venus first with a 3-inch refractor, and then with my 12½-inch reflector. Two diffuse shadings were seen, just perceptible with the small telescope, but perfectly obvious with the large one. This experiment has been repeated on numerous occasions, and the result is always the same; the genuine features of Venus, the diffuse shadings and nebulous white patches, as well as the occasional deformations of the terminator, are only seen clearly with large apertures under good conditions."

Mr. Moore is more than generous in mentioning the A.L.P.O. We hope that we are worthy of being called on pg. 226 "the nearest American equivalent of the B.A.A." We are naturally honored that material published in The Strolling Astronomer has been useful to our English friend; and it is pleasant to see such names as Bartlett, Cragg, Saheki, and Cave in the pages of A Guide to the Planets.

The style is as fluent as that of a good novel; one really hates to put the book down once he has started it. Little touches such as Legentil's incredible misfortunes in attempting to observe the 1761 and 1769 transits of Venus keep up interest. There are a few inevitable errors, but they do not seriously mar the book.

A Guide to the Planets deserves a place in the library of every serious amateur student of these bodies.

Der Sternenhimmel 1955. Edited by Robert A. Naef, Swiss Astronomical Society. 103 pages, numerous charts and diagrams. H. R. Sauerländer and Co., Aarau, Switzerland. Obtainable in the United States through Mr. Albert J. Phiebig, 545 Fifth Ave., New York 17, New York. Price 6.95 Swiss francs.

"The Starry Sky" is an excellent handbook of astronomical events written in the German language. Even those who read German only with the help of a dictionary can extract some very valuable information from it. The amount of useful material in this booklet is truly remarkable. The general plan is the same as in Der Sternenhimmel 1954 , which was reviewed by Dr. Bartlett in The Strolling Astronomer for January-February 1954. There is listed for each month pertinent data about the sun, the moon, the large planets, the asteroids, meteor showers, and variable stars. Star maps of the visible sky are given for every other month. Unusual events such as a very close conjunction of Jupiter and Uranus on May 10, 1955 and an eclipse of the Algol-type star Epsilon Aurigae expected to begin on May 3, 1955 and to last until May 26, 1957 are pointed out. The solar student will find a diagram showing the apparent paths of sunspots across the disc during each calendar month. The observer of the Zodiacal Light will find statements of the best dates and times to look for this phenomenon. There is a list by constellations of interesting stellar objects, bright stars, double stars, clusters, nebulae, and variables. A two-page explanation of some astronomical terms deserves praise.

Those able to cope with German can find many delightful hours with the help of this outstanding handbook at the telescope and under the starry sky.

OBSERVATIONS AND COMMENTS

"Twilight" in Copernicus. Mr. G. H. Johnstone of Albuquerque, New Mexico has communicated to Dr. Dinsmore Alter, Director of the Griffith Observatory and Planetarium in Los Angeles, an account of a very curious appearance in the famous crater Copernicus. Dr. Alter has kindly forwarded to us a copy of Mr. Johnstone's letter and of his own reply to it. The appearance was apparently seen on November 6, 1954, 2 hrs.-4 hrs., U.T. colongitude 34°.7 to 35°.7. The telescope employed was a 4-inch reflector at 150X. Mr. Johnstone says of Copernicus on that occasion: "The western part, about one-third I would say, of the interior of the crater was pitch black with shadow, then there was a zone about as wide, or perhaps only a fourth of the total width that was distinctly lighter bluish, like twilight, and the shadows of the peaks on the western edge of the rim were clearly seen crossing this bluish shadow area. Then, this area ended sharply, and the far side was bathed in light from the rising sun. The shadows of the peaks were sharply defined across the twilight zone, and the edge of the pitch black shadow was easily defined but not as sharp as the darker shadows crossing the blue twilight zone. I switched to other craters and did not see this condition in any of them that I examined. They all had the abrupt division between black and white that we are accustomed to seeing."

Dr. Alter suggested two possible explanations in writing to Mr. Johnstone. The first is that sunlight was just touching the tops of many small hills or low elevations on the floor, their total effect being to lighten part of the shadow. The second, less likely in Dr. Alter's opinion, is that a very small amount of lunar atmosphere in Copernicus was creating a lunar twilight, the bluish hue according with such atmospheric scattering. The first explanation, it seems to us, would require that the blue semi-shadow should be seen in every lunation when the lighting is just right and for at least the interval of two hours through which Mr. Johnstone observed.

Were any of our readers also watching Copernicus on November 6, 1954; and did they see anything unusual?

A Bluish Bright Spot Near or On the Moon. Mr. Daniel A. Logue, Jr., of Larchmont, Penna. has reported a curious observation on January 5, 1955, 1 hr., 0 mins. - 1 hr., 30 mins., U.T., colongitude 44°.1. He says: "I saw a strange blue light above the surface of the moon where the night and day meet. I observed this light for more than 30 mins.; it did not move. It appeared like a star, in that rays of light came from it." Mr. Logue adds that he at first thought that the object was a star but later decided that it must be on the moon itself. He employed a 6-inch reflector at 340X in good seeing. An accompanying drawing places the blue spot near the rugged southeast limb of the moon, but the Editor is unable to identify the craters drawn. One conjecture is that Mr. Logue saw a very high lunar peak with its summit only in sunlight and detached from the illuminated regions, but the blue color is then left unexplained.

Clavius D. Mr. Howard G. Allen of Coatesville, Penna. has made a special study of this crater, which is readily identified on Section XXIII of the Wilkins map of the moon as the largest crater in the west central part of the floor of the giant walled plain Clavius. Mr. Allen has expressed his results in a map here reproduced as Figure 15. He speaks of it as a very tentative

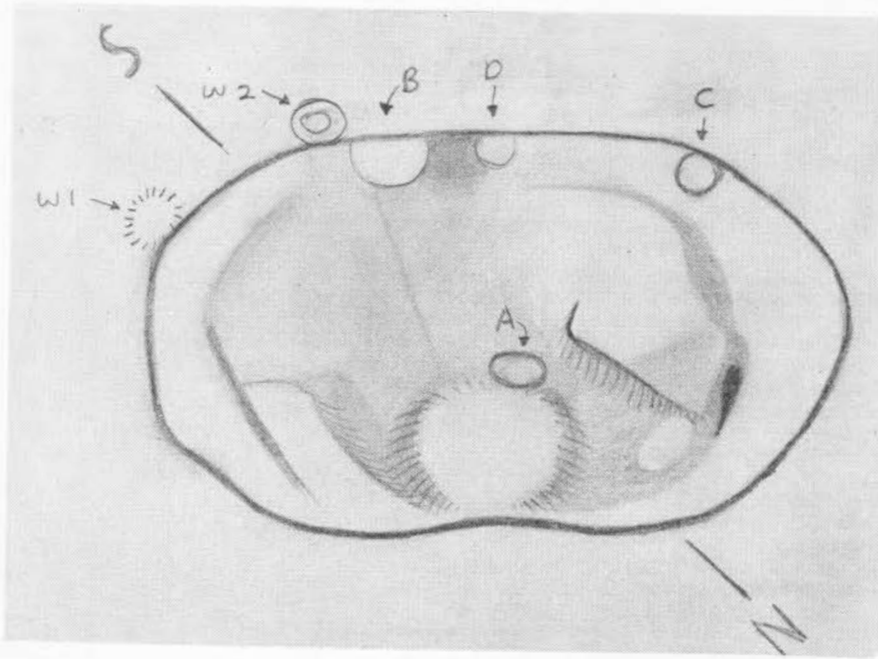


Figure 15. Tentative Map of Clavius D by H. G. Allen. Based on 10 Drawings in 1953 and 1954 with a 6-Inch Reflector, 180X and 300X.

map and as "a map of possibles and probables that combine to make an interesting topographical puzzle" Other A.L.P.O. members may now enjoy confirming or refuting the features shown! Mr. Allen's original objective was to become thoroughly familiar with some sufficiently small lunar crater. Of course, libration plays a large rolè in the appearance of Clavius D because it is near the south limb of the moon. Mr. Allen offers several comments about objects on his map, as follows:

<u>Supposed</u> central elevation, possibly a very low mound.
A - probably a craterlet.
B - probably a craterlet.
C - probably a craterlet and appears to be present on a Mount Wilson photograph.
D - a white spot, possibly a craterlet, also present on the photograph.
W - 1 - shown on the Wilkins map, not observed in this study.
W - 2 - shown on the Wilkins map and seen once as a shadow-filled craterlet under low morning illumination.
A light oval area in the north under morning lighting.
A possible ledge below the terrace in the west.
A marking, seen with evening lighting, east of A and almost certainly a ledge.

<u>Concerning Lunar Domes</u>. Figure 2 on pg. 104 of the July, 1953 <u>Strolling</u>

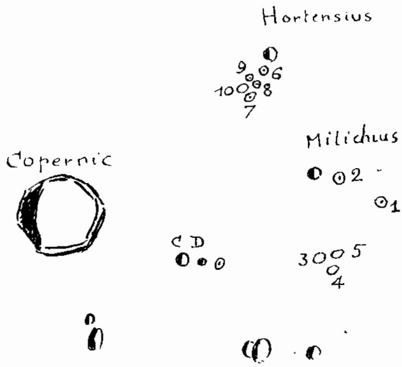


Figure 16.
Sketch by A.C. Larrieu
Showing the Positions
of Lunar Domes near
Copernicus.

Astronomer shows two domes near the crater Arago, one to its north and one to its east. Observing the dome to the north under very low lighting on June 7, 1954 near colongitude 338°.2, Howard G. Allen remarked that this feature looked smooth except for a small hump at the south end of its base, a crater at the north base, and a difficult shadow-filled craterlet in its summit.

Mr. A. C. Larrieu of Marseille, France has contributed the sketch of lunar domes near Copernicus here reproduced as Figure 16. Much of it is taken from a sketch published by Danjon in L'Astronomie in 1923. Observing with the 19-inch refractor at the Strasbourg Observatory, Mr. Danjon found ten domes in this region; they are numbered from 1 to 10 on Figure 16. Numbers 1,2,6,7, 8, and 9 were found to have orifices in their tops. On October 11, 1953 and on May 2, 1954 Mr. Larrieu detected an additional dome just east of C and D on Figure 16, this dome also having a small orifice (or crater) in its top. Mr. Larrieu urges that persons having telescopes of sufficient aperture attempt to confirm the presence of orifices in the eleven domes marked on Figure 16.

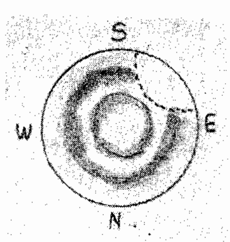


Figure 17. Uranus.
Owen C. Ranck.
4-inch refractor. 240X.
January 8, 1955.
2 hrs.,50 mins., U.T.

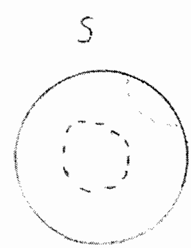


Figure 18. Uranus.
Leonard B. Abbey, Jr.
6-inch reflector. 300X.
January 8, 1955.
3 hrs., 20 mins., U.T.

Uranus. An active program of study of this remote planet is being pursued both by Mr. Owen C. Ranck of Milton, Penna. with a 4-inch refractor and by Mr. Leonard B. Abbey, Jr. of Decatur, Georgia with a 6-inch reflector. These observers have discerned a surprisingly large amount of detail on Uranus with such modest apertures, perhaps in large measure because of the perseverance with which they have observed it. We have on hand 8 drawings by Ranck and 4 drawings by Abbey in December, 1954 and January, 1955. On two occasions they observed independently at almost the same time. One pair of these comparable views is given by Figures 17 and 18. It is very gratifying that the two observers agree on the presence of a bright area near the center of the disc and of another bright area on the southeast limb. (It is the practice of many planetarians to indicate brighter areas by enclosing them with dashed lines.) Indeed, such agreement is very rare in the annals of observations of the small disc of Uranus, only 3".9 in apparent angular diameter on January 8. The bright near-central area is the most persistent feature on the Ranck and Abbey drawings; and it is reasonable to regard it as centered on the pole of Uranus now turned in the roughly approximate direction of the earth. We know that Jupiter and Saturn sometimes show small whitish polar caps. The two almost circular dark bands on Figure 17 may well be belts parallel to the equator of Uranus; they should be less nearly circular, but the exact shape of such small features must be uncertain. A number of bright areas have been drawn on the limb of the planet; Ranck on January 16-17 found two such spots shifted by the rotation of Uranus over an interval of almost three hours, and on other occasions the positions of such spots appeared compatible with the accepted period of rotation of 10 hours and 45 minutes. On January 31 at $0^h 13^m$, U.T., Ranck remarked a bright crescent along the west limb, perhaps a partial view of an Equatorial Zone resembling those of Jupiter and Saturn.

On January 29, 1955 at $2^h 5^m$, U.T., Abbey had the good fortune to observe Uranus with the 30-inch Cassegrain reflector at Agnes Scott College, employing a power of 360X. His drawing shows a heavily shaded northwest limb, a semicircular and very thin dark band on the southeast limb, and a dark line joining the two.

The "Light" in Herodotus. We refer, of course, to the apparent central peak described by Dr. Bartlett in our July-August, 1954 issue. An explanation by means of crystalline reflections is offered by Mr. Rosebrugh elsewhere in this issue. Dr. John M. Sharp of Texas Western College, El Paso, Texas has suggested in a somewhat similar way that polyhedral crystals, such as quartz, may at special times brightly reflect the image of the earth. Dr. Bartlett points out that the earth is a crescent in the lunar sky when the sun is rising upon Herodotus and questions that its reflected image could equal in brightness the brilliantly lit inner wall, as the pseudo-peak does. Even so, it is most interesting that Dr. Sharp and Mr. Rosebrugh should independently have hit upon such similar explanations.

It may be that the seeming peak has a long history. Mr. A. C. Larrieu in writing to Dr. Bartlett quoted from a paper by C. M. Gaudibert in 1887 as follows: "On this floor (Herodotus) which is, perhaps, of a much more recent period than Aristarchus, the eye cannot positively see anything, merely a uniformly dark plain; perhaps, a very faint and fugitive whiteness seems to appear in the center of the cirque; there is here an interesting object to watch."

Alphonsus, Apianus, Playfair Clavius, and Sinus Iridum. Mr. Frank J. Kelly of Binghamton, New York, has contributed a drawing of each of these lunar formations, employing a 4-inch refractor at powers of 132X to 200X. He has compared his drawings to the Wilkins map of the moon - naturally, only after they had been completed. For the most part his drawings show expected aspects, and the amount of detail cannot compare with that recorded with the larger telescopes. However, on October 14, 1953 at colongitude $355^\circ.6$ Mr. Kelly found Apianus much larger than Playfair, although they are similar in size on the Second Edition of the Wilkins map. (Neither do they differ greatly on the Goodacre map.) In the view mentioned Kelly found Playfair deep enough to be full of shadow; the floor of Apianus was about one-half illuminated, and the shadow had a curiously angular shape.