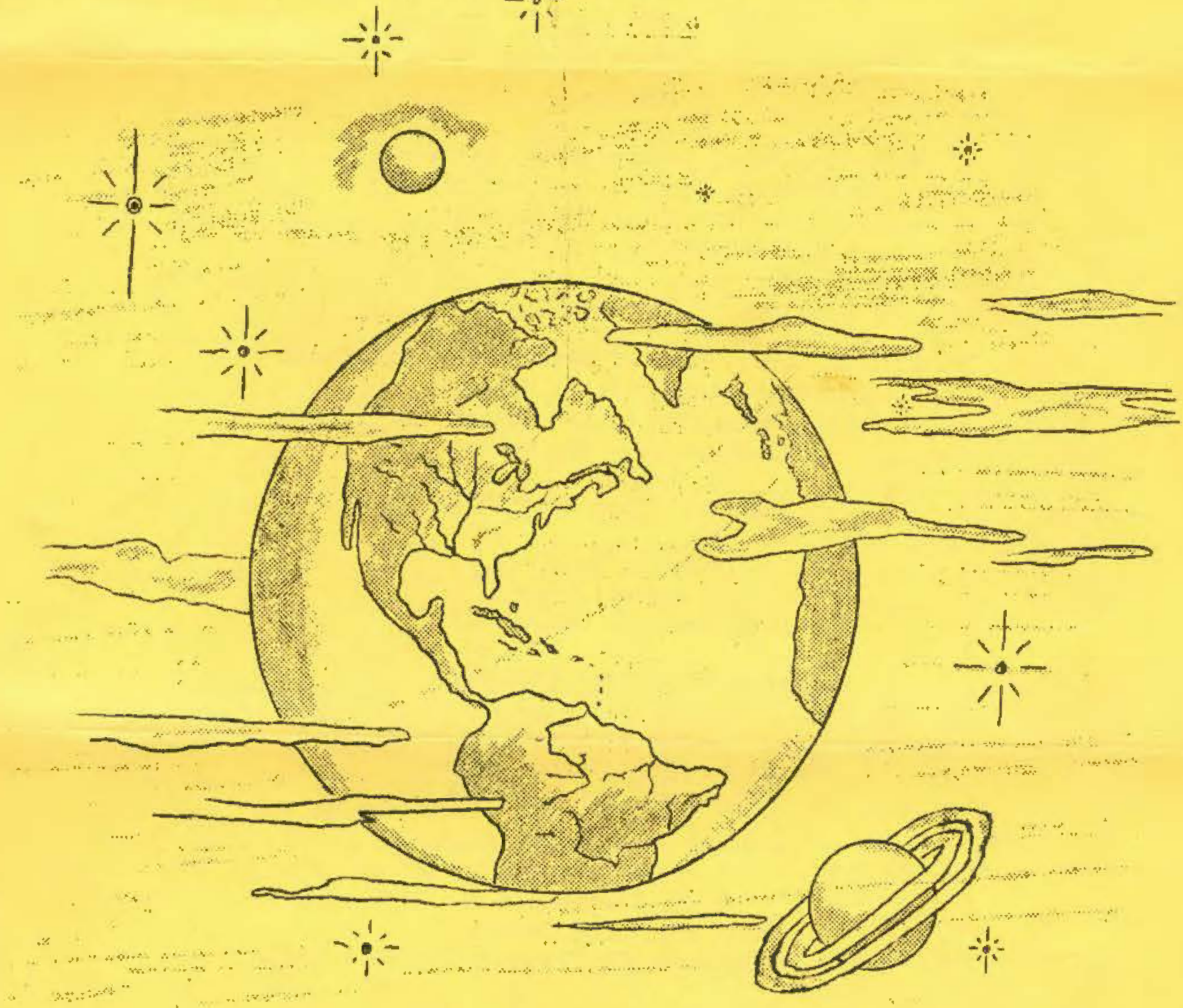
Volume 3, Number 9 September 1, 1949

THE STROLLING ASTRONOMER

(ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS)



Mailing Address

The Strolling Astronomer
Institute of Meteoritics
University of New Mexico
Albuquerque, New Mexico

SUBSCRIPTION RATES

1 Year......................$3.00
6 Months.................. 1.50
1 Issue......(in print)..... .25

STAFF

-Editor-

Walter H. Haas, Instructor in Mathematics
Astronomer, Institute of Meteoritics
University of New Mexico
Albuquerque, New Mexico

-Counsellor-

Dr. Lincoln LaPaz, Head of Mathematics Department
Director, Institute of Meteoritics
University of New Mexico
Albuquerque, New Mexico

-Acting Venus Recorder-

Thomas R. Cave, Jr.
265 Roswell Avenue
Long Beach 3, California

-Acting Jupiter Recorder-

Elmer J. Reese
241 South Mount Vernon Avenue
Uniontown, Pennsylvania

-Acting Mercury Recorder-

C. B. Stephenson
Room 103, 6208 Drexel
Chicago 37, Illinois

NOTES ON RESOLVING POWER

by David W. Rosebrugh

May I discuss the comments contained on pages 2 and 5 of the June, 1949, Strolling Astronomer regarding the possibility of seeing narrow line planetary detail with widths of as little as 0".20 to 0".08 with 6- to 10-inch telescopes?

The remark is made in the Strolling Astronomer that such narrow lines are below the Dawes limit of resolution for 6 - to 10-inch telescopes, which would, of course, be 0".76 to 0".456 respectively. Dawes limit, however, applies to the separation of two stars, as stated on page 2.

It is well known that for some reason, still undiscovered, it is possible to see lines of much narrower width than the minimum separation required of two objects to render them distinguishable as two separate entitites. Dr. Loren Riggs of Brown University, Providence, R.I. when addressing the AAVSO meeting on May 28, 1949 commented on this fact. He stated that the eyeballs of human beings are continually oscillating at a rate of 60-75 times a second with small amplitude. It may be that this increases the visual acuity for such details as lines. The question is being studied by physiologists.

It has occurred to the writer to do a little experimenting in this regard. As I sit in my office I can see an electric light pole 600 feet away carrying two black wires, which upon nearer inspection appear to be about ½ inch in diameter. Their width, therefore, subtends an arc of 0'.239 or 14".32 at my eye. These wires appear sensibly black against the light brown earth and green foliage of the hillside behind them. They are planetary details of the earth's surface and are illuminated by the same sun which shines on the planets; hence, the test object is a good one.

By experimenting with different sized pinholes in front of my eye I find I can still see the wires clearly with a pinhole 0.03 inches in diameter. It is possible that they are visible with 0.02 and 0.016 inch pinholes, but they are definitely invisible with a 0.01 inch diameter pinhole. Let us take the condition under which the wires are clearly visible with the 0.03 inch pinhole. The Dawes limit for an aperture of 0.03 inches would be 152 seconds, whereas the wires subtend only 14.32 seconds at my eye. The ratio is 10.6.

Now suppose I multiply the power of my eye by placing a telescope in front of it. Suppose I multiply it by 200 by using a 6-inch aperture with a power of 200X. Presumably now the wires would be visible if I could move back to 200 X 600 feet distance or to 120,000 feet, but I am unable to check this experimentally. Heat waves in the lower atmosphere might affect the result; but granted the same excellent visibility that I have for 600 feet, the wires should still be visible at the greater distance. At that distance the wires would subtend an angle of 0".0716. This is of the same order of width as the planetary details reported in the Strolling Astronomer as having been seen. It is smaller than the Dawes 0".76 limit for a 6-inch aperture by the ratio of 10.6, as for the naked eye.

NOTE ON OCCULTATION OF ANTARES BY THE MOON ON JUNE 9, 1949

by David W. Rosebrugh

Those of us who only occasionally look at occultations, and then only for the beauty of the phenomenon, are accustomed to seeing the star disappear instantly. It was, therefore, of interest to the writer to note that Antares dwindled progressively in brightness at this occultation. True, it was not a very leisurely process; for the writer estimated afterwards that it only took from 0.2 to 0.5 seconds of time to disappear, but it was far from instantaneous.

A review of the data involved indicates why. Russell, Dugan, and Stewart state on pg.749 of Volume II of their Astronomy (First Edition) that Antares' apparent diameter is 0."040. The moon moves about 1 second of arc in the sky in 2 seconds of time. Hence, even if the occultation had been central, the time taken would still have been about 1/12th second. Actually, however, the occultation at Waterbury was almost tangential. This circumstance lengthened the time of immersion by a factor of 2 so that the time required was actually about 1/6th second.

The determination of the factor of 2 was made as follows. Antares "moved in" upon the moon at Wargentin and "out" at Vlacq or Fabricius or thereabouts, some 60 degrees removed around the edge of the moon. Draw a circle, and draw two radii at an angle of 60 degrees. Join their ends. We now have an equilateral triangle. Antares "entered" the moon along this latter line, which makes an angle of 60 degrees with the radius. The cosine of 60 degrees is 0.5. Hence Antares moved radially "into the moon" at only half speed.

This calculation can be checked for other conditions. For instance, if Antares had emerged at a point 180 degrees from where it entered, the triangle drawn would be a straight line; and Antares would have entered with 0 degrees of angle between its path and a radius. The cosine of 0 degrees is 1; hence, the star would have entered at full speed. For a mere grazing contact, the angle is 90 degrees; and the cosine is 0, or no entry into the moon at all.

Remarks by Editor. We thank Mr. Rosebrugh for his two articles and are sure that our readers will find them of interest. His address is 87 Fern Circle, Waterbury 69, Connecticut.

Some of our readers might like to try to verify the results of the experiment with pinholes. Perhaps they could even be greatly extended. It would be very interesting to know, for example, whether with a pinhole 0.03 inches in diameter it is possible to distinguish a difference in the width of two (unequal) wires both subtending an angle of less than 152", the Dawes limit for this aperture. It should perhaps be tested whether spots, lines, etc. darker than their background and ones brighter than their background are subject to the same limitations as regards visibility, resolvability, etc. One might also investigate the effect of very small pinholes on the appearance of the detail on the naked-eye moon.

As far as the editor can recall, Mr. Rosebrugh is the first to attribute the non-instantaneous disappearance of a star at a visually observed occultation to its finite diameter. The argument appears very sound, though; and he must have been watching the star closely to realize that an interval of disappearance of 1/6 of a second was not instantaneous. Naturally, this interval of disappearance at lunar occultations affords a theoretical method of determining the apparent angular diameters of stars. It has also been pointed out that the pre-telescopic observers could have used this method to discover that stars do not have angular diameters of two or three minutes of arc, as was then thought to be true. Incidentally, the sun would require 0.01 second to disappear at a central occultation (more at a grazing one) if its distance were 6.1 light-years.

Of six stars besides Antares of great angular diameters listed on pg. 749 of Astronomy (see above) the only other one subject to occultation is Aldebaran. Since its angular diameter is only 0".02, the non-instantaneous character of the disappearance can probably be recognized visually only at very grazing occultations.

THE LUNAR ECLIPSE OF APRIL 13, 1949

by Walter H. Haas
(concluded from August issue)

More On Lunar Meteor Searches

A late report on searches during the eclipse by the Glendale, California, amateurs is contained in a letter from J. G. Moyen to me dated July 7. We quote part of it: "We divided into two groups of four each, each member having a telescope for his use. The two groups were separated a distance of about 20 miles. We tried to observe continuously while the eclipse was total, though I estimate that not more than one-half of that time was actually spent in watching.

"I am enclosing reports showing results. Both reports of having noted 'flashes' were from the same group, but you will note that neither report was confirmed by another observer. The consensus of opinion seemed to be that conditions for observing the possible phenomena are best at the regular monthly periods three or four days after new moon. There does not seem to be nearly as much light from the darkened portion of the moon at these times as during the times of total eclipse."

The one "flash" was observed by G. Carroll at Newhall, California, at $4^h\ 0^m\ 40^s$. Mr. Carroll was using a 6-inch refractor at 60X with poor seeing and good transparency. The "flash" looked blue and was estimated to be of the twelfth stellar magnitude, no trail being noticed. The position was "approximately 1/10 the moon's diameter in from the bottom edge." The other object was observed by J. Day at Newhall at 4^h 18^m 25^s. He was using a 6-inch reflector at 54X, again with poor seeing and good transparency. A yellow "flash" estimated to be of the eleventh magnitude and leaving no discernible trail appeared "in the center of the darkened disc". I rather think that both observers saw objects which were moving with respect to the lunar surface and not stationary, though they do not explicitly mention such motion. The distinction is important to the problem here being studied because a moving bright speck cannot be a meteoritic impact-flare, but a stationary one can be. If we may rely upon the stellar magnitudes estimated by the two Glendale observers and also upon the limiting magnitudes for observers located elsewhere (pg. 5 of July issue), we can determine how many of the latter were looking with instruments capable of showing the Glendale objects at the time that they appeared. Carroll's object was too dim for all but Bridgen or Douglas. Mr. Day's "flash" should have been visible to Bridgen or Douglas, Haas, Orr, and Tisdale. However, it would have been at the extreme limit of visibility for Haas, Orr, and Tisdale. It is more puzzling that in each case seven other Glendale watchers (with instruments of about the same size as the observer's?) did not see the "flash".

There is perhaps a <u>very slight</u> possibility that Mr. Carroll's object may be the one suspected by an unnamed observer at about 3^h 57^m (pg. 6 of July issue). <u>If</u> they are the same, this observer must have made an error of some minutes in recording the time; but the matter cannot be pursued further without more exact information on the position of Carroll's object.

We commend the Glendale group on their excellent planning of their program and on their precise records of the times when possible lunar meteors were seen. The new information kindly furnished by them does not appear to alter much the discussion on pages 8 and 9 of the August issue. It does emphasize the need for careful and systematic searches <u>as nearly continuous as possible</u> and by <u>as many observers as possible</u> at future eclipses.

SOME CURIOUS APPEARANCES

The writer is very puzzled about how to interpret some phenomena seen during the eclipse by Mr. John J. O'Neill, Science Editor of the <u>New York Herald-Tribune</u>. This observer was at Teaneck, New Jersey. We first summarize the observations:

1. With the 12-inch telescope of the Bergen County Astronomical Society between 4^h 46^m and 4^h 48^m (but time uncertain), O'Neill noticed a "needle point spot of light" close to the position of the mountain Piton. This "needle point", perhaps really as large as a lunar crater some miles in diameter, was "very bright" relative to its background; it was about as bright as a third magnitude star looks to the naked eye. This point was visible at irregular intervals; it appeared about six times during a minute and a half, and it remained visible less than a second. There was no increase in the general illumination of the area when the point of light appeared. The observer who followed O'Neill at the telescope and looked for about ten seconds noticed the bright spot but was not sure that it was intermittent.

There was a heavy haze so that Piton was not certainly visible on the eclipsed moon (though Plato was).

2. Soon after $4^h\ 54^m$ and when a crescent of the moon was again in sunlight, O'Neill saw with the unaided eye numerous needle points of light appearing intermittently on the illuminated limb. They were much brighter than the sunlit crescent and appeared to be confined to its edge. As many as three or four were seen simultaneously. A second observer saw these spots when they were brought to his attention, and apparently he and O'Neill were able to "call" some of the light-points at the same time.

3. Not long after 4^h54^m O'Neill observed with the unaided eye a remarkably variable illumination of that portion of the moon still in the umbra. It fluctuated irregularly from "almost complete darkness to sufficient illumination to permit identification of principal geographic regions". At one time two areas brightened with a coppery light for about two seconds while the rest of the eclipsed moon was uniformly dark. On another occasion the whole eclipsed region became suffused with irregular patches of coppery illumination never enduring more than five seconds. A sketch by O'Neill of the brighter and darker sections shows no resemblance to the pattern of <u>maria</u>.

   The writer is perhaps most puzzled by the fact that these appearances were apparently not seen at other stations. At least reports on them are lacking, and it would appear that effects visible to the naked eye should have been noticed by thousands of persons. The writer hence wonders whether the effects were on the surface of the moon at all. The third effect was certainly not visible to W. L. Orr at Montreal; he noted at $4^h\ 59^m$ with his 6-inch reflector and 65X:---"the usual" difference in color due to natural surface markings of the moon was more pronounced than the difference in the intensity of the surface due to involvement of different parts in different depths of the earth's shadow. The writer hence wonders whether O'Neill may have seen some strange terrestrial atmospheric effects localized to Teaneck and not visible elsewhere.

In a letter written on June 3 Mr. O'Neill suggests that the second effect, the peripheral points of light, may have a physiological explanation. He points out that the expansion of the blood vessels of the retina with each pulse beat causes a displacement of every point on the retina. He says that he once found it possible to produce a spurious appearance at the boundary between two surfaces of different brightness merely by breathing deeply. Presumably the intensified heart action resulted in greater distortion of the retina. He goes on to propose that the needle point of light near Piton scarcely behaved as a single meteoritic impact-flare should; a train of meteorites all striking near Piton is very hard to credit. The writer agrees. Mr. O'Neill thinks that the diffuse patches of light, the third effect, may somehow represent light produced on the surface of the moon in an undetermined manner. Perhaps this general diffuse illumination was concentrated at times to cause the needle point near Piton, he says. Our correspondent suggests that the curious illumination may exist only during eclipses and hence might be looked for at future eclipses. If it is instead usually present but is not visible against the sunlit background, perhaps then something of it can be seen on the earthshine.

Some of our readers might like to share their ideas on these phenomena with either Mr. O'Neill or the writer. The address of the former is 209 N. Long Beach Avenue, Freeport, Long Island, New York.

AN ECLIPSE TO COME

During October observers in the United States and Canada will have the opportunity to witness another total eclipse of the Moon. The circumstances are as follows:

Event	Universal Time	Eastern Standard Time
Moon enters penumbra	October 6, $23^h50^m.1$	October 6, 6:50.1 P.M.
Moon enters umbra	October 7, $1^h\ 4^m.7$	8:04.7 P.M.
Total eclipse begins	$2^h19^m.5$	9:19.5 P.M.
Total eclipse ends	$3^h33^m.2$	10:33.2 P.M.
Moon leaves umbra	$4^h48^m.1$	11:48.1 P.M.
Moon leaves penumbra	$6^h\ 2^m.7$	October 7, 1:02.7 A.M.

One subtracts an hour from E.S.T. to get C.S.T., two hours for M.S.T., and three hours for P.S.T. As was also true last April, Western observers will not be able to see the moon to much advantage before totality. It is proposed that A.L.P.O. studies of this eclipse consist of two principal programs: the systematic search for possible lunar meteors and/or meteoritic impact-flares and the careful examination of a few selected regions for possible changes caused by the shadow's passage.

The lunar meteor searches are best carried out only while the eclipse is total. During the 74 minutes of totality all participating observers should watch the moon as carefully as possible and as nearly continuously as possible. They should employ a magnification low enough to show the entire moon. Where groups of observers exist so that it is possible to take turns at the telescope, it is recommended that no one person look for more than 30 minutes at a time; for the eye is apt to become wearied by longer watches. An observer who witnesses any unusual bright object should record its <u>exact time of appearance</u> and its <u>precise location on the moon</u>(perhaps marked on a chart). If an observer merely <u>suspects</u> such an object and is not sure of its reality, we urge him <u>very strongly</u> to report to us anyhow; for it is possible that someone else saw clearly what he only suspected and that he may have important confirmation of the time and place of appearance. Of course, an observer reporting such a suspected object should clearly state that it was only suspected.

A weakness of our searches for lunar meteors during the eclipse last April was that it was usually very uncertain just how faint a lunar meteor or impact-flare the observer might have perceived. It is proposed, therefore, that at the October eclipse each observer make a quick sketch of stars near the moon and visible to him. Such sketches will allow most accurate intercomparisons of the limits of visibility of stars (and hence of meteors and impact-flares) for different observers if they are all made at the same time. We accordingly recommend that each observer make such a sketch between $2^h 55^m$ and $3^h 0^m$, U.T. (between 9:55 and 10:00 P.M., E.S.T.), this interval falling near the middle of totality. It is expected that the stars shown on such sketches can then be identified in atlases which give their magnitudes.

In making their searches for possible lunar meteors or flares observers should record all the usual data for lunar and planetary observations and also the following ones: the beginning and ending times of the search, the number of minutes spent in actual watching (since one may fail to be 100% efficient), the region watched if other than the whole moon, the estimated stellar magnitude of the faintest object that might have been seen or else a sketch as mentioned above, and the results. If any unusual luminous object is seen, there should be recorded its time of appearance, its position on the moon, its angular diameter, its stellar magnitude, the length of its path (which may be given relative to some crater), the lunar direction of motion, the duration of visibility, the color, and any other note-worthy characteristics. Blank forms helpful in recording all this information will be supplied by the editor free of charge upon request.

The following objects are suitable ones to study for possible eclipse-caused changes:

1. Linné. Watch carefully the size, brightness, and sharpness of the white area around this crater. Equipped readers might undertake micrometrical measures of the north-south diameter.

2. Riccioli. Watch closely the south tip of the conspicuous dark area in this crater, and note its darkness. Micrometrical measures of the north-south length of the dark area are desirable; otherwise, visual estimates of the latitude of the south end relative to other lunar objects may be made. Note whether the south end is pointed or rounded.

3. Atlas. Watch the intensity and appearance of the two main dark areas on the floor, one near the south wall and one northwest of the central mountains, and of the narrow dark band joining these two areas.

4. Grimaldi. Watch for changes in the darkness of the floor, or parts thereof, and in the brightness of the bright spots along the west wall. Pay especially close attention to the three spots forming a right triangle near the northwest rim of this walled plain.

5. Stoefler. Examine carefully the dark areas on the floor, and compare the intensities of the ones in its east and west parts.

6. Eratosthenes. Estimate the intensities of the dark areas on the floor and walls, especially of those in the east half of the floor.

7. Alphonsus. Observe the intensities, sizes, and general appearances of the three very dark spots on the floor.

8. Plato. Note the relative conspicuousnesses of the spots and streaks on the floor. Watch also for possible changes in the darkness of the floor, or parts thereof.

9. Conon. Note the size, brightness, and general appearance of the floor "cloud", a variable somewhat triangular white area based upon the northwest wall.

An observer must naturally begin by deciding which of these objects to watch. No one should try to study more than four of the nine listed; he will otherwise find time only for superficial, and correspondingly useless, views. The beginning observer will be wise to take only one object. One must next choose a telescope and a magnification for the program. Once decided upon, they should be kept constant throughout the night of the eclipse and for all comparison-observations; one source of false variations in appearance is thus removed. Since the problem is to determine whether the eclipse affects the appearance of the lunar area, it is important to know its usual full-moon appearance. Photographs of excellent quality can here be helpful. Visual check-observations with the telescope and magnification being used in the program can scarcely become too numerous. The lunar area being studied should be observed, if possible, before immersion in the umbra, on the night before the eclipse and also on the night after, and in at least one other lunation at about the same solar illumination as will prevail on eclipse-night. During this present month check-observations for areas to be watched during the eclipse are best made upon the evenings of September 6 and 7 (local civil time dates).

It is best to make many of the observations suggested above by comparisons to other lunar features not far away. For example, the darkness of the floor of Plato may be compared to that of Mare Imbrium; and the size of Linné may be compared to that of a number of white spots on Mare Serenitatis. Such relative estimates of intensities and sizes are likely to be far more dependable than attempted absolute ones. Each observer should select the comparison-areas he requires with some care. Here again good photographs of the full moon can be an aid. It will be an important advantage on the night of the eclipse, however, to have gained thorough familiarity at the telescope with each lunar object being watched for possible eclipse-caused changes and its neighboring comparison-areas.

On the night of the eclipse each object on the program should be examined carefully soon after it leaves the umbral shadow. If anything in the least abnormal is seen, it should be reobserved at short intervals until the normal full-moon appearance returns - or else for as long as possible. One must be very careful here not to be deceived by penumbral illumination, and it is probably quite impossible on this account to establish the reality of eclipse-caused changes that do not endure for at least 15 minutes. In testing for such penumbral effects it is an advantage if the observations allow for the appearance a certain number of minutes after emersion from the umbra to be compared with the appearance the same number of minutes before immersion in it.

Observers are asked to time when each object that they watch enters the umbral shadow and when it leaves the umbra. Needless to say, the time of each observation on the whole program must be noted if the work is to have value.

We hope that our readers will find these instructions for studying the eclipse helpful. We wish them all clear skies and excellent seeing.

Those colleagues living in the New York City area are reminded of the kind invitation of Mr. Bernard Lewis to watch the eclipse from the Empire State Observatory. His address is Public Relations Office, Empire State Building, New York, New York.

OBSERVATIONS AND COMMENTS

Observations of Saturn by Haas from July 21 to July 28 (all dates and times by Universal Time) may turn out to be the last ones obtained before conjunction. The views were poor since the planet was at a low altitude on a twilight sky, but they did suggest that there had been no striking changes in appearance since early June. The ball was perhaps slightly more dusky south of the South Equatorial Belt than north of the rings, such a difference having often been seen last spring. The North Tropical Zone, the space between the North Temperate Belt and the projected rings, was probably no longer as bright as Bartlett and Haas had found it in late May and early June. The rings off the ball were somewhat brighter than the ball north of the rings and far dimmer than the Equatorial Zone. The Crape Band was still notably conspicuous.

Several early risers have reported being unable to see anything yet on Mars. C. B. Stephenson with a 6-inch refractor at $10^h 5^m$ on July 16 "could see markings on Mars but was quite unable to identify them because of great uncertainty about their form." The central meridian of longitude was about 31°, a value uncertain by some degrees because of the necessity of extrapolating from Ephemeris data. The angular diameter of Mars was only $4''.0$ on July 16 (and indeed is still only $4''.5$ on September 15). Stephenson sought to compare the visibility of detail on Mars and Mercury. On July 16 the latter planet had a diameter of $5''.5$ but was seen lower in the sky and against a much brighter background than Mars was. The markings on Mercury were perhaps slightly easier to see than those on Mars, Stephenson having reached the same opinion definitely in a comparison on June 8, 1948.

The chart of Neptune on pg. 10 of our June issue has apparently not aroused as much interest as we had hoped it might. The suggested estimates of brightness are actually well within the range of the smallest telescopes - or even of binoculars. E. J. Reese obtained a stellar magnitude of 7.63 at $2^h 30^m$ on June 23. He used a 4-inch reflector at 12X and thus enjoyed a field of view $3^\circ 20'$ in diameter. At $3^h 5^m$ on May 14 E. E. Hare obtained 8.2, presumably with a 7-inch reflector. W. H. Haas made 14 estimates with a 6-inch reflector from March 27 to June 2. The average stellar magnitude found by him was 7.78; the individual estimates ranged from 7.48 to 7.92.

E. E. Hare's observation of fault b (Reese's term) in the lunar crater Conon on June 6 was given on pg. 1 of our August issue. A drawing by E. J. Reese at colongitude $27^\circ.0$ on June 6 checks well with Hare's description. (Colongitude is the eastern longitude of the sunrise terminator.) At $26^\circ.8$ and $27^\circ.4$ on the same date L. T. Johnson saw fault b only in its southwestern half. The northeastern half recorded by Hare and Reese was invisible to Johnson; as Reese says, "another puzzle can be chalked up!" At $39^\circ.2$ on June 7 Johnson thought that fault b was visible along its entire length but wasn't sure because his view was less distinct than on June 6. At colongitude 33°2 on July 6 Reese "estimated fault b in Conon to be about 2/3 as conspicuous as the famous 60-mile wall!" The comparison is to the prominent Straight Wall. The editor confesses that he isn't sure just what meaning "2/3 as conspicuous" has in this connection. Even so, the mere fact of comparing fault b, a feature not found on H. P. Wilkins' 1946 map of the moon or on any other map of the editor's knowledge, to the Straight Wall is surprising enough!

On July 17 T. R. Cave and T. Cragg enjoyed such excellent seeing with the former's 8-inch reflector that they could use powers above 500X to advantage. In Plato they found shadows visible in at least six craterlets on the floor near 10^h, colongitude 171°6. The plain was thus seen under rather low evening illumination.

H. P. Wilkins, the Lunar Director of the British Astronomical Association, has communicated two unusual observations. The first of them was on May 1; he was scanning the earthshine with a 3-inch refractor, the sky being very clear so that much detail could be seen. "Aristarchus was visible as a bright patch in the earthshine, power 100X; and while I was actually looking at it, the time being $20^h\ 44^m.5$, it suddenly 'glowed', seemingly as brightly again, all the inner terraces, central mountain, and other details becoming distinctly visible [Wilkins' italics]. The whole crater was thus illuminated; and this appearance lasted two seconds when it [Aristarchus] reverted to its previous appearance."

Wilkins' other observation was made on June 1 in a very clear sky with a 6-inch reflector and 200X. "At $22^h\ 6^m$ a bright star-like flash suddenly appeared, in the earthshine close to the central meridian, i.e. due north of South Cusp, and due east of Theophilus which was shadow filled on the terminator. This flash attracted attention [Wilkins' italics] and lasted for one second."

In a letter written on July 26 Mr. Wilkins gave some additional information: "The 'flash' noted on June 1 was stationary. There was no color, merely white. It is difficult to estimate the stellar magnitude with any accuracy, but I think it would have been about the third. As for the estimated diameter, this was quite considerable and must have been of the order of 3 seconds of arc. No doubt it seemed larger than it really was. The 'glow' within Aristarchus was indeed remarkable; it is interesting that Barcroft noted some peculiarity on May 2. Evidently things are happening on the moon which are mysterious, and it is astonishing that the earlier observers did not record more of them. It is very easy to be deceived, but you can take the observations I have given as quite genuine. I am not likely to make mistakes of that nature and know the moon fairly well."

The reference to D. P. Barcroft's observation on May 2 should be clarified. That observer examined the earthshine with a 10-inch reflector and 96X from 3^h to 4^h on that date. At 3^h30^m Aristarchus "began to glow dully." Mr. Barcroft further states: "The Aristarchus appearance is not just that of a light appearing feature - it has a silvery phosphorescence - something like a nebula projected against the moon's surface." Did Barcroft witness some very abnormal appearance about Aristarchus on May 2? And is there any connection to

Wilkins' "glow" noted about seven hours earlier? Both questions, we fear, are likely to go unanswered.

Wilkins suggests that his "flash" on June 1 was a meteoritic impact-flare. At any rate, this object would appear to be similar in nature to several other stationary bright objects briefly visible against the moon to members of the A.L.P.O. in recent years. The "glow" of May 1 is more puzzling. E. E. Hare says that in looking for faint stars he occasionally finds stars in the field of view to flare up a full magnitude for two or three seconds and then to fade more gradually. He presumes that this effect is physiological and wonders whether Mr. Wilkins can have been deceived by the same thing. Perhaps D. W. Rosebrugh, the veteran variable star observer, has seen something of such an effect. He wrote on April 28: "On occasion I have seen stars swing up and down rhythmically in brightness over a period of several seconds, from invisibility to clear visibility." However, E. J. Reese states that he has never noticed such erratic changes in the sensitiveness of his own eyes as Hare reports. He further says that his 6-inch reflector shows Aristarchus by earthlight merely as an amorphous splotch of light with a bright and very small nucleus (probably the central peak). He thinks it improbable that his eyes could become so much more sensitive that a 3-inch refractor could reveal the inner terraces of Aristarchus distinctly by earthlight. The editor is disposed to agree with Mr. Reese. But in that event, what did cause the "glow"?

OBSERVATIONS OF JUPITER IN JULY

by Elmer J. Reese

Activity Report. Observations of the Giant Planet in July have been received from the following observers:

J. C. Bartlett, 3.5-in. refl., Baltimore, Maryland
T. R. Cave, 8-in. refl., 12-in. refr., Long Beach, Calif.
T. Cragg, 6-in. refl., 12-in. refl., Los Angeles, Calif.
W. H. Haas, 6-in. refl., Albuquerque, New Mexico
E. E. Hare, 7-in. refl., Owensboro, Kentucky
L. T. Johnson, 10-in. refl., La Plata, Maryland
R. Missert, 6-in. refl., Kenmore, New York
D. R. Monger, 6-in. refr., Lawrence, Kansas
D. O'Toole, 6-in. refl., Vallejo, Calif.
E. J. Reese, 6-in. refl., Uniontown, Penna.
E. K. White, 7-in. refl., Chapman Camp, B. C., Canada

Already our group has obtained over 1400 central meridian transit observations during the present apparition. These will surely yield reliable rotation periods for many of the Jovian currents. A pleasingly large number of valuable drawings, color observations and general descriptive notes have also been received.

Color Observations. Many more color observations have come to hand since the last report was submitted. Bartlett, Haas and Missert agree that the NEB was reddish-brown in June and July. A beautiful drawing in color by Hare on July 4 at $6^h 0^m$ shows the NEB to be dark brown;

the EZ, orange; the SEB Interior Zone, bright yellow. Bartlett observed a yellow-brown or ochre hue in the EZ in June and early July changing to brownish-gray late in July. Haas found the EZ definitely less dusky near the end of July than it was early in June - the color fading from dull orange to dull white.

Dr. J. C. Bartlett recorded an anomalous appearance of Jupiter on July 27 at $5^h 8^m$ while observing with his excellent 3.5-inch reflector at 100X. The sky was clear and calm. Although the planet itself could be brought into sharp focus, as shown by the limbs, the belt details could not be clearly defined but appeared blurred as if seen through a haze. "Associated with this spurious haziness was a very pale ruddy cast over the whole planet, easily apparent in the telescope but so delicate that it did not affect the white color of the planet to the naked eye."

Red Spot and Hollow. The Hollow became less conspicuous during July as the SEBs continued to fade. The mysterious Red Spot was seen and drawn by Cave, Cragg, Hare, O'Toole, Missert and Reese in July and early August. The Red Spot was seen a a complete, dusky-pink oval tangent to the north edge of the STB by Hare on July 4. A detailed drawing by Cave on July 28 shows the STB deflected southward where in contact with the Red Spot. T. Cragg had a splendid view of the Red Spot on August 1 at $9^h 20^m$ while using a blue filter on his 12-inch reflector. Without the filter the Spot was quite invisible to Cragg on that date. This observation is interesting; first, because it demonstrates the important role which color sensitivity plays in the appearance of planetary markings, and second, because it confirms the pink hue which others have seen in the Red Spot.

Longitudes (II) of the Red Spot and Hollow obtained from central meridian transits follow:

Observer	Limiting Dates	Object	Prec. End	Center	Fol. End
Cragg	July 8-Aug. 1	RSH	228°(3 obs.)	244° (3)	261° (4)
Hare	July 2-July 28	RSH	223 (4)	239 (2)	254 (3)
O'Toole	July 16	RSH	228 (1)	243 (1)	252 (1)
Reese	July 3-July 28	RSH	223 (9)	238 (8)	253 (9)
Hare	July 4-July 28	RS	227 (4)	241 (2)	253 (2)
Reese	July 3-July 28	RS	225 (9)	240 (9)	253 (9)

Equatorial Zone Activity. The EZ was apparently even more active in July than it had been in May and June. A splendid series of drawings by Cragg shows the EB greatly disturbed and frequently divided into two components. Whitish clouds of varying brightness were frequently seen by various observers extending across the EZ and obscuring all or much of the normally visible detail beneath them. On July 3 Bartlett observed a broad, diagonal white band near 168° (I) crossing the EZ from northwest to southeast. "Where this white cloud crossed the zone, both the golden-brown color and the multiple belt structure of that zone were obliterated, indicating that the band was in the nature of an opaque cloud." On July 19 a very similar dull white band was seen by Reese extending from 169° (I) at the south edge of the NEB to 179° (I) at the SEBn. The band completely obscured a ten-degree section of the SEBn but only partially obscured the fainter EB. It may be significant that the SEBn was observed broken near 179° (I) by Hare on July 5 and 6 and by Reese on July 24 with no bright cloud visible anywhere in the vicinity. D. R. Monger observed this break in the SEBn near 170° on July 17. "In the area where the belt should have been was a rather large bright area that was seen easily, once it was located." Is it possible that the break in the SEBn resulted from a disturbance beneath the visible surface from which whitish vapors were erupted at irregular intervals?

SEB Disturbance. On July 20 Hare found the SEB tranquil near 150° (II). The first indication of the impending storm was a narrow dark column extending across the SEB near 156° (II) observed by Hare on July 23. This dark column was seen on July 25 by Monger, O'Toole and Reese near 152° (II). A small, intensely brilliant spot was then seen on the north edge of the SEBs immediately following the dark column. Three days later, on July 28, an amazing development had occurred. The dark column was now near 146° (II) and it extended from a dark spot on the SEBs to another dark spot on the EB. Just following this column was a large bright band about seven degrees wide extending from the south edge of the NEB all the way to the SEBs. Hare and Reese agree that this band obscured the SEBs but did not even dim the narrow SEBn. A large cloud of dusky matter greatly resembling smoke was seen stretching across the EZ from the dark SEB column to a projection on the south edge of the NEB which preceded the column by some thirty degrees! A peculiar attraction seemed to exist between the SEB column and the dark projections on the south edge of the NEB. By August 1 the difference in rotation between the SEB column and the south edge of the NEB had brought other NEB projections into the vicinity of the column. Dark streaks had also been drawn from these projections into the SEB disturbance. It is interesting to note that on this date O'Toole and Reese agreed that the SEBn was completely obscured by what appeared to be a small remnant of the once great white band. Does this indicate that the band was at a higher level in the atmosphere of Jupiter on August 1 than on July 28? As W. H. Haas has suggested, it may be that brightness and darkness cannot serve as a criterion of the relative level of details in the atmosphere of Jupiter.

Satellite Markings. T. R. Cave and T. Cragg have made some very interesting drawings of detail on the visible surfaces of satellites III and IV. We will discuss these observations in the next report.

ACKNOWLEDGMENT

The Association of Lunar and Planetary Observers wishes to thank the Astronomical League for the many courtesies extended to it at the recent National Convention of the League on July 2, 3, and 4 in Cleveland. Those desiring to know what happened at the Convention should read pp. 246-9 of the August Sky and Telescope. Our association is especially indebted to Mr. R. R. La Pelle, Activities Chairman of the League. Mr. La Pelle acted as Chairman of the A.L.P.O. Delegation (non-voting) to the Convention and directed the discussion of several phases of our observational activities. Our other Delegates were J. P. Dow, R. Missert, and C. P. Richards, whom we thank for representing us at what was evidently a very enjoyable astronomical gathering.

-*-