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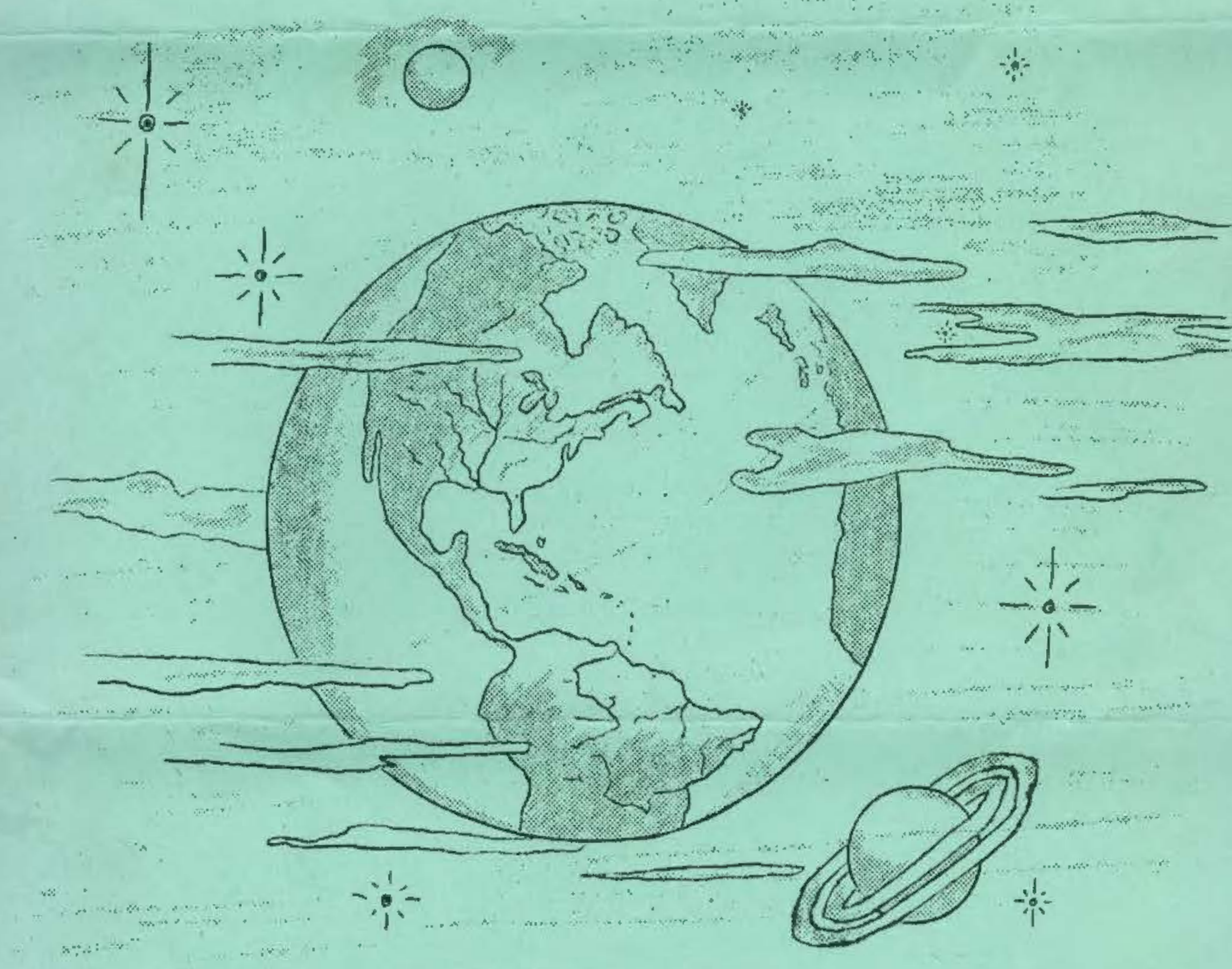

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OBSERVATIONS AND COMMENTS

E. E. Hare has made a number of drawings of the lunar crater Proclus with his 7-inch reflector. These reveal, among other features, a black streak running in a north-south direction the whole length of the floor and located a little east of its center. This streak may be Schmidt's cleft (pg. 218 of Goodacre's <u>Moon</u>); but Hare now thinks that he saw the shadow of a low ridge, or perhaps a fault with a raised west wall. Hare has also seen a deep crater at the southern end of this ridge and another crater at the foot of a v-shaped ravine in the southeast wall. A light streak running up the inside central west wall is the side of a ridge which causes a wrinkle in the crest-line there, Hare reports. His observations have been made with Proclus several days from the sunrise terminator.

Our February and March, 1949, issues contained an article about the walled plain Grimaldi by J. C. Bartlett. T. Cragg was thus impelled to make a drawing of this object with a 6-inch reflector at $5^h 30^m$ on March 14 (Universal Time here and later). The eastern longitude of the sunrise terminator was 83.°4 so that Grimaldi had been in sunlight for about a day. Cragg remarked a long, pointed, bright streak tapering from the north end of Grimaldi to an apex near its middle. He suspected that this streak might be composed of tiny hills and mounds since what appeared to be minute shadows behind hills were observed. Very good definition will doubtless be needed to see the presumed hills distinctly.

The lunar crater Conon has been observed and drawn during the last few months by E. J. Reese (6-inch reflector), E. E. Hare (7-inch reflector), T. Cragg (12-inch refractor, 6-inch reflector), and T.R. Cave (12-inch refractor). Early in the year Reese directed special attention to a very dark streak, which he calls "fault b", visible at the foot of the northwest inner wall between colongitudes 24° and 40°. (Colongitude is the eastern longitude of the sunrise terminator.) He had found apparent temporary obscurations of this streak from time to time. For example, on March 20, 1948, "fault b" was wide and dark but was interrupted by a hazy band just before reaching the shadow of the southwest wall, the colongitude being 26.°3. With the very same conditions of observation on September 13, 1948, at 26.°1 Reese found "fault b" conspicuous, black, and unbroken. Reese therefore proposed that lunarians make special efforts to examine "fault b" each lunation between the colongitudes mentioned above. If several different observers could agree about a changing appearance of the mark, that would constitute <u>far more decisive evidence</u> for a lunar change independent of solar illumination than would the work of one observer alone. On April 8, 1949, at colongitude 26.°7 Reese found "fault b" very conspicuous and unbroken. On April 9 Reese at 39.°4 and Hare at 38.°4 agreed that it was dark and unbroken. On April 10 both observers examined Conon at 50.°5 and found "fault b" continuous, though rather faint. On May 8 near 33° Reese and Hare again found this mark conspicuous and unbroken. On June 6 at 26.°3 Hare observed "fault b" as dark but inconspicuous against a northwest wall almost as dark as itself. He noted a gray streak on the northwest wall "so faint it appeared to fade out just before reaching b" and thus causing no break in b. If the results of the attempted coöperative observing secured so far appear very meager, it is hoped that much more may be achieved if more observers having instruments capable of <u>good</u> definition will concern themselves with this program. In the near future Conon will be suitably illuminated on August 4, August 5, September 3, October 2, and October 3. These are U. T. dates; <u>subtract one</u> to get local civil time evening dates in the United States and Canada.

T. Cragg perhaps enjoyed his best view of Conon with the 12-inch refractor on March 9 at colongitude 21°.7. He perceived two pinnacle-like peaks near the foot of the south inner wall. Cragg says that these were pinnacles "beyond the shadow of a doubt" and that he could have measured their heights with a micrometer, presumably by measuring the lengths of their shadows. Cragg re-observed the peaks under higher lighting on April 9. It is very puzzling that a "preliminary map" of Conon by Reese not only does not show Cragg's pair of peaks but shows a pair of craters near or at their position. Can someone solve the mystery? Cave on April 9 at 41°.3 drew a crater in the center of the floor of Conon and two smaller craterlets or mounds in its west half. If one may judge from the shadows, they were craterlets and not mounds. This central craterlet has not been seen by other observers and should hence be looked for.

At $2^h 37^m$ on May 31 L. T. Johnson observed a bright speck against the moon in his 10-inch reflector at 179X during the course of a survey of the earthlit hemisphere for possible lunar meteors or possible lunar meteoritic impact-flares. The stellar magnitude was estimated to be 9 or 10. The duration of visibility was less than half a second. No color was noticed, nor was there a detectable disc. On a sketch Johnson shows the speck very near the east limb of the moon and at the latitude of the Riccioli dark area. Johnson further notes: "As it [the speck] was of very short duration and my attention was on the center of the field when it appeared, I do not have a good idea of its motion or direction. The motion was less than 15 miles, I believe; and I could not be sure it moved at all. Also, I cannot be sure whether it was just inside the limb, just outside, or right at the limb. [It was] no more than 20 miles either way. Although the speck was faint and of very short duration, I am positive there was something there. Earlier [at $1^h 58^m$] what was apparently a terrestrial telescopic meteor flashed most of the way across the field. It travelled in a northerly direction, was very faint, and was much too fast to be a lunar meteor. It was only visible for an instant and was barely visible against the earthlit moon. The speck observed at the limb could have had a large radial component of velocity." We hope that Mr. Johnson's success will encourage others to examine the earthlit hemisphere as he does. If his May 31 speck was completely stationary and was not outside the limb of the moon, it may have been a meteoritic impact-flare - or a meteor moving precisely along the line of sight.

On pages 6 and 7 of our May issue we spoke of the desirability of Argeländer step-estimates of the relative brightnesses of the satellites of Saturn, where the step or unit is the smallest perceptible difference in brightness. E. E. Hare has communicated the observations listed below, which he made with a 7-inch reflector. These abbreviations are employed for the satellites: T for Titan, R for Rhea, J for Japetus, Te for Tethys, and D for Dione.

Date	Time	Observation	Notes
1949, March 29	$4^h 0^m$	Te 3 D	Both at east elongation
April 14	$4^h 0^m$	T14J8R	R near conjunction. J near west elongation.
April 18	$2^h 0^m$	T 8 J	
April 20	$2^h 40^m$	T8J14R6D	R near west elongation. D at east elongation.

Date	Time	Observation	Notes
1949, April 23	2^h40^m	T 8 J	
April 24	1^h45^m	T12J8R7D7Te	Te just out of eclipse.
May 6	3^h0^m	T18R7J7D3Te	Te near conjunction. J near T.
May 8	2^h30^m	T18R6J1D	J near conjunction.

On two of these dates Haas observed with a 6-inch reflector and with the following results: April 23 at 5^h7^m, T 7J; May 8 at $5^h\ 11^m$, T 13 R (both near west elongation). Mr. Hare opines that amateurs seriously interested in this problem would do well to construct a simple photometer to achieve greater accuracy in the estimates. The editor thinks that two serious sources of error in simple visual estimates are the fact that Titan is often much brighter than any other satellite so that a useful estimate of the intervening number of steps becomes very difficult and the large systematic effect upon the observed brightness of a satellite caused by the illumination of the field by the ball and rings. A photometer can overcome the first difficulty, but the evaluation of the systematic error may be far from easy. A simple comparison suggested to Haas that in May Tethys and Dione were seen about as well at elongation as a star of magnitude 13.0 on a dark sky. If so, the systematic correction was then about two magnitudes at the elongation-distance of these bodies from Saturn and must have been larger closer to their primary. Finally, we want to remind our readers that the slight tilt of the rings during the 1949-50 apparition will reduce one source of background-light and will be favorable to studies of the brightnesses of the satellites.

J. C. Bartlett summarizes his observations of Saturn with a 3.5-inch reflector from April 27 to June 23 as follows: "It would certainly appear that following an earlier appearance of weak color and little activity,heightened color and marked activity in the south hemisphere of Saturn became prominent from April through June. Most noteworthy, perhaps, has been the appearance in this interval of festoons, wisps, and thin pencil-line shadings on the South Tropical Zone and the frequent developments of condensations in both the South Equatorial Belt and the South Temperate Belt [between which the South Tropical Zone lies] , also occasional undulatory outlines of the edges of both polar zone shadings." The South Temperate Zone between the S.T.B. and the shaded South Polar Region was so dusky from May 14 to June 6 as to appear to be a part of this polar shading. At $1^h\ 15^m$ on May 26 the North Tropical Zone looked white to Bartlett, and at $1^h\ 27^m$ on June 4 it was white and perhaps as bright as the Equatorial Zone. Does he here confirm the unusual brightness that Haas attributed to the N. Tr. Z in late May and early June (pg. 9 of Jully issue)? However, Bartlett found the N. Tr. Z. yellow on June 1 and 3. He sometimes, but not always, saw a "blackish inner cap" on the extreme south limb inside the general polar shading. Colors seen by Bartlett include slate-green, gray-green, a nd brownish-gray in the S. P. R.; white, yellow, yellow-orange, and brownish-orange in the zones between the S. P. R. and the S. E. B.; gray in the S. T. B.; and light chocolate and brownish in the S. E. B. The Equatorial Zone was always white except for a pale yellowish tint on June 23. The North Polar Region was usually bluish gray. At $1^h\ 16^m$ on May 14 Bartlett found Saturn so ruddy as to affect its color to the naked eye. "Comparison with Regulus left no doubt of this." Perhaps our readers would find it interesting to compare the color and brightness of Saturn to first magnitude stars of known stellar magnitude and spectral class.

It might be possible to detect or confirm changes in the hue and tone of large areas of the planet in this way.

On pg. 10 of our July issue we reported that Reese, Hare, and Haas found the rings to grow dimmer last spring. Bartlett also concurs and has found both Rings A and B increasingly darker relative to the Equatorial Zone since March 9. Near the first of May each one underwent a change in color, he writes; A altered from a reddish orange tint to grayish or bluish-gray, and B changed from bright yellowish to whitish gray. On July 21 Haas observed the rings to be still rather dim.

Rather poor views of Saturn in June and July suggest that it was undergoing no great changes. The Crape Band remained dark and wide. With a 12-inch reflector on June 24 T. Cragg found Ring C at the ansae to reach about 0.45 of the way from the inner edge of Ring B to the globe. Cragg recorded a bright zone just north of the South Polar Band on June 26 and part of another zone farther north on July 5. With a 12-inch reflector and fairly good seeing on June 30 Cragg perceived within the bright North Polar Cap a thin dark shading or streak on the extreme limb. South of the cap was the usual (for him) broad North North Temperate Belt. We may, of course, hope to see the north polar regions of Saturn better during the 1949-50 apparition. The same observation showed a thin and faint belt just south of the south component of the S. E. B. Cragg finds the north part of the Equatorial Zone still definitely brighter than the south part, with the boundary between them very sinuous. He suspects that the S. E. B. components are closer together than some months ago (because Saturn is more remote?) and that Ring B between its inner edge and the Third Division is a trifly less dusky than before. Cragg and L. T. Johnson could still see the Third Division in June.

A letter from E. J. Reese on June 27 contains the following valuable remarks about "personal equation" in Jupiter central meridian transits: "These large systematic errors may have caused some observers to consider visual transit work impractical. However, it should be stressed that if these systematic errors are known and constant (and there is good evidence that they are constant) they will have no effect on the accuracy of rotation periods determined from transit-positions. In 1948, E. E. Hare and I obtained 17 Jovian transits of the same objects on the same dates. Hare's longitude values are 4°5 greater than mine on the average. After allowance is made for this systematic difference, an average sporadic error of 2°2 remains - this represents an average error of only 3 2/3 minutes in timing a transit. It will be recalled that Maedlow gave a 'possible error' of 2° either way for his micrometric measure of the position of the R. S. H. in 1948 with a 26-inch refractor."

There follow the first Interim Reports from our Jupiter and Venus Recorders. The one about Jupiter is illustrated by the enclosed photographic print, copies of which were very kindly furnished by Mr. Reese. We hope that the four drawings of Jupiter exhibited on it will encourage new observers by demonstrating how much can be seen with ordinary-sized telescopes of good optical quality.

JUPITER IN MAY AND JUNE

by Elmer J. Reese, Acting Jupiter Recorder

The first half of the 1949 apparition of Jupiter has been notable - perhaps remarkable - for striking changes affecting vast areas of the planet's southern hemisphere. The North Equatorial Belt and Equatorial Zone have also been very active. Some of the belts and zones have displayed colors of unusual purity and strength. The Giant Planet is indeed a wonderful and interesting world to study; we can only wish that it were not so low in the sky for observers in north temperate latitudes.

Red Spot and Hollow. The Red Spot, which was very faint in 1947 and quite invisible in 1948, was distinctly seen by E. E. Hare on May 28 (fig. 3) as a dusky pink shading in the southern part of the Hollow. Subsequent to May 7, E. J. Reese regularly saw the Red Spot as an elliptical, orange-ochre stain about 28° long in the S Tr Z. Both observers agree that the Red Spot was in contact with the north edge of the STB. There is some evidence that the Red Spot grew darker while the SEB faded - a normal but unexplained reaction. At best, however, the Red Spot must have been very faint in May since excellent drawings of this region by L. T. Johnson on May 9, 14 and 26 and by T. R. Cave on May 21 show nothing of the Spot but do show a narrow dusky strea in the S Tr Z outlining the following end of the Hollow. It would seem that the Red Spot appears much darker to some eyes than to others, and F. R. Vaughn has suggested that color sensitivity of various eyes may be the variable factor involved (JRASC, vol. 39, no. 10, p. 384).

T. Cragg was very much surprised to find the Hollow very dull and reddish on June 16 when it was about 63° east of the central meridian. With the Hollow about 42° east of the central meridian on June 4, C. B. Stephenson noticed that the Hollow appeared darker than the S Tr Z but lighter than the EZ. Twenty-five intensity estimates by Reese in May and June indicate that the Red Spot and Hollow were darker when near the limb than when near the central meridian; the Hollow, however, was frequently quite bright even when very near the east limb but much duller at equal distances from the west limb. (Here we are referring to that portion of the Hollow not occupied by the Red Spot). It will be noticed that three observers (figs. 1,2,3) agree that the very dark SEBs ends abruptly at the preceding and following ends of the Hollow and is not visibly deflected around the north end of the Hollow. A thin faint belt has been seen near the middle of the S Tr Z in all longitudes except thos occupied by the Hollow.

We have these longitudes (II) for the Red Spot and Hollow:

Observer	Limiting Dates	Object	Prec. End	Center	Fol. End
Hare	May 21-Jun. 22	RSH	222° (5 obs.)	237° (3)	251° (4)
Reese	May 2 -Jun. 24	RSH	221° (9)	235° (11)	249° (11)
Reese	May 9 -Jun. 24	RS	223° (8)	238° (7)	252° (6)

Belts. The NEB was easily the most prominent belt on the planet. The SEB, which was so dark and conspicuous in March and April, has continued to fade. A list of the belts recorded in May arranged in order of decreasing average conspicuousness follows: NEB, SEBs, STB, NNTB, NTB, SEBn, EB, SSTB, SPB, NNNTB, NPB, STrZB, STeZB. A similar list for June follows: NEB, STB, SEBs, NNTB, NTB, SEBn, EB, SSTB, NNNTB, NPB, SPB. Some of the abbreviations used here are arbitrary.

The appearance of the NTB-NNTB region varied greatly in different longitudes and may also have been subject to rapid changes. Thus, with poor seeing on June 15 at CM (II) 25°, Cragg found the NTB clearly visible with a dark condensation a little east of the central meridian. However with fairly good seeing on June 20 at CM (II) 30° he was unable to see either the NTB or the NNTB.

Zones. The Equatorial Zone was dull while the two tropical zones stood out like bright ribbons of light on an otherwise dusky globe. The STrZ was slightly brighter than the NTrZ. The NTeZ was fairly bright for about 120° following the longitude of the Hollow, but elsewhere it was very dull; indeed near longitude (II) 120° it was so very dark that it combined with the NTB and NNTB to form a wide belt which rivaled the SEBs near the end of June. A beautiful drawing by Johnson on June 6 (fig. 4) shows the preceding end of this dark section near 84°. Reese found the following end near 145° on May 30 and near 161° on July 3. It is hoped that enough transit observations of these interesting features will be obtained to enable reliable rotation periods to be determined. At best, the STeZ is very much fainter than it was in 1948. The SEB Interior Zone brightened remarkably. D. O'Toole observed this zone to be fairly bright on June 27 at $11^h\ 30^m$.

Colors. The Equatorial Zone was yellow-ochre to ruddy in color except for some white oval areas along the south edge of the NEB. The tropical zones appeared white to Reese; however Cragg found them to be very prominent when viewed through a yellow filter and concluded that they must be very yellow. A clear yellow hue was seen in the SEB Interior Zone late in June. A deep-brown-red color pervaded the NEB; however, the projections on the south edge of this belt and the Equatorial Band may have been neutral or even slightly bluish! Perhaps the purest color of all was an orange hue frequently seen in the SEBn.

STB Cloud. Mr. E. E. Hare writes in part as follows: "The following end of a darker section of the STB at 189° on May 28 coincides closely with an extrapolation of the preceding end of the 1948 enclosed white cloud (The Strolling Astronomer, vol. 2, no. 10, p. 10). A section 13° long is the lightest part of the belt." Mr. C. B. Stephenson writes: "Observing Jupiter on the morning of June 4 this year I noticed a gap, or markedly lightened area, in the STB very similar in appearance to the one noticed by E. E. Hare last spring. I obtained $9^h\ 32^m$ for the time of transit of the center of the area, or a longitude (II) of 190°. I obtained 80° and 74° for the longitude of its center on August 19 and 26, respectively, a motion of 0°.84 per day. The June 4 object if the same one, has then drifted in decreasing longitude by about 244° since August 26, 1948 or 0°.86 per day. The agreement is close and seems to leave little doubt that this is Hare's feature, still conspicuous and still drifting in decreasing longitude." A splendid drawing by Cragg on June 16 shows the preceding end of this cloud near 172°. The cloud must have been very faint or invisible early in the present apparition. W. H. Haas suggests that the area may have maintained its drift while undetectable below the visible surface of Jupiter.

Another STB Cloud. T. Cragg on June 20 and L. T. Johnson on July 2 observed a conspicuous bright rift or cloud along the middle of the STB near longitude (II) 340°. No other reports of this feature have been received.

Satellite Phenomena. The small black disc on the north edge of the NEB in figures 1 and 2 is the shadow of Jupiter II. On May 26 at 9^h E.E. Hare observed Jupiter III on the central meridian projected against the southern half of the NEB. The satellite's disc was noticeably darker than the NEB but not black. A drawing by Johnson at $9^h 4^m$ on the same date shows the disc of that satellite as a very dark spot in the same position. Mr. Johnson at first thought this dark spot to be the <u>shadow</u> of a satellite! On May 2 at $9^h 20^m$ Reese observed Jupiter IV on the planet's central meridian. The satellite's disc appeared black as shadow with the NNTB tangent to its north edge.

INTERIM REPORT ON VENUS, MAY, JUNE, JULY 1949
by T. R. Cave, Jr., Acting Venus Recorder

Observations of Venus were made by Cragg, White, Stephenson, O'Toole and Cave during May, June and July. Mr. Donald O'Toole observing from Vallejo, California on May 8 at $23^h 30^m$ (U. T. here and later) and using 100X on a $3\frac{1}{2}$" refl. found the size of the Planet's disk to be about 10" in diameter and apparently perfectly circular with no indications of surface detail. Mr. C. B. Stephenson's observation at 16^h on May 10 was described on pg. 6 of the June <u>Strolling Astronomer</u> . O'Toole observed on May 22 at $20^h 15^m$, using his $3\frac{1}{2}$" Refl. in excellent seeing. He found the disk devoid of detail but slightly oval in appearance. Mr. E. K. White observed Venus on June 19 at 20^h (1:00 P.M., M.S.T.) from his observatory in Kimberley,B. C., using his long focus 7" Refl. under apparently good seeing conditions, and obviously excellent transparency. White observed no surface detail, though the image was well defined. He found the Planet readily visible to the naked eye once the location was noted. Mr. T. A. Cragg of Los Angeles, California observed on a number of days during June and July. In late May and early June Cragg noted prominent "Polar Cusp Cap-Bands"; also he find nearly always a broad faint "Equatorial Belt" and thinks that the Polar Bands decrease in intensity with increasing phase. Haas points out that he thinks this is usual during the period of thick phase. On each side of the "Equatorial Belt" a faint zone exists which Cragg feels might be attributed to contrast between the normal whitish color of the general surface of the Planet and the darker texture of the belt. Mr. Cragg has sent five very fine detailed drawings of Venus on various days during June and early July. On June 8, using a six inch refl., 104X,at $3^h 10^m$ he noted a rather intense large white area south from the equatorial zone of the limb, with a less intense smaller white area just to the north on the limb. Rather faint cusp caps are depicted, and some vague darker band detail. Cragg found on June 24 a prominent Equatorial Band with the south cusp appearing more as a band than on previous drawings. At this observation he felt that a rather intense amount of activity was occurring in the north temperate region of the disk. On June 28 at 3^h he found the state of the clouded disk to be rather quiescent with an interesting amount of vague detail in a high southern latitude zone. On June 29, $3^h 20^m$, Cragg found a striking similarity of detail with the June 24 observation. The detail was somewhat displaced to the south; but with the exception of a large very white area on the south terminator, the details were as seen on the 24th but shifted some degrees to the south. Cragg explains this in part by this analysis: "If the planet is rotating at a rate exceeding 24 hours by not too great an amount, the June 28 observation would have probably been made when the disturbed area was on the other side of the planet." He feels that the details were not the same. However, the Recorder finds the striking similarity of detail indicates the poles of the planet to be at a considerably different position than at the cusps. Cragg suggests that one pole may lie not far from the visible center of the disk. On July 5 at $3^h 25^m$ Cragg made his last observation of this series on which some of the detail seen on June 24, 28 and 29 remains in good position. Cragg then stated: "The big question remains; are these details the same or are they not? Past experience with the transitory manner in which Venus usually presents its detail seems to want to make one believe that the two areas are not one and the same."

The Recorder feels that Cragg may have something significant and that a more complete study is here desirable either, of course, of this same detail or possibly of another similar; but more complete series should be undertaken by one of the excellent observers in the A. L. P. O. The Recorder observed the planet on July 10 at $1^h\ 10^m$, using an eight-inch Refl. and 200X. He found the terminator easily distinguished from the limb, a slight suspicion of detail in the form of one very vague area of considerable size near the southern portion of the terminator and somewhat darker in intensity than the rest of the disk, and also a small and slightly lighter area near the north cusp.

At present Venus is a rather difficult object to observe, still near the Sun and very gibbous. The diameter of the disk is slowly expanding but is still rather small. It is at this time, however, that observational work is of the greatest importance, as with all other objects for astronomical observation; for as the object becomes less difficult to do work on, the more work is done. Venus should be observed during the next few months by all planetary observers who find it possible to do so. Remember, absence of detail may be just as significant as observed details.

THE LUNAR ECLIPSE OF APRIL 13, 1949

by Walter H. Haas
(continued from July issue)

ON RESULTS OF LUNAR METEOR SEARCHES

If Haas' estimate that his speck was of stellar magnitude 11 is correct and if the limiting magnitudes in the table above are also correct, then the failure of most other observers to see his object is explained. The only others watching at $4^h\ 28^m$ and seeing faint enough objects to be able to note this one are Tisdale and Bridgen or Douglas. These two colleagues did not see the Haas speck. If the suspected specks near $3^h\ 57^m$ and $3^h\ 53^m$ are real, the chances for confirmation would be much better; six observers were then watching with a sufficiently dim limiting magnitude, not counting those who suspected the specks. However, the six saw nothing.

One interpretation of this lack of confirmation is that the specks are illusions. However, it appears difficult to apply this argument to all of the growing number of specks seen outside of eclipses. Another possibility is that one has terrestrial meteors, which are naturally not seen against the moon at both of two widely separated stations. A third interpretation is that coverage of the moon in such searches is really incomplete. The observer having no clock-drive knows that he loses time from watching when he moves the telescope to follow the moon, but it may also well be that bright specks visible against the moon within the field of view are often overlooked even when there is a good drive. This possibility gains likelihood from experience with naked-eye observations of ordinary shooting stars, surely a close analogy. It has been found that meteors within the section of sky watched by a given observer do sometimes go unseen and that a large number of observers would be needed to give complete coverage of the whole sky.

At any rate I hope that many observers will make careful surveys of the moon for possible lunar meteors or impact-flares during the total lunar eclipse on October 6-7, 1949. It would be especially good if some large apertures could be devoted to this problem. Perhaps better skies than we had last April will allow the obtaining of more data and hence the reaching of some conclusions. If two or more well-separated observers should see the same object in the same place on the moon at the same time, that would constitute conclusive evidence that one is dealing with an object near the surface of the moon and not in the earth's atmosphere. Otherwise, arguments for lunar meteors rest upon statistical considerations only.

POSSIBLE ECLIPSE-CAUSED CHANGES

Another principal observational program consisted of the careful examination of a few selected lunar regions for possible changes in appearance caused by the umbra's passage. Observers participating in this program are D. P. Barcroft with a 10-inch reflector, P. D. Bevis with a 10-inch reflector T. R. Cave with a 6-inch reflector, T. Cragg with a 10-inch reflector, P. F. Froeschner with a 10-inch reflector, D. Garneau with a 12-inch reflector, W. H. Haas with a 6-inch reflector, A. Hestin with a 12-inch reflector, A. W. Mount with an 8-inch reflector, the Messieurs Roques with a 4-inch refractor, and C. B. Stephenson with a 3.5-inch refractor. Now he would be a naive lunarian who would conclude that an eclipse changed the appearance of a lunar object merely because it looked somewhat different on two different occasions. It is evidently important to know the normal or usual appearance of the area at the solar illumination prevailing just after the eclipse. To determine this normal appearance one may observe the object on the night before and the night after the eclipse or in other lunations near full moon, and one may also study good photographs of the moon. Further, one should compare the post-emersion (in the umbra) aspect with the pre-immersion aspect; and if the two differ, one should investigate whether or not the passing hours bring a return to the pre-immersion aspect. (If the moon was not observable before totality, one can look for a return to the usual appearance). In these implied comparisons one must be careful not to be deceived by changing seeing, transparency, etc. It is also necessary to beware of spurious effects due to penumbral illumination; in fact, it is probably impossible on this account to establish the reality of eclipse-caused changes that do not endure for at least 15 minutes after emersion from the umbra. In this connection important and instructive observations of Atlas, showing the gradual change in aspect and the final disappearance of the detail with the approach of the umbra, were made in France at this eclipse by Mr. A. Hestin and the Messieurs Roques. Their drawings and accompanying notes are published in an "Annexe" to Documentation des Observateurs, no. 8, 1949. It is perhaps obvious that the observer should be familiar with the regions that he watches for possible eclipse-caused changes. Naturally not all our observers could apply all these criteria to the regions that they watched for possible changes, but Stephenson and Haas were able to employ almost all of them.

Linné. This white area was in the umbra from $3^h\ 9^m$ to $5^h\ 26^m$. Stephenson observed its size, brightness, and sharpness of outline by comparing it to other bright spots on Mare Serenitatis. No worthwhile evidence for change in size or sharpness was found, but the brightness very probably varied. On April 12, the night before the eclipse, at $7^h\ 15^m$ Linné was slightly dimmer than two comparison-craters, which Stephenson calls A and B. At $1^h\ 15^m$ on April 13 he found Linné brighter than A and B. At $5^h\ 40^m$ its brightness was "possibly slightly less than before the eclipse." As Linné was seen better with better lighting, it was found to be nearer A and B in brightness than at $1^h\ 15^m$; in fact, at $5^h\ 50^m$ and $6^h\ 28^m$ (last view) it was fainter than A and B, as on April 12. At $3^h\ 15^m$ on April 14 Stephenson found Linné much brighter than A and B, thus as at $1^h\ 15^m$ on April 13.

Haas compared the size and brightness of Linné to Bessel and to several spots on Serenitatis. He found its size to be unaffected by the eclipse; if it was apparently larger near the edge of the umbra, this effect was the same before immersion and after emersion and can be blamed upon dim lighting. At $4^h\ 52^m$ on April 12 Haas found Linné as bright as spot B and slightly brighter than spot D, these letters being his own nomenclature only. At $2^h\ 39^m$ on April 13 he found Linné slightly brighter than B, which in turn slightly surpassed D; he thus agrees with Stephenson that the pre-immersion brightness surpassed that on April 12. At $5^h\ 34^m$ and $6^h\ 0^m$ Linné was distinctly dimmer, at least relative to B and D, than before the eclipse; for it now equalled them in brightness. Hence, this observer too found an eclipse--caused dimming. At $6^h\ 36^m$ Haas found Linné very slightly brighter than B and D, but it may not have regained its pre-immersion intensity until $8^h\ 54^m$ (after $6^h\ 28^m$, according to Stephenson).

This dimming is not possibly a mere penumbral effect; for Linné left the penumbra near $6^h\ 20^m$, and in addition Haas found Linné dimmer after emersion than before immersion when at the same distance from the edge of the umbra.

Hestin in France could observe only before immersion. His estimate of the size of the "aureole" of Linné agrees fairly well with Haas'. He estimated that the diameter of the interior of the craterlet was about 1/6 that of the aureole, corresponding to about 1.3 to 1.6 kms. (0.8 to 1.0 miles.) At $5^h\ 32^m$ and $5^h\ 41^m$ Mount thought the Linné white area the same size, shape, and brightness as before the eclipse on the basis of comparisons with previously chosen suitable objects; however, his post-emersion views were through thin cirrus clouds. Linné looked normal to Barcroft soon before 8^h. Garneau noticed no changes here in observations apparently ending near 6^h; it is not known how carefully he observed the brightness.

Grimaldi. This large plain was in the umbra from $2^h\ 31^m$ to $4^h\ 58^m$. Stephenson noticed nothing noteworthy on the floor but did find a definite change in the relative brightnesses of three bright spots, at least two of which are craters, near the northwest edge of Grimaldi. These form a right triangle with the right angle at the southeast spot and the south side of the triangle much shorter than the other sides; they are well shown, for example, on Plate 16A in W. H. Pickering's Photographic Atlas of the Moon. On April 12 and 14 Stephenson found the southeast spot "most definitely brighter" than the other two, with the southwest the dimmest; he further notes: "That this is the normal brightness order is borne out----by at least two photographs of Grimaldi of my knowledge." It is certainly the brightness order on Plates 15A, 15B, and 16A in Pickering's Atlas, all taken near full moon. However, at $5^h\ 56^m$ on April 13 Stephenson found the southeastern spot to be intermediate in brightness between the then brighter northern one and the third spot. He had at the time no recollection of his observation of April 12, and penumbral illumination can have played no observable role. He expresses confidence that a change occurred here.

Cragg made two drawings of Grimaldi. One of them was at $5^h\ 9^m$ from the lunar image on a ground glass screen with a 12-inch refractor, and the second at $5^h\ 49^m$ was a direct view with a 10-inch reflector. The drawings show only the floor and hence tell nothing about Stephenson's bright spots. Cragg apparently thinks that the two drawings indicate a change, but the editor fears that he must regard the evidence for a change as completely insufficient. The conditions for observing were too dissimilar, the later drawing was made with very poor transparency, and penumbral lighting must have affected the earlier view. The change in question was apparently the development of a broad north-south bright streak on the floor.

Soon before 8^h Grimaldi looked normal to Barcroft, but he probably would not have detected any abnormal order of brightness of Stephenson's three spots.

Eratosthenes. It was in the umbra from $2^h\ 55^m$ to $5^h\ 17^m$. Haas made numerous estimates of the intensities of seven dark areas in or near this crater. Four of them were apparently quite unaffected by the shadow's passage, but the other three darkened appreciably as a result of the eclipse. Of these three areas one lies just northwest of the central mountains, the second is just east of the central mountains, and the third is east of the second and hence in the east central part of the floor of Eratosthenes. Haas found that these three areas were distinctly darker just after emersion than just before immersion, even though conditions of observation were rather similar. Also, they were darker at $5^h\ 22^m$ and later than on April 12 or than near the same illumination in the March, 1949, lunation. From $5^h\ 22^m$ to $11^h\ 10^m$ the three areas, or perhaps only the one northwest of the central mountains, lightened slightly; but even at $11^h\ 10^m$ they were darker than before immersion. Is it significant that they were darker at $4^h\ 50^m$ on April 14, the night after the eclipse, than under the very same conditions of observation at $3^h\ 31^m$ on March 15, 1949? The illumination was similar, the colongitude being $100\overset{\circ}{.}9$ on April 14 and $94\overset{\circ}{.}6$ on March 15.

Drawings by Garneau indicate that the eclipse apparently caused some changes in Eratosthenes. Unfortunately, it is difficult to identify dark areas shown on his drawings with ones observed by Haas and thus to determine whether or not they agree on the nature of the eclipse-caused variations. In "brief glimpses" of Eratosthenes between emersion and 6^h Cragg found its appearance unchanged by the eclipse; the criterion was a comparison to its appearance on April 12, the night before the eclipse. It is perhaps difficult to say whether he would have noticed the comparatively minor effects found by Garneau and Haas.

Atlas. Immersion was at $3^h\ 22^m$; emersion, at $5^h\ 33^m$. The observers in France did good work in drawing the pre-immersion appearance but could not work after emersion. Haas was able to make observations of the chief dark areas on the floor and of the dark band in the southwest part of the floor connecting two of them from $2^h\ 16^m$ to $11^h\ 15^m$. He gave close attention to their darkness and to their general appearance. It is quite certain that the pronounced effects on Atlas of the eclipse of August 26, 1942 were not repeated this time. At that eclipse a dark area west of the center of the floor faded almost to invisibility, and the dark band mentioned above did vanish (Popular Astronomy, Volume 51, pg. 264, 1943). On April 13, 1949, however, Haas quite failed to find any effects on Atlas except that from $5^h\ 44^m$ to $6^h\ 46^m$ the area west of the center of the floor was suspected to be smaller than before immersion. At $7^h\ 31^m$ and $8^h\ 39^m$ it was thought to have regained its normal size, but at $9^h\ 5^m$ and $11^h\ 15^m$ it was uncertain whether it was as large as before immersion or not. Any change is evidently very uncertain. Cragg thought Atlas normal in a brief glimpse before 6^h, meaning that it looked the same to him then as on April 12. Garneau found one of the two main dark areas on the floor sometimes as dark as Plato or Endymion and sometimes darker than that, but there is apparently a tendency for this area to look darkest when well within the penumbra.

Riccioli. This plain was in the umbra from $2^h\ 31^m$ to $4^h\ 57^m$. The dark area in its north part is prominent at full moon. Attention was chiefly given to the south tip of this dark area, which had been observed to be affected at several past eclipses. Stephenson and Haas quite failed to find any effect on this occasion, the latter noting that the best views showed the south tip longest. At $5^h\ 15^m$ Stephenson thought the boundary between the northern edge of the dark area and the light area filling the rest of the floor of Riccioli perhaps somewhat sharper than before, but it is uncertain that any result of the eclipse is involved. Riccioli looked normal to Cragg before 6^h and to Barcroft soon before 8^h.

Plato. This feature was in the umbra from $3^h\ 9^m$ to $5^h\ 12^m$. Stephenson could detect no effect of the eclipse on the appearance of the near-central craterlet and of a number of light areas or on the darkness of any part of the floor. Barcroft saw nothing unusual about Plato soon before 8^h. Cragg before 6^h thought Plato the same as on April 12. Cave before 6^h noticed the floor to be "unusually dark", but it is uncertain without more evidence that the eclipse was the cause.

Other Objects. Barcroft soon before 8^h also observed Aristarchus and the twin craterlets Messier and W. H. Pickering. They showed their usual full-moon aspects. Cragg before 6^h also quickly examined Conon and Alphonsus, which were apparently the same as on April 12.

(to be continued)

NOTES

We are glad to announce the appointment of Mr. C. B. Stephenson as our Acting Mercury Recorder. His address is Room 103, 6208 Drexel, Chicago 37, Illinois. All observations of Mercury should be sent to him.

Mr. T. R. Cave, Jr., Acting Venus Recorder, requests that all observations of that planet be mailed to him so as to arrive no later than the tenth of each month. Depending on the observer's distance from Long Beach, California, he may hence wish to mail his observations as early as the sixth or seventh.

Remember the Convention of Western Amateurs at Los Angeles on August 22, 23, and 24. All our readers who can possibly attend are urged to do so; for an excellent program has been planned by the host organization, the Los Angeles Astronomical Society. Those desiring more information should write the Program Chairman, T. R. Cave, Jr., Los Angeles Astronomical Society, Box 9841, Los Feliz Station, Los Angeles 27, California. The editor looks forward to meeting many of his astronomical friends, some so far known only through correspondence, at the convention.