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ALL DATES AND TIMES BY U. T.

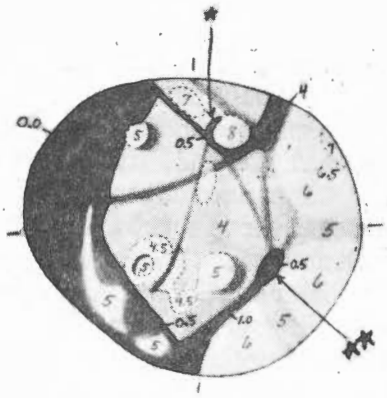

Fig. 1. Crater Conon
E. J. Reese. 6-in. Refl.
Dec. 30, 1949. 1^h 30^m.
240X.
Colong. = 31°.0

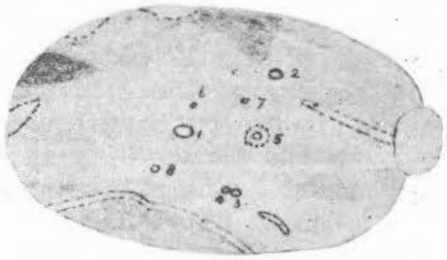

Fig. 2. Crater Plato
E. K. White. 7-in. Refl.
Nov. 6, 1949. 5^h 45^m.
200X.
Colong. - 96°.2.

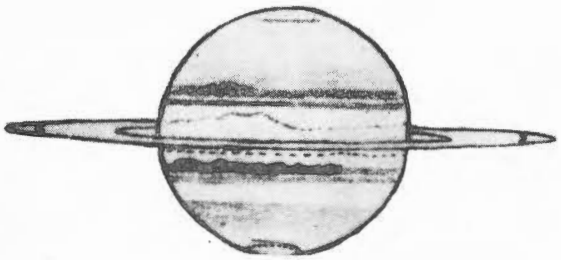

Fig. 3. Saturn
T. Cragg. 6-in. Refl.
Feb. 28, 1950. 7^h 35^m.
208X.

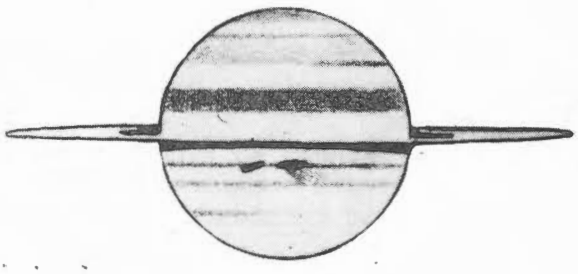

Fig. 4. Saturn
D. O'Toole. 6-in. Refl.
Jan. 24, 1950. 14^h 45^m.
185X.

Fig. 5. Mars
T. R. Cave. 8-in. Refl.
March 16, 1950. 7^h 52^m.
320X to 550X.
C.M. = 209°.

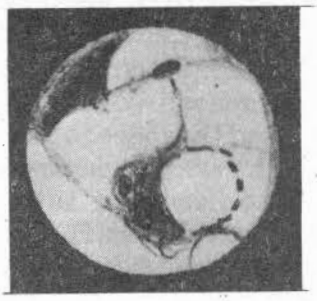

Fig. 6 Mars.
Winterberg
7-in. Refr.
March 21, 1950.
0^h 50^m.
371X.
C.M. = 62°

Fig. 7. Mars
F. E. Brinckman.
6-in. Refl.
Feb. 13, 1950.
8^h 30^m.
230X.
C.M. = 133°.

CONVENTION AT KANSAS CITY

We learn from Mr. Russell C.Maag. 611 Bluff St., Fulton, Missouri, of plans for a convention of amateur astronomers of the Central States at Kansas City, Missouri, on June 17 and 18, 1950. Everyone is welcome, and we hope that many of the members of the A.L.P.O. living in the area will attend. Those interested should write to Mr. Maag for detailed information. The convention is sponsored jointly by the Kansas City Amateur Astronomers and Telescope Makers and the Central Missouri Amateur Astronomers Club, Fayette, Missouri. The meetings will be at the Kansas City Museum, 3218 Gladstone Blvd. There will be a charge of one dollar per person for registration and two dollars per person for the banquet on the evening of June 17. Meals and lodging will otherwise be the individual's responsibility; Mr. Maag will be glad to furnish a list of hotels, motels, etc. in Kansas City. Papers ten minutes in length may be submitted to Mr. Maag on any phase of amateur activity in astronomy. Those attending are requested to bring along their telescopes, astro-cameras, photographs, etc.; for ample space has been alloted in the museum for astronomical exhibits. Other items on the program include a demonstration of the Spitz Planetarium at the museum, a star-party if skies allow (astronomical movies otherwise), and discussion of future organizational plans.

VENUS NEAR INFERIOR CONJUNCTION

by T. R. Cave, Jr.

As Venus approached the inferior conjunction of January 31, 1950 and the planet became considerably more difficult to observe, activity might have been expected to decline. The Recorder is most happy to report, however, that a very considerable amount of work was done then by members of the Venus Section. Those reporting for this period were: Dr. J.C. Bartlett, 3½" refl.; Mr. L. Bellot, 6" refl.; Mr. P. D. Bevis, 6" refl.; Mr. F. E. Brinckman, Jr., 6" refl.; Mr. T. R. Cave, Jr., 8" refl.; Mr. P. Chorley, 3½" refl.; Mr. T.A. Cragg, 6" refl.; Mr. E. L.Forsyth, 6"refl.;Mr. W.H. Haas, 6" refl. & 3" refr.; Mr. E.E. Hare, 12" refl.; Mr. M. B. B. Heath, 10" refl.; Mr. L. T. Johnson, 10" refl.; Miss H. Koyama, 8" refr.; Mr. H. LeVaux, 6" refl.;Mr. B. Lane, 6" refl. & 3" refr.;Mr. S. Murayama, 8" refr.; Mr. A.W. Orton, 6" refl.; Mr. D. O'Toole, 6" refl.; Mr. G.D. Roth, 4¼" refl. All apertures are given in inches.

We wish to acknowledge and welcome the observations this month from Mr. G. D. Roth of Munich, Germany, who has contributed a number of excellent drawings, employing his 4¼" Brachyt reflector with various color filters.

THE DARK HEMISPHERE - It is rather significant that nearly all observers reported observing the dark hemisphere of Venus during January. To some it appeared dark; to others, light, with respect to the sky-background. To a few it was even by turns both light and dark, changing in only a few days. Orton, observing on Jan. 1 (Universal Time here and later), noted the previously reported peculiar "Area A" or "Lens Area" on the unilluminated portion of the disc (refer to our January and February, 1950 issues) to be of a somewhat larger area than the crescent phase. Haas noted on Jan. 7 that the dark hemisphere was darker than the sky with Wratten Filters #47 & #58 but was invisible without filters. Haas usually found the "Lens Area" darker than the sky during most of January. He measured the angular width (perpendicular to line of cusps) of the "Area" to

be 55° on Jan. 7. Bevis and Bellot were in excellent agreement with Haas on this same date; measurements of their drawings indicate the angular width to be 53° in the sketch by Bevis and 57° in Bellot's. Bartlett on the same date found this area lighter than the sky and the narrow region bordering the terminator; Brinckman observing two hours later on the same date noted perhaps a very similar appearance. Johnson strongly suspected the dark hemisphere to be lighter than the sky on Jan. 8, using several Wratten and Kodachrome filters. O'Toole easily observed the dark hemisphere as darker than the sky in early January; however, on Jan. 13 he found this hemisphere lighter than the sky without filters and with red and amber filters but pronouncedly darker than it with a neutral screen. Cave found the entire dark hemisphere very slightly lighter than the sky on Jan. 16, but LeVaux thought the unlighted portion of the disc darker than the sky-background on Jan. 15 and Jan. 20. Haas on Jan. 22 measured the east edge of the "Lens Area" to be 3°.3 west of the central meridian of Venus and the angular width to be 65°.2. He thinks that this edge remained nearly stationary near the C.M. during January, the angular width increasing as the crescent narrowed. The well-known English observer of Venus, Mr. M.B.B. Heath, observed on several occasions during January the "Lumière Cendrée" (phosphorescence of the dark hemisphere) and also a darker appearance of much of the unlighted hemisphere, using his excellent 10" Calver reflector in both daylight and twilight skies.

ANGULAR PERIMETER OBSERVATIONS - Haas was able to observe Venus on numerous occasions during January, and his fine report is extremely complete. He often measured the angular perimeter on drawings or estimated it and near the end of the month saw the cusp-extensions as very fine lines nearly completing the circle around the dark hemisphere. On Jan. 7-8 he measured the perimeter to be 200°; on Jan. 15 he estimated it as 190°. He noted it to be generally increasing after this time and on Jan. 27 found it to be 215°. On this date Lane, observing with Haas and employing a 3" refractor, thought it well over 200°. LeVaux on Jan. 27 found the perimeter to be 210°. On this same date Hare estimated it to be 200°, while on Jan. 25 O'Toole found it to be 210°. During the last few days of January and the first days of February Johnson, Haas, Hare, LeVaux, O'Toole, Cragg, Murayama, and Koyama all found faint lines of light extending along the limb for dozens of degrees beyond the normal cusps. Using the superb 8" Zeiss refractor at the Tokyo Science Museum, Murayama and Koyama observed with 60 X at the time of inferior conjunction, Jan. 31, $7^h\ 0^m$, and, to quote from their observation:" We used the 8" and could catch the planet easily. Then Venus looked like a narrow ring line, its angular perimeter being 250°-270°; and it is interesting to note that the broadest part of the ring was at about 20°-25° eastward from due south. The eastern cusp was far more prolonged than the western one, although these were very difficult to see because of the brightness of the sun."

HAAS' CLOUD BULGE - In the March, 1950 issue we discussed this feature. A few more observations are now available. On Dec. 31 Haas found this bulge to have an altitude of about 2.1 miles by the method described in the March issue. On Jan. 7-8 he found that the "latitude" of the center was 18° north, and his height calculations now gave a value of 3.3 miles; thus the "cloud" appeared to shift about nine degrees north from Dec. 31 to Jan. 7. A higher portion of the cloud may have projected upon the terminator on Jan. 7. "Latitude" is here used as if the phase - cusps and the poles of rotation coincide.

ABOUT THE DARK HEMISPHERE - Mr. Arthur W. Orton of San Bruno, Calif., perhaps has cast some new and interesting light upon the cause of the peculiar appearances recently seen on the unlighted hemisphere of Venus. Mr. Orton tried a field bar experiment and after several tries feels that diffraction explains to

some degree the appearance of the phosphorescence of Venus. He placed the illuminated crescent behind the field bar; in this position the faintly illuminated dark hemisphere seen when the planet was not hidden completely disappeared. He later tried another interesting experiment by cutting out a white crescent of paper and placing it on a blue-violet background. When observed under moderate light from a distance of twelve feet, the entire area between the cusps appeared darker than the blue-violet background.

REMARKS BY THE RECORDER - This article concludes the discussion of observations by the Venus Section during the period from May, 1949 to Jan., 1950, or of the evening apparition of Venus. It is planned in future months, while the planet is in the morning sky, to report less frequently on the work of the Section. Regular reports will probably be made only every three or four months. The Recorder would like strongly to urge all Venus observers to observe whenever possible and convenient while the planet is in the morning sky. He also wishes to thank most sincerely the many observers who have contributed such excellent work to him and hopes that they will resume their regular observing when the planet is again in the evening sky.

Notes by Editor. The experiments by Mr. Orton deserve much praise and may well shed light on the cause of the visibility of the dark hemisphere. Such experiments should by all means be repeated and extended by our readers.

The bulge near the middle of the terminator that was persistently visible to Haas from December 23 to January 9 might well argue for a very slow rotation of Venus; the cloud should not otherwise have been on the terminator for so long. An alternative interpretation could be that what was seen was part of a cloud-zone encircling much or all of the planet. The approximate average velocity of the northward drift of the cloud from December 31 to January 7 is 3 miles per hour.

HOW NARROW A LINE CAN WE SEE ON MARS?

by David W. Rosebrugh

On page 180 of Percival Lowell's Mars and Its Canals he points out that it is impossible to measure with a micrometer the widths of the canals on Mars because the micrometer cross-hairs appear wider than the canals. Only by comparison with tests made on lines here on the earth can the widths of the canals of Mars be inferred. Lowell also discusses this matter on page 271 of Mars as the Abode of Life. Summarizing the comments in both of Lowell's books, a rusty wire 0.0726 inches in diameter could be "well glimpsed" against the sky at 1800 feet, at which distance its angular width was 0".69. When Mars is apparently 14" in diameter and a power of 310X is used, this corresponds to a line about 3/4 of a mile wide. Considering that both light and definition are lost in telescopic views of Mars, Lowell adopts 2 miles as the width of a Martian canal which could be barely perceived.

When the writer read Lowell's notes it occurred to him that the canals on Mars may present less contrast against their surrounding backgrounds than a wire seen against the sky (which appears black against light blue, whatever the color of the wire) and may therefore be less visible than tests on such a wire would indicate. Casual observations in the summer of 1949 indicated that a telephone wire in Lime Rock, Connecticut, was perfectly visible with a sky background; but where it passed in front of a tree background (which might be considered as a mottled background) on the slopes of nearby Forge Mountain, it became totally invisible.

Some tests were therefore made with various colored wires against various colored backgrounds. Summarizing the results in three sentences, these tests indicate that wires seen against a plain buff-colored background must appear twice as wide, and against a copper background five times as wide, to be as visible as the same wires seen against a sky background. If mottled backgrounds had been used, these factors might have been higher; it may in fact be that the copper background can be considered as mottled and that this accounts for its larger factor. For the colors of the wires to be distinguishable they must appear to be from 5 to 26 times wider than the minimum apparent width of wires which are visible against the open sky.

DESCRIPTION OF TESTS.

These were made on Dec. 25 and 29, 1949 in Boston, Mass., under conditions of good seeing as shown by solar observations. The tests of the wires against the sky background were made on January 7, 1950 at Waterbury, Connecticut, with poor seeing as shown by solar observations. All tests were made around noon time in sunny, cold weather. The tests were made with 6 cotton-covered wires each 0.0085 inches in diameter outside the insulation. The 6 wires were dipped in various colored Higgins drafting inks in order to dye the cotton covering. The colors used were undyed white, blue, green, red, brown, and black. All colors would be described as strong and brilliant except the brown and black.

The following backgrounds were used:

(a) sky near horizon, in west, southwest, and southeast.

(b) plywood, the ordinary ½" article of commerce, not new but not particularly weathered.

(c) sandpaper 3/0 Flint Paper, made by Carborundum Co., very even and fine and matte in appearance.

(d) a piece of yellow or buff colored drafting paper chosen to represent as nearly as possible the general average color of Mars to the eye and binoculars. It is darker than a grape-fruit rind but considerably lighter than an orange in color. The surface is smooth but not glossy.

(e) a piece of roofing copper, weathered so that most of the metallic shine is gone, still very red and coppery in color without any patina of green. This is the only background used which could be described as mottled.

(f) a piece of green baize or felt, apparently identical with that used on the surface of billiard tables.

Notes on the above tests:

The wires were held vertically and for all but the sky background tests were viewed with the sun behind one's back and one's shadow pointing towards the wires. This was to try to make the wire shadows lie behind the wires so as to be hidden by the wires and not to increase their visibility. All tests were made using the right eye only. The writer's right glasses lens is described in the oculist's prescription as"-4.00 dioptres, cylindrical axis 165, cylindrical correction -1.25 dioptres, 2.5 dioptres prism base up, to correct muscular unbalance between the right and left eyes." It can be judged that his eyesight is not of the best. All tests were made with wires seen <u>distinctly and continuously</u>. The writer found evidence that his eye tired quickly so that the "distinctly and continuously" criterion was used to give as consistent results as possible. During the tests the writer noticed evidences of diplopia, which is one of the suspected causes of the gemination of the Martian canals; but this line of research was not followed further. There are no doubt many possible sources of uncertainty in the writer's tests, among them being: (a) Does poor atmospheric seeing

affect the visibility of these narrow lines? (b) Is the sensitivity of the human eye the same with night vision as with day vision, with which these tests were made? (c) The lines (wires) used present clear sharp edges. If they had been irregular-edged (like assumed vegetation on Mars), would they have been less easily visible?

The results of the tests which are reported below are all in seconds of arc. When Mars is of 14" angular diameter and is viewed with 300X these seconds of arc correspond directly to miles on Mars since 14" x300 equals 4200" and Mars is about 4200 miles in diameter.

Calibration Tests

To check the writer's eyes against the Dawes Limit artificial stars were used. Both white discs against a black background and black circles against a white background were used. There was no significant difference. As shown in Table D the writer could see "stars" 262" apart distinctly and continuously. If viewed on Mars, when it is 14" in apparent diameter, with a 6-inch telescope at 300X this would correspond to two objects 262 miles apart on its surface, at a separation of 0".873. Dawes Limit would be 0".76. The writer has separated stars 0".6 apart at 450X with his 6-inch telescope so that this figure of 262" with the naked eye does not appear out of line, considering that it was found in daylight using artificial stars instead of at night with real stars.

TABLE A

Visibility of 6 colored wires 0.0085 inches in diameter seen against blue sky. Wires distinctly and continuously seen. Perhaps there was some indication that the black wire was more easily seen than the white, green, blue, red, and brown wires.

Direction Looking	Distance Seen	Width
West	48.2 feet	3".02
South	50.1	2 .91
Southwest	48.2	3 .02
Wires in shadow to west	51.5	2 .83
Average	49.5	2 .95

TABLE B

Different colored backgrounds
Minimum Visible Widths

Color of Wire / Background	White	Blue	Green	Red	Brown	Black
Plywood	7".7	6".5	5".4	6".3	5".5	4".1
Sandpaper	6.9	5.4	6.0	5.2	5.4	5.2
Buff paper	5.9	5.8	5.8	5.8	5.8	5.5
Copper	23.7	12.4	14.3	10.7	12.4	12.6
Green baize	3.6	6.0	4.2	4.5	8.2	10.0

If the above data are plotted using the seconds of arc as ordinates and white, blue, green, red, brown, and black as equally spaced abscissae, it will be apparent that there is little significant difference between the plywood, sandpaper, and buff (or yellow) paper backgrounds and that the black wire is more

easily visible than the white wire against these backgrounds. The blue, green, red, and brown wires are all about equally visible. Against the green baize background, however, white is more easily visible than brown or black. Against the copper background all colors were poorly visible, particularly the white wire. This background might perhaps be considered as the only one which was mottled to any extent.

TABLE C

Distance at which the color on the wires was perceptible (Only the buff, or yellow, background was used.)

	White	Blue	Green	Red	Brown
Distance in feet	2.34	3.75	4.27	8.77	1.86
Seconds of arc	62.5	39.0	34.2	16.7	73.8

Red maintained its color to a greater distance than the others; brown, to a lesser distance. When viewed from greater distances all wires looked black.

TABLE D

Distance at which artificial double stars could be seen separately, distinctly, and continuously

Size of stars	Inches center to center	Feet Distant	Seconds of arc
Small	0.137	9.1	262
Medium	0.206	11.0	320
Large	0.376	18.5	348

There is a suggestion here that the smaller artificial stars are more separable than the larger. Can this be owing to more atmospheric unsteadiness at the longer distances?

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It will be noted that Lowell was able to "well glimpse" a wire of 0".69 width, and one of 1".03 was distinctly visible against the sky. The writer's results should be compared to the latter. They indicate that the writer's eyes are not very sensitive to thin lines, for he cannot see them continuously until they subtend 2".95. On the artificial stars the writer's eyesight seems more adequate. Perhaps his work on variable stars has helped his eyesight in this regard. In Table D the figure 262" corresponds to about 1.15 times the Dawes Limit. Despite the writer's poor showing on the wires, he can detect a wire against the sky 1/89th as wide as his own "Dawes Limit." (262" ÷ 2".95 equals 89). Perhaps others, especially with eyes trained on the planets, can do better.

And now to answer the question postulated by the title "How Narrow a Line Can We See on Mars?" The writer can, of course, only speak for himself. His readers will wish to apply such correction factors to their own cases as they deem expedient. If we consider a canal as green on a buff (yellow) background, by referring to Table B one notes that the writer can see such a line if it is 5".8 wide. This corresponds on Mars, when Mars subtends an apparent angle of 14", with 300X to 5.8 miles wide. If we multiply this by a safety factor of 3, as Lowell did, we get 17 miles wide. This is somewhat less than Lowell's width of

Nilosyrtis, which he considers as 25-30 miles wide, and is about Lowell's width of the larger canals, which he considers to be about 15-20 miles wide. Such little observing as the writer has done on Mars seems to indicate that these test results may be a little optimistic in his case; but he cannot seriously argue with their validity as the writer has seen Nilosyrtis on a number of occasions and some of the other canals with extreme difficulty on many occasions with his 6.2-inch refractor, using powers of 186X and 280X.

Note by Editor. We thank Mr. Rosebrugh for his article and congratulate him upon the tests which he carried out. More experiments with artificial discs of this kind are much needed in planetary astronomy and might shed light upon many puzzling problems. It is perhaps surprising that the difference in color between a line and its background appears to affect the visibility of the line so little. Mr. Rosebrugh's address is 79 Waterville St., Waterbury 10, Connecticut.

SOME CURIOUS OBJECTS—METEORITIC PERHAPS

Writing on April 9, 1950, Mr. Tsuneo Saheki of Osaka, Japan, tells us that "an amateur in Tokyo observed a very brilliant spot appearing on the south-southwest limb of Mars for 2-3 seconds on March 24, 11^h 45^m, with his 15 cm. reflector, 146X". Unfortunately, no one else was observing Mars at the time as far as he knows. Mr. Saheki uses west to mean to the right in a simply inverted view with south at the top. The date and time are by U.T. Since the central meridian on Mars at the time was 196°, the brilliant spot must have been at a high southern latitude near longitude 286°-probably over Hellas. Two possible interpretations of such a transient brilliant spot are that it was either the flare caused by the impact on the surface of Mars of a giant meteorite or a fireball of extraordinary brilliance in the atmosphere of the planet. The distance of the planet on March 24 was about 60,000,000 miles; it follows that a luminous object was then 28.9 stellar magnitudes fainter at the distance of Mars than at a distance of 100 miles. This difference may be compatible with a meteoritical interpretation, for there is evidence that terrestrial fireballs and meteoritic impact-flares are very rarely as bright as the sun, or of stellar magnitude-27. An object that bright at a distance of 100 miles would be of stellar magnitude 2 at a distance of 60,000,000 miles and would thus appear to an observer to be "a very brilliant spot."

On the other side of the world Mr. R. Rigollet has communicated an observation of a temporary, stationary, bright spot on the moon by Mr. Albert Hestin, an A.L.P.O. member at Acy-en-Multien (Oise), France. Mr. Hestin was observing with a 31 cm. (12-inch) reflector at 65X on March 26, 1950, at 18^h 56^m, U.T., when his attention was caught by a bright spot not in the lunar region that he was examining. "The brightness of this glow having immediately attracted his attention, he had time to turn his gaze toward it and to look at it directly for a fraction of a second before it disappeared." (This quoted sentence was translated by the editor.) The sky was very clear, and the seeing was fairly good. Mr. Hestin estimated the stellar magnitude at 6 and the angular diameter at 10". The spot was diffuse and nebulous and was yellowish in color. The moon being near the first quarter, the spot appeared on the earthshine in the vicinity of Landsberg; the lunar coordinates were about 40° East, 4° North. Mr. Hestin "is entirely affirmative upon the objective reality of the object he saw." The appearance and disappearance were rapid but were certainly not instantaneous.

It appears to the editor rather unlikely that a lunar meteor (in a very rare lunar atmosphere, of course) would have an angular diameter of 10". It is more probable, he thinks, that this object was a meteoritic impact-flare, with irradiation perhaps greatly increasing the apparent size. There is also a curious resemblance in appearance to eighteenth and nineteenth century observations of temporary bright spots on the earthlit moon by Herschel and Schroeter, among others. However, these spots of the past endured for a number of minutes, according to the observers, while Hestin's spot lasted for a few seconds or less.

Writing about the interpretation of J. J. O'Neill's dark object against the moon (pg. 6 of April issue), L.T. Johnson points out that the velocity of a bird would be greatly affected by the wind at its altitude. He thinks that with a good tail-wind, a bird might occasionally attain a velocity of over 100 miles per hour. Would it be possible to obtain information about winds at various altitudes at O'Neill's station at the time of his observation? Johnson further remarks that he counted several hundred migrating birds against the full moon one evening in the autumn of 1940 (?) with a 3-inch refractor at the Washburn Observatory and that these birds were usually in fairly good focus (as O'Neill's object was).

SOME LUNAR AFFAIRS

Figure 1 on pg. 1 may be regarded as typical of Mr. E. J. Reese's many excellent drawings of the crater Conon. Referring to the map of Conon on pg. 1 of the February issue, the reader will see clearly that Reese has here represented Fault B, Cleft V, and Streaks V, A, and Z. It will be noted that Reese on this date found Fault B dark, conspicuous, and unbroken. At the position indicated by the star Reese remarked a dark shading on the inner west wall of a craterlet, a shading seen well by L. T. Johnson on November 30, 1949 at colongitude 26°.8. (Colongitude is the eastern longitude of the sunrise terminator.) The dark spot indicated by the pair of stars on Figure 1 was observed also by T. Cragg on the same date (December 30). On March 29, 1950, Conon was drawn independently under mediocre conditions by Cragg and W. H. Haas only 30 minutes apart; each used a 6-inch reflector, and the colongitude was about 36°.1. Haas saw Fault B; continuous and very dark, it impressed him as being the shadow of a ridge (as Hare has seen it with his excellent 12-inch reflector). Cragg probably drew the southwestern half of Fault B; he also depicted several dark streaks on the floor itself, all of which escaped Haas. One of these might be Cleft V. Both observers saw Q and O (refer to map) as white areas on the floor.

We have spoken often of the bright spots and streaks on the floor of Plato in past issues; Figure 2 on pg. 1 is a good representation of what an ordinary-sized telescope can show. The numbers indicate the order of decreasing conspicuousness. Numbers 3 and 4 are the twin craterlets, and number 7 is the "new" spot to which Reese called attention last autumn. H. P. Wilkins, Lunar Director of the British Astronomical Association, has had remarkable views of Plato with his recently acquired 15-inch reflector; on February 28 he was able to see fully 30 spots on the floor, the colongitude being about 50°. Mr. Wilkins has recently occupied himself with estimates of both the conspicuousness (depending upon size and brightness) and frequency of visibility of a number of the floor-spots. A short summary of his results in a communication dated March 15 suggests to the editor that there may well be significant variations in both conspicuousness and frequency of visibility of some of the spots studied from lunation to lunation. Of course, there are many difficulties in such an analysis. Wilkins employs the near -central craterlet, numbered 1 on our Figure 2, as a standard in both kinds of estimates.

Wilkins and his B. A. A. colleagues continue to do much good work in mapping the libratory regions, those portions of the moon which are alternately visible and invisible from the earth. In fact, he has just completed an additional Special Section of his map dealing with these regions. As an example of this work, he has sent a drawing that he made on January 26, 1950, at colongitude 8°.6 with his 12-inch reflector at 250X. The drawing shows a distinct row of craters on the interior of Demonax B, a crater near the west end of the lofty Leibnitz Mountains on the south limb of the moon.

Since the total eclipse of the moon on April 2 was observable only in the Eastern Hemisphere, the editor in March sent out a circular directing the attention of A.L.P.O. members in Europe, Asia, and Africa to this event. We know at this writing that the eclipse was observed in England and Japan. In Japan, however, the eclipse began late in the night; and it was not possible to look for possible lunar meteors or possible eclipse-caused changes. Mr. S. Murayama did secure some photographs of the eclipse at the Tokyo Science Museum. From Osaka Mr. T. Saheki reports a curious faint illumination of the dark (east) limb as the moon advanced into the umbra; the aspect was just the same as on a crescent moon two or three days old (see below). The observations in England have been communicated by H. P. Wilkins. Colors seen there were not prouounced, perhaps because the moon did not enter deeply into the umbra. The eclipsed parts of the moon were chiefly a dirty gray without much coppery hue; the edge of the umbra was perhaps bluish gray. Mr. P. A. Moore with a 9-inch telescope saw "no changes in Linné or other objects."

We mentioned on pg. 7 of the April issue a curious faint illumination of the limb of the earthlit hemisphere observed in Japan in January. From February 19 to 21 Messrs. Saheki and Murayama saw the very same appearance again. Murayama employed in his views a number of color filters and concluded that a violet filter showed the limb-illumination clearly and distinctly. Presumably, then, its visual radiation is chiefly near the violet end of the spectrum. On March 20 and 21 about a dozen Japanese observers of Mars "completely confirmed" this illumination of the limb while meeting at the Tanakami Observatory; they used both reflectors and refractors ranging in aperture from 2 inches to 18 inches. Writing on April 6, Saheki expresses the opinion that there is now no doubt of the existence of this illumination but that the important matter is to determine its cause and nature. J. C. Bartlett writes of having often had an impression of a pale blue radiance from the east limb of the earthlit moon; there would appear to be significant agreement with Murayama's results with color filters. However, Bartlett has not noticed variations in the appearance (see April issue). It would appear quite possible that photographs of the earthlit limb in blue, violet, and ultraviolet might yield significant information. Let all equipped readers please notice.

Many readers will recall Dr. J. C. Bartlett's article "Grimaldi, a Lunar Enigma" in our February and March, 1949 issues. Our contributor on April 4 at colongitude 109°.5 found the general color of the floor of this walled plain to be dark olive-green, visible without a color filter. He noted a very dark, irregular border on the east-southeast, with a corresponding dark area on the west-southwest. Yellow and green filters made these areas much darker than the rest of the floor, which was lightened and was now sprinkled over with bright spots. On the basis of this appearance, Dr. Bartlett made a number of predictions about the later appearance during the April lunation of various features on the floor of Grimaldi. Since future events are always the test of the prophet's wisdom, <u>it is very much desired to receive any drawings and/or observations of the floor of Grimaldi made by A.L.P.O. members during the April lunation</u>

subsequent to April 4. These should be immediately submitted either to the editor or to Dr. Bartlett, whose address is 300 No. Eutaw St., Baltimore 1, Maryland.

D. O'Toole has offered some interesting, if admittedly speculative, suggestions about puzzles raised by the visibility of detail in Fracastorius, as reported on pp. 7-8 of the April issue. He proposes that lunar atmospheric mists cover the floor at sunrise and for some time thereafter; the hills and mounds rise above the mists and are seen, but the craters are concealed. When O'Toole saw Fracastorius on the sunrise terminator at colongitude 328° on July 30, 1949, he remarked two large, light, faint areas which looked like possible clouds to him. They are dimly visible on an enlargement of a photograph that he took at the time. The editor confesses that he is no longer willing to infer lunar atmospheric obscurations only from diffuse appearances of detail. Bitter experience has shown that poor seeing or telescopic inadequacies can produce quite the same appearances! It is safer to inquire, for example, whether the diffuseness varies independently of the solar lighting. However, he heartily endorses a suggestion by Mr. O'Toole that Fracastorius be examined carefully near colongitude 328°. These near-future times and dates, all by Universal Time, are favorable for such studies: June 20, 3^h; August 18, 1^h; and October 16, 1^h.

MARS IN FEBRUARY, MARCH, AND APRIL

It has been very pleasing to notice that many of our members have kept observing Mars. During the last month we have received reports from D. P. Barcroft (6-inch refl., 10-inch refl.), J. C. Bartlett, Jr. (3.5-inch refl.), L. Bellot (6-inch refl.), P. D. Bevis (6-inch refl., 10-inch refl.), C. R. Bohannon (13-inch refl.), T.R. Cave, Jr. (8-inch refl., 12-inch refr.), P. Chorley (3.5-inch refl.), T. Cragg (6-inch refl., 12-inch refr.), S. Ebisawa (7-inch refl., 8-inch refl., 8-inch refr., 12-inch refl., 18-inch refl.), P. F. Froeschner (6-inch refl.), Gerstenberger (7-inch refr.), W. H. Haas (6-inch refl.), E. E. Hare (12-inch refl.), L. T. Johnson (10-inch refl.), J. E. Lankford (5-inch refr., 12-inch refr.), Meyer (7-inch refr.), S. Murayama (8-inch refl.), D. O'Toole (6-inch refl.), E. Pfannenschmidt (3-inch refr., 5-inch refl.), T. Saheki (8-inch refl.), and Winterberg (7-inch refr.) - a total of 21 observers! Several of the instruments listed are at professional observatories. Mr. Ebisawa obviously improves his travels to observe with the telescopes of his friends.

Mars will be receding during May, though still close enough for regular and careful studies of detail. The angular diameter will diminish from 12".3 on May 1 to 9".8 on May 31. The north pole will be tipped toward the earth by 23 to 25 degrees during the month. Quantity ⊙ will range from 111° on May 1 to 126° on May 31, the season thus being early summer in the northern hemisphere.

The Japanese observers have been able to construct a very interesting history of a cloud-projection on Mars. It was first seen as a slight bulge on the limb by Ebisawa with his 7-inch reflector on March 29 at C. M. 139° (central meridian of longitude) and was still present, though difficult, at C. M. 155°. The projection was on the sunset limb of Mars at a high southern latitude. Its dull gray color was apparently very similiar to that of Saheki's gray cloud of January 15, which we have discussed in recent issues; however, Ebisawa on March 29 could see nothing at the position of the January object. Perhaps the March 29 gray cloud is related to an observation by Saheki on March 27 at C. M. 156°; there was then a rather brilliant white cloud on the south limb and suggestions

of a grayish white veil over the surface between it and Mare Sirenum. On March 31 or April 1 Murayama observed Ebisawa's cloud as a dull yellowish white projection at the same position on Mars as on March 29 but apparently less bright than then. On April 2 Saheki at C. M. 125° found the southeast part of Thaumasia apparently to be covered by a grayish white cloud and at C.M. 143° noted a dusky bluish white projection, still at the same position as on March 29. Using an 8-inch refractor in bad seeing at C. M. 149° on April 2, Ebisawa confirmed the dusky projection but could not determine its color. The last observation was secured by Saheki on April 4 at C. M. 142°; the cloud was dull white but did not project, while Solis Lacus was extremely faint and diffuse under the cloud. (As usual, all dates are by Universal Time.) We thus have good evidence that the cloud was stationary or nearly so over the southern part of Thaumasia from March 27 to April 4. The reported changes in color are very interesting but are not too easy to interpret.

Several observers have reported on the colors of features on Mars, sometimes checking them with color filters. In particular, E. E. Hare has paid close attention to colors with his 12-inch reflector and has made a number of lovely and excellent drawings in natural colors. There is fairly good evidence that from mid-February to mid-April there was a distinct difference in color between the southern maria and the northern maria (other than Syrtis Major). The former were often called blue or green; the latter were contrariwise described as gray or brown. Like Hare, O'Toole has found the canals to range in color from gray to brown. The dark polar band around the small north cap looked bluish to Bartlett on April 4, but its color has probably been chiefly gray in recent weeks. The intensely dark northern part of Syrtis Major, a region called Euxinus by W. H. Pickering, was frequently called blue or blue-black in March and April. Moreover, Cave on January 28 described this portion of Syrtis Major as "very dark blue, not green." Murayama and Saheki independently comment upon the striking difference between the blue of Syrtis Major and the green of adjacent southern maria. Saheki thinks that Euxinus always possesses this color, except when the hue is modified by thin Martian clouds. Haas, however, sometimes remarked a deep blue hue here in 1937 and 1939 and concluded then that it is perhaps chiefly visible during the summer and early autumn of the northern hemisphere, though also subject to non-seasonal variations. On March 9 and 10 near C. M. 240° Hare noted: "The southern maria were pink and brown over a darker slate or blue slate... The Utopia group was pinkish brown over slate markings....Nepenthes was brown or pink-brown." Also, on April 12 at C. M. 290° he found the lighter portions of both southern and northern maria to be filled in with a brown coloration. Even the deserts have not been quite void of interest as regards colors. Bartlett and Hare have each once remarked a distinct difference in tone between different deserts, perhaps a consequence of differing atmospheric conditions above them. Hare on March 21 at C. M. 135° could perceive only traces of a striking red coloration which he had found to affect many features in the northern and equatorial deserts in these longitudes near the middle of February. From March 9 to 15 the same observer found a pink ring to surround a whitish Elysium.

Hare wrote on March 15 that most of the canals he is seeing "have been about as narrow as Lowell drew them." They were surely narrower than in 1948 and early in 1950, he says; and Hare thinks that there must be a seasonal narrowing of canals in both hemispheres soon before the summer solstice of the northern one. In this connection it is interesting that Cave this spring has often remarked upon the straightness, thinness, and generally geometrical appearance of the canals. Moreover, some of the drawings of Bevis, Bellot, Cragg, and O'Toole show canals of remarkable narrowness. On the other hand, Chorley depicts the desert regions as composed of many areas of slightly different tones, the boundaries of

which are often canals-a rather surprising revelation for a 3.5-inch telescope. Of course, one can scarcely suppose that A.L.P.O. studies this year will settle matters which have puzzled many eminent students of the planet for decades.

If the true appearance of the canals still puzzles us, there are also riddles relating to their curious gemination, or doubling. Saheki writes that Thoth-Nepenthes was doubled from March 22 onward, and Ebisawa on that date with Saheki's 8-inch reflector drew this canal double. Cragg found Nilus canal double with the Griffith 12-inch refractor on April 1. Early in March Ebisawa and Murayama drew Nilokeras as a pair of rather widely separated canals, an aspect perhaps glimpsed by Bevis on March 29. Cave and Hare have suspected a doubling of a few canals but are doubtful that this effect is real. Hare, however, may have obtained an important clue about the much-discussed gemination. He is confident that he has observed what might be called a splitting of a canal. For example, he found Nepenthes to divide into two closely adjacent canals west of Moeris Lacus; one branch connected to Moeris, and the other joined directly to Syrtis Major. Again, what was Protonilus canal to the west of Ismenius Lacus became Deuteronilus and Tritonilus canals to its east. Such splittings as these, of course, might very well cause an impression of a doubled canal.

We now supply a partial description of surface features on Mars as our observers saw them from the middle of February to the middle of April. Those not acquainted with Martian nomenclature will find the map published in our April issue very helpful in following this discussion.

The forks of Aryn were rather difficult to separate, Cragg on one occasion comparing them to "a double star that has been resolved into two blobs of light which merge into one another." Cave and Hare report that the area between the forks is dusky, probably more so than in 1948. Hare on April 6 and 7 noted a third fork at the east (right) end of a Sinus Sabaeus extended eastward toward Margaritifer. A white area frequently seen near or between Aryn and Margaritifer in February and March was apparently a persistent cloud. Cave, Hare, Johnson, and Haas have recorded Oxia Palus as a notably dark spot at the north tip of the tapering Margaritifer Sinus. Mare Acidalium was extremely dark and prominent, perhaps the darkest large feature on Mars. Some structure has been visible inside Acidalium (Figure 2 on pg. 1 of April issue). Many observers continue to see Achillis Pons as a white lane separating Acidalium and Niliacus. Iaxartes canal was broad and very dark. On February 20 and 27 Hare found a very white area between Acidalium and the north polar band; on April 2 this same region was orange deserts. Readers may remember T. Saheki's prediction that Acidalium would show a pentagonal form after May. Such a shape to Acidalium appears already to be present on drawings by Bellot on March 31 and by Cragg on April 7. Saheki, Cragg, Hare, and Haas have seen Achillis Pons as a darker spot on Nilokeras canal between Acidalium and Lunae Lacus. On February 20 Hare found Achillis far more distinct than Lunae; and in this connection it is interesting that he then saw the deserts around Lunae to possess a rosy cast, through which gray canals showed faintly. Martian clouds over Lunae? On a number of occasions Nilokeras canal has been drawn as tapering from Acidalium to Lunae; if it is really double, perhaps the two components converge. Cave and Hare sometimes recorded Fons Juventae as a tiny dark spot and Baetis as a very thin canal joining it to Aurorae. These objects are very good tests of excellent definition in the editor's opinion. Thaumasia was void of detail for most of the observers, but a few of them did distinguish Solis Lacus and Nectar canal. Cragg on April 1 with a 12-inch refractor saw four canals radiating from Solis. Cave near the end of March considered Solis Lacus unusually faint. Saheki thinks that Martian clouds currently cover Thaumasia and conceal detail there. On February 28 he could not see Solis

Lacus when it was near the central meridian, but it revealed itself as a dark oval as it approached the sunset terminator. Saheki thinks that the clouds cleared away during that Martian afternoon. A few of the best drawings show a number of dark spots and streaks along the north border of Thaumasia.

All observers agree that detail in the northern and equatorial deserts between longitudes 70° and 170° was very faint and difficult. Saheki reports: "I saw a great many broad, dusky bands making a network and many irregular spots at the connections of the canals." Brinckman on February 13 saw more detail in Amazonis than on February 8 with better seeing (Figure 7 on pg. 1). Atlantis, between Sirenum and Cimmerium, revealed itself only as a small, faint notch on the north shore of the southern maria, according to Hare. Hare found Nix Olympica very white on February 11, March14, and March 15 but invisible on March 21. Propontis was probably lighter than last autumn, and Haas on April 16 thought it considerably lighter than even in March. Even so, it was the most conspicuous feature in its longitudes and somewhat resembled Acidalium in its general form. On March 14 and 16 Cave saw a break or bay in the north shore of Mare Cimmerium near longitude 200° (Figure 5 on pg. 1); he had observed the same feature there in 1941. In mid-March Hare found Sinus Gomer to be separated from Mare Cimmerium by a white lane. Then and again in mid-April he observed a large, darker spot to form the east (following) end of Gomer. On March 13 and 14 Haas saw Trivium Charontis and Hades canal combined into a wide and very dark band (in which band Hare perceived structure on March 14 and 15). On March 14 Haas thought Hades-Charontis "surely more conspicuous" than on March 11; however, something resembling its March 14 aspect to him had previously been drawn by Saheki on January 15, by Cave on January 31 and February 1, and by O'Toole on February 11. In the middle of April Haas found Charontis notably dark. The darkness of Cerberus canal was apparently widely variable, perhaps because of an overlying, variable, Martian atmospheric veil. Saheki on February 23 found Cerberus very faint, as Hare did on March 9 and 10. This canal was "difficult" for Haas on March 11, but on March 19 he glimpsed it as "a very dark streak" in spite of vile seeing. Cerberus was surprisingly conspicuous to Cave on March 13. Ebisawa and Murayama have drawn Pambotis Lacus as a darker spot along Cerberus canal. Elysium has been seen by many of the observers as a bright, oval region most conspicuous near the limb or the terminator. Hare, Ebisawa, and Haas have found it brightest in its west part (left part in simply inverted view). Near the middle of March Haas found it to be overlain by brilliant blue clouds when near the sunset terminator, as shown by examinations with color filters. It was less bright to him at the same C. M. on March 14 than on March 11. Hare on March 9, 10, and 14 found Elysium to be surrounded by an outstanding pink ring. Cave, Hare, Ebisawa, and Murayama have drawn Elysium as a polygonal area enclosed by chiefly faint canals. Hesperia has been distinguished as a bright strait between Cimmerium and Tyrrhenum. Little or nothing marks the position of Syrtis Minor.

The "Wedge of Casius" remains present as a huge dark shading over Utopia and vicinity. Some observers have perceived a number of darker spots and streaks within this shading (Figure 5). Saheki's "new dark spot east of Nodus Alcyonius" (pg. 11 of March issue) is really to its west as we are applying these terms to Mars. Hare, Haas, Cave, Saheki, Murayama, and Ebisawa have all seen the "new" spot in recent months. It and Nuba Lacus (editor's identification) to its east form a pair of closely adjacent and similar-looking "lakes" at the south end of the Casius shading; they are shown on Figure 6 on pg. 1 of our February issue. This "new" spot was observed in Japan in 1946 and both by Japanese observers and by some A.L.P.O. members in 1948; however, Murayama thinks that it is now more conspicuous than in those years. Murayama further tells us that the "new" spot

is faintly present upon an unpublished 1937 drawing by S. Kibe and suggests that it may hence be a seasonal effect of some kind. Hare on April 12 found the "new" spot to be faded in its southern half. Nepenthes canal was among the more conspicuous canals, though less prominent than sometimes in the past. Nilosyrtis canal was also seen by many of the observers, being perhaps especially prominent to Bellot on April 11. Hellas has often been viewed as a far southern bright region; it is brighter near the limb or the terminator than near the C. M. On April 7 and 12 Hare depicted Peneus canal as a dark streak in Hellas. The best views of Syrtis Major near opposition showed its north part, or Euxinus, to be much darker than the rest of the mare. Indeed, Haas glimpsed Euxinus to be black in fair seeing on April 14; it is of interest that he found it less dark on April 17 at the same C. M. Hare, Haas, Johnson, Ebisawa, Murayama, and Bellot have found the southwest shore of Syrtis to be indented by a whitish bay. Hare and Haas have frequently seen this feature as a large wedge-shaped notch with its apex almost at the east shoreline of Syrtis. On March 6, 9, and 10 Hare observed a whitish Nix Atlantica preceding Euxinus. During February, March, and April a prominent cloud was repeatedly seen on the sunrise limb or terminator just following Syrtis. Lankford on April 7 even recorded this cloud when well west of the C. M., using a 12-inch refractor. A whitish rift (Solis Pons?) nearly or completely severed Syrtis Major from Sinus Sabaeus. Saheki directs attention to an oasis which he has named Sakura Fons. It lies just east of Syrtis Major on Astusapes canal. Saheki writes that he "discovered" this oasis in 1937 at the Kwasan Observatory and that it was recorded by E. C. Slipher as a "new" lake in 1939. (Sakura is apparently the "new oasis" on No. 10 of Fig. 133 on pg. 218 of F. L. Whipple's Earth, Moon, and Planets.) Saheki writes that Sakura is regularly visible to him this year; it is shown on a drawing by Hare and also on one by Ebisawa. Lacus Ismenius has been easily visible. Hare on April 7 resolved Ismenius into two spots and three lines, and C. W. Tombaugh with the McDonald Observatory reflector at 30 inches of aperture on April 8 drew Ismenius as a pair of spots. In addition, Cave found Ismenius oval-shaped on April 7. Usually Sinus Sabaeus was narrow, and Pandorae Fretum was a narrow and light streak to its south. To be sure, Haas on March 4 and 5 found Sabaeus amazingly wide, as Brinckman apparently did on March 3. In April, however, Haas noted Deucalionis Regio (between Sabaeus and Pandorae) to be dusky; perhaps a variable duskiness of Deucalionis accounts for the supposed abnormal width of Sabaeus in March. Many of the observers have depicted Gehon and Hiddekel canals as the edges of a dusky region in the deserts; the same character has been imputed to some other canals.

Using his 6-inch reflector near opposition, Haas attempted to determine at how small a value of the phase-angle i the phase of the planet can be detected. He clearly saw the phase as a non-circularity of the disc on March 29 at 7^h, U. T., when i was only $5^\circ.5$ (somewhat less than its maximum value for Saturn). At that time the maximum angular defect of illumination was 0".03 or about 0.2 % of the angular diameter of the planet.