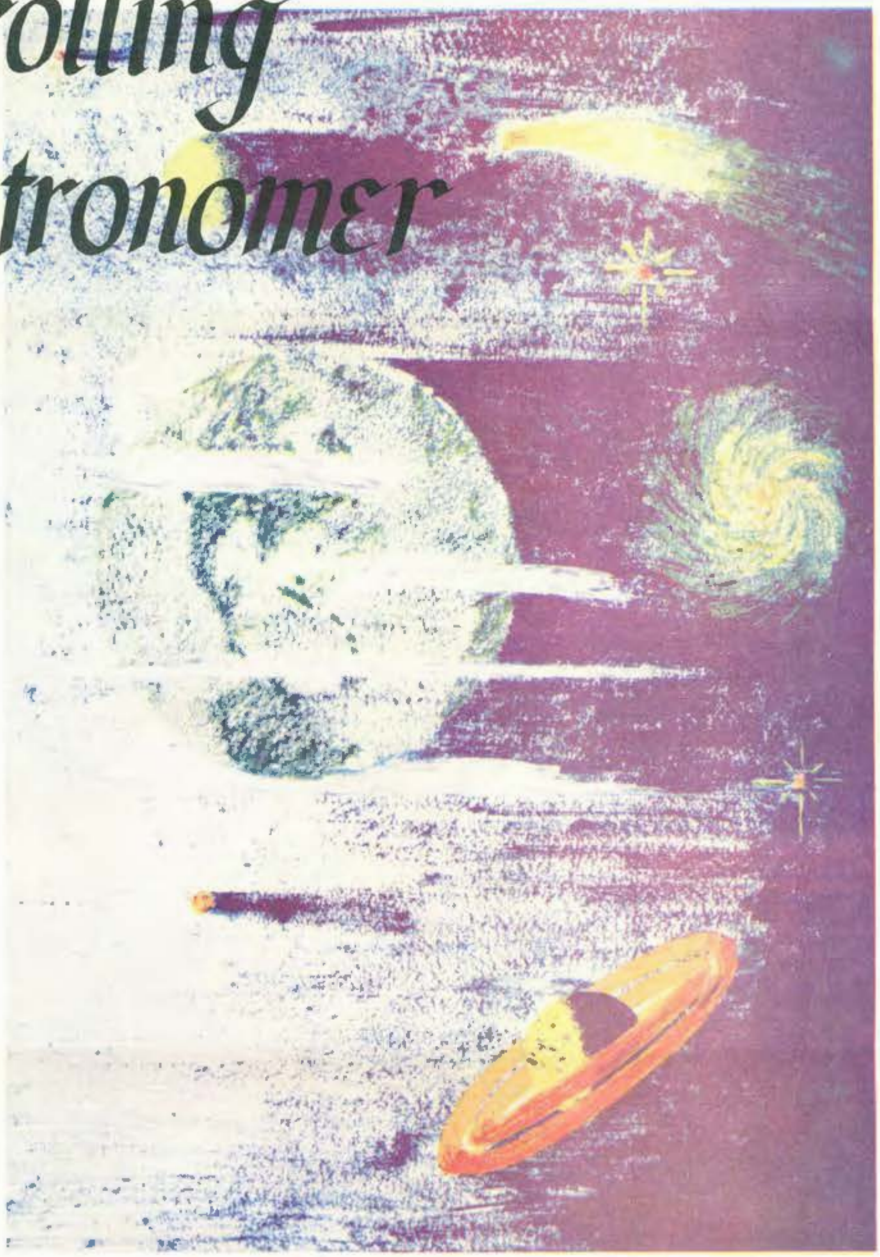
The Strolling Astronomer

Volume 6, Number 1 January 1, 1952

ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS



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NOTICE: In order to facilitate the reproduction of drawings in future issues, readers are requested to exaggerate contrasts on drawings submitted. Extremely faint marks cannot be reproduced. Outlines of planetary discs should be made dark and distinct. It is not feasible to reproduce drawings made in colors. Following these precepts will permit better reproductions.

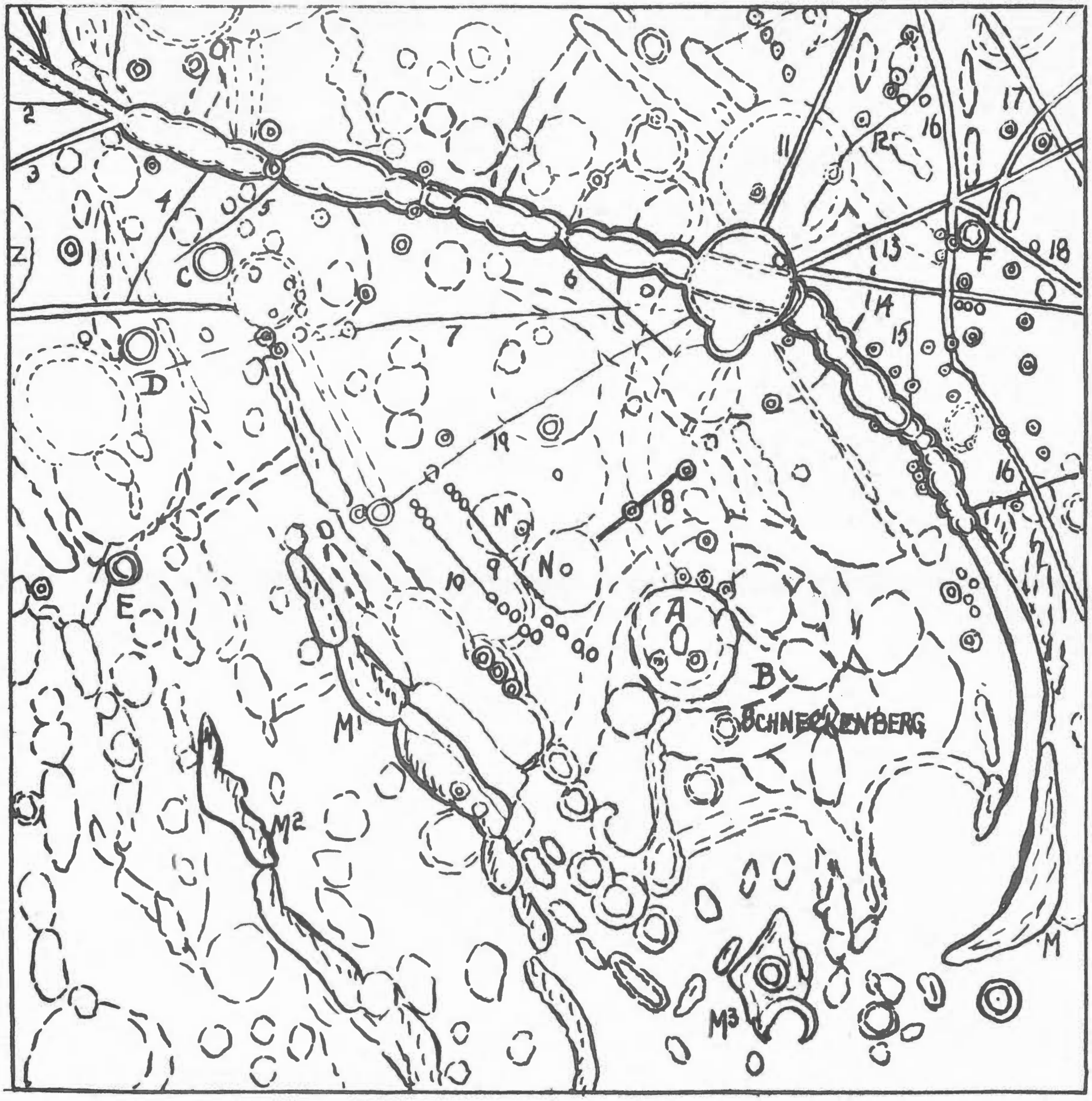


FIG. 1. Map of the Hyginus region by H. Percy Wilkins, F.R.A.S.

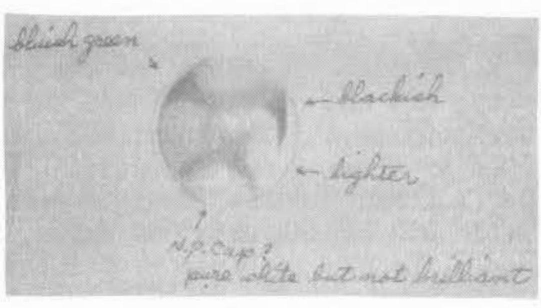


Figure 2. Mars. T. Saheki
8-inch refl. 400X.
Sept. 5, 1951. $19^h 50^m$, UT.
C.M. = 216°.

Figure 3. Mars. T. Saheki
8-inch refl. 400X, 500X.
Sept. 27, 1951. $19^h 10^m$, U.T.
C.M. = 7°.

Errata in December, 1951, Issue. Figure 1 on pg. 1 was unintentionally reproduced upside down. South is at the bottom, and west is at the right; thus both are reversed from the customary astronomical orientation. We trust that the figure looked very natural and proper to our members in the southern hemisphere! On pg. 3, line 17 Mr. Rosebrugh's street address is 79 Waterville St. On pg. 11, line 37, the angular perimeter should have been written as "$280^{\circ} \pm 40^{\circ}$". On pg. 12, line 7, it should have been written as "$220^{\circ} \pm 20^{\circ}$". On pg. 15, line 34, Mr. Mount is, of course, offering a word of caution.

ANNOUNCEMENTS

Astronomical Exhibition in Spain. Dr. Ernesto Guille Moliné, the President of the Agrupación Astronómica in Barcelona, Spain, has informed us of a Great Astronomical Exhibition to be held in Spain in March, 1952. Dr. Guille has graciously invited the Association of Lunar and Planetary Observers to contribute an exhibit. We naturally desire to send a good display in answer to his kind request. Therefore, we have already invited each of a limited number of our most active members to submit to the Director, Walter H. Haas, for use in such an A.L.P.O. exhibit a photograph and a short description of his telescope and a suitable small sample of his observational work (drawings, photographs, charts, etc.). We shall be glad to have any other interested members submit similarly a photograph of their telescope and a sample of their work. The Director will be the final judge, of course, about the suitability of all items received for inclusion in the exhibit. Since surface mail requires several weeks to go from the United States to Spain, all items submitted should be in the hands of the Director no later than February 1, 1952.

Consecutive Numbering of Pages. In Volume 6 (1952) of The Strolling Astronomer the pages will be numbered consecutively throughout the year, not merely in a given issue. It is our thought that this new arrangement will be a convenience to all those who keep bound volumes of The Strolling Astronomer, and particularly to libraries. We further hope to provide an index of Volume 6, and perhaps eventually of earlier volumes; however, final arrangements have not yet been made at this writing.

Reorganization of Planetary Observers in Germany. Mr. G. D. Roth at Munich, Germany, wrote us on November 9, 1951, that the Planet Section of the Bund der Sternfreunde has been reorganized as a new and independent group, the Planetensektion der Sternfreunde. Mr. E. Maedlow is their new Chairman. Mr. Roth holds the office of Foreign Secretary; and all correspondence should be directed to him, both about scientific work and about international cooperation. It is Mr. Roth's hope that there will be a growing collaboration between the Planetensektion der Sternfreunde and the A.L.P.O. in the future, and we invite all interested members to correspond with him on subjects of mutual interest. His address is Privatsternwarte, Muenchen 9, Lengmoosstrasse 6, Germany.

Foreword by Editor. We are glad to be able to present another lunar article by Mr. H. Percy Wilkins, 35 Fairlawn Ave., Bexleyheath, Kent, England. Mr. Wilkins is a Fellow of the Royal Astronomical Society and is Director of the Lunar Section of the British Astronomical Association. His great experience with the moon should certainly give authority and importance to what he here says about the vicinity of Hyginus. Readers should employ Figure 1 on pg. 1 to follow the discussion.

THE MYSTERIOUS HYGINUS REGION

by H. Percy Wilkins, Director B.A.A. Lunar Section

One of the most curious of lunar regions is the southern portion of the Mare Vaporum near the center of the disc. It may be described as a plain traversed by the great valley-cleft of Hyginus, in itself one of the most remarkable of lunar objects; and the district was described by the famous French astronomer, Flammarion, in his Les Terres du Ciel, pg. 467, as "un paysage bizarre extrêmement difficile à dessiner et remarquable par sa teinte enfumée....elle varie un peu, comme celle de la plaine de Platon". [Translation by editor: "a strange landscape extremely difficult to draw and remarkable for its smoky tint....it varies a little, as does the walled plain Plato".]

In March, 1878, Dr. H. J. Klein of Cologne announced, in Wochenschrift fuer Astronomie, the appearance of a crater-like depression a few miles to the northwest of Hyginus, which depression he maintained to be a new feature, or nova, hence the designation Hyginus N. No trace of this object appears in the maps of Lohrmann, Maedler, or Schmidt; but it was not long before other observers saw this depression. Drawings appeared in the Journal of the then active Selenographical Society; and in these N is depicted as a shallow saucer-shaped hollow, without a rim but full of shadow when near the terminator. Since it could not be found in the previous records but, once its existence was known, was an easy object in even a small telescope, it was considered by many observers as an instance of change. As Flammarion said, pg. 504 (I translate): "Not to have seen a thing, even when looking at the place where it may be, is no proof that it does not exist; but when observers have been numerous and attentive, and when the object is very apparent, it is hardly possible to doubt. This is the case with the new amphitheater; and the doubt that remains proceeds from the numerous irregularities of the land, which are very difficult to draw accurately."

A little to the east of N is a curious spiral formation, the so-called Schneckenberg; and between here and Hyginus Krieger, Brenner, Fauth, and other observers noted a broad valley with an offshoot towards N. To the south of N Krieger saw a smaller depression, N I, also considered to be new, and several very small pits, among which Brenner alleged changes. With regard to N itself Krieger shows a central pit, Mond Atlas, Vol. 1, plate 8, while in Vol. 2, plate 36, he shows two pits on the interior, from the more northern of which a cleft runs northeast. Immediately to the west of N is a hill, shown by Lohrmann and Maedler and also by Fauth in his map contained in The Moon in Modern Astronomy, 1906. Fauth, however, was quite wrong in asserting that the cavity N only appears as such at sunset since it is well exhibited at sunrise.

The writer has carefully examined this region with instruments of 6, 12, and 15.25 inches of aperture with the following surprising results:

The Schneckenberg is really composed of two parts, marked A and B on the accompanying chart (Figure 1 on pg. 1), which contains considerably more detail than does Section I of the 300-inch map [published in The Strolling Astronomer for November, 1950.] With the morning terminator at the west wall of Eratosthenes part A appears as a complete ring; with the terminator at the east wall of Archimedes A is a prominent object with an illuminated central hill, while an extensive shadow covers the region to the east. At this stage of illumination N appears as a shadow-filled depression. On April 13, 1951, at $19^h 30^m$, terminator just east of Hyginus at the crater F, parts A and B appeared with 15.25 inches of aperture as confluent shadowed depressions; the craterlit immediately north of F was a brilliant, flashing point of light; Hyginus itself was at the center of a large, but very shallow, hollow. Under evening illumination with the terminator just west of Julius Caesar the eastern part of A is in shadow, but B is hardly traceable. With the terminator west of Posidonius I once saw what appeared to be shadow on the western part of the interior, whereas it should have been on the eastern; the hill on the wall of B was casting some shadow; N and N I were definitely hollows. Under very low illumination, however, the entire district is seen to be very uneven and to be largely covered by comparatively small but numerous hollows of excessive shallowness, of which N and N I are the most prominent. A slight alteration in the inclination of the sun's rays almost completely alters the general appearance of this region; for with the exception of the mountain-ridges M 1 and M 2, which are 1,500 feet high, everything is very shallow, the deepest part of the Schneckenberg being only 700 feet (B.A.A. Memoirs, Vol. 36, part 1). Under high illumination numerous bright streaks traverse this region, and between these streaks are conspicuous dark patches. The Schneckenberg is sometimes bright, being so shown by L. Rudaux in 1909; but quite as frequently it is dark. Neither N nor its smaller companion N I can then be traced. Though such is the usual appearance, on April 4, 1944, at $19^h\ 45^m$, 6-inch telescope at 200X, the cavity N was very strikingly darker than its surroundings; and the southern edge of the great cleft, immediately west of Hyginus, was bordered for more than 8 miles by a narrow dark band.

On June 8, 1935, I distinctly saw what looked like a hillock within Hyginus, close to the southeast edge and south of the bank of the cleft. The instrument was a 12.5-inch reflector at 400X, and the seeing was good. Since I had not seen this hillock before and have not seen it since, it may have been a temporary cloud.

The discussion may be summarized as follows:

No trace of N or N I appears in the classical maps of Lohrmann, Maedler, or Schmidt.

Following Klein's announcement the drawings of his time show N and N I as two shallow, rimless depressions, the surrounding district being more or less level. The Schneckenberg appears as a spiral formation.

Today both N and N I are seen as cavities; but numerous, though more shallow, objects of similar nature can be seen under low illumination. Hyginus itself is seen to occupy the center of a large, shallow hollow, as though this area had subsided since attention was first especially directed to it. Under high illumination bright spots and streaks together with dark patches cover this region, and these are very variable and are not repeated even under apparently similar conditions of libration and illumination. The "spiral mountain" now consists of two distinct parts, of which the smaller and more prominent is a complete ring, eccentric within the larger which itself varies very much in apparent diameter from time to time. A smoke-like haze of peculiar tint occasionally makes its appearance and considerably alters the aspect of this region; the cavity N seems at times to be so filled, possibly due to emanations from the tiny central pit. The second pit, shown by Krieger, appears to have now disappeared; but a delicate cleft now passes through N I and along the west edge of N. The whole region seems to be becoming pitted with shallow hollows and also to be cracking, while little pits, not previously seen, are now within the reach of instruments of moderate aperture.

Obviously these indications of change call for the earnest attention of every interested reader, and for these it is hoped that the chart will prove of value.

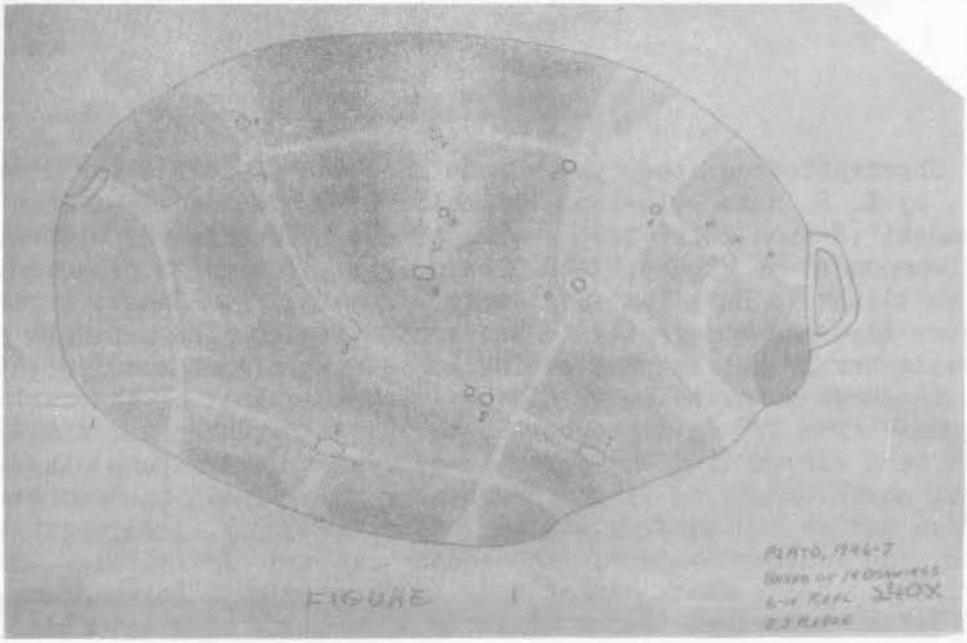
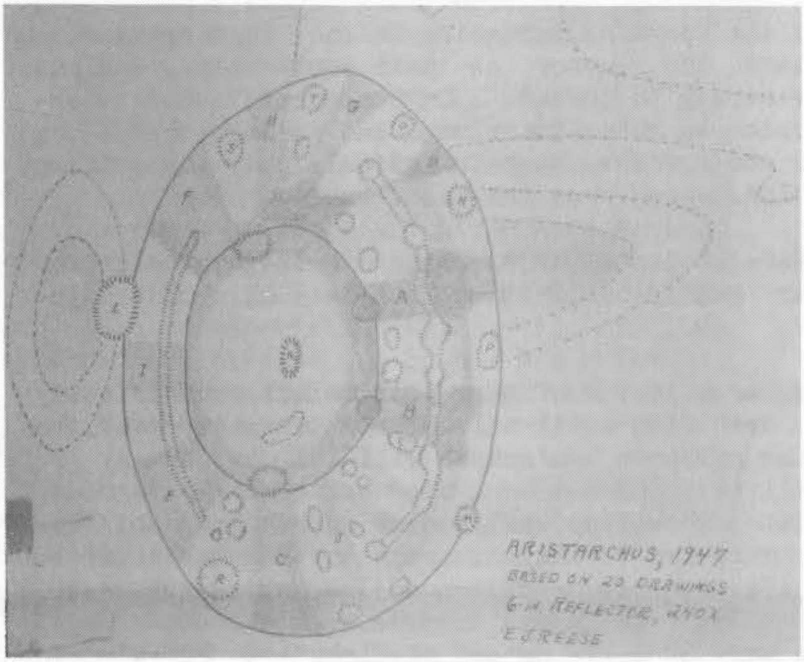


FIGURE 1



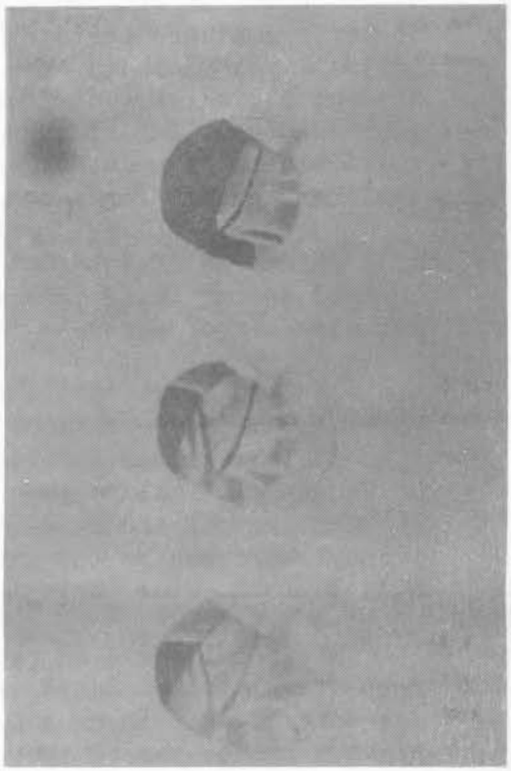


Figure 2

Figure 3 - Drawings of Lunar Crater Conon by E. E. Hare. 12-in. refl. 300X.
Upper. Dec. 29, 1949. 0^h 50^m, U.T. Colong. = 18°.5
Center. Dec. 30, 1949. 1^h 0^m, U.T. Colong. = 30°.7
Lower. Dec. 31, 1949. 0^h 0^m, U.T. Colong. = 42°.3

OBSERVATIONS AND COMMENTS

Observations of the yet remote Mars were reported in September-November, 1951, by E. E. Hare (12-inch reflector), O. C. Ranck (4-inch refractor), and T. Saheki (8-inch reflector). Two of Mr. Saheki's surprisingly good drawings are reproduced as Figure 2 and 3 on pg. 1. The north polar cap was pure white and brilliant to Hare on September 9 and 23, to Saheki from September 27 to October 11, and apparently to Ranck on November 21. (Saheki could find no cap on September 19 but in poor seeing.) Quantity Θ, the heliocentric longitude of Mars measured so as to be 0° at the vernal equinox of the northern hemisphere, increased from 27° on September 9 to 59° on November 21. All observers saw a black band surrounding the north polar cap. Saheki found the angular diameter of the north cap to be 35° on September 27 and 45° on October 5 and 11. Hare secured 42° on September 9 and 43° on September 23. As might have been expected in the southern autumn, the south cap was invisible. Mare Acidalium was prominent, being much darker than southern maria in the same region of Mars; and Saheki perceived Lacus Niliacus as a dark mark detached from Acidalium (Figure 3 on pg. 1). Casius-Utopia was also rather strong. Saheki found Syrtis Major "utterly invisible" on October 5, though it had been seen very clearly on September 5 (Figure 2); Syrtis must have been covered by Martian clouds on the later date. Hare found Acidalium and Casius darker in their northern parts than in their southern parts; perhaps the wave of darkening in the northern spring had not yet advanced as far toward the equator as their south tips. Sinus Sabaeus looked very dark and very narrow to Saheki. On September 5 Saheki observed a beautiful bluish green color in Mare Cimmerium, and on September 27 he noted bluish gray in Margaritifer and Aurorae. He recorded only gray in northern features, except for a possible bluish tone near the polar band.

It may be of interest that Hare on September 9, using his 12-inch reflector in good seeing found 525X a better magnification than 100X to 300X. The angular diameter of Mars was then $3''.9$.

On January 15, 1952, the angular diameter of Mars will be $6''.7$, sufficiently large to justify occasional views even with small telescopes. Quantity Θ will be 83°, and the summer solstice of the northern hemisphere will fall on January 30. On January 15 the north pole will be tipped toward the earth by 20 degrees. Looking farther ahead we find that opposition will occur on May 1; and the closest approach to the earth is scheduled for May 8, when the angular diameter will be $16''.8$ - the largest since 1943.

Figures 1 and 2 on pg. 5 are maps by E. J. Reese of Plato and Aristarchus respectively. Mr. Reese stresses that these maps are preliminary and tentative, and both he and other A.L.P.O. members have since 1947 recorded features not shown on these maps. However, the maps should still constitute an important and useful starting-point for those of our readers studying Plato and Aristarchus, and the nomenclature shown (Reese's own) will be helpful in future discussions of these lunar formations.

The drawings of Conon in Figure 3 on pg. 5 should interest those readers who have been following discussions of this crater. Hare's central drawing, on December 30, 1949, may be compared with one by E. J. Reese on the same date, which was reproduced as Figure 1 on pg. 1 of our May, 1950, issue. We shall use Reese's nomenclature in discussing features in Conon; for it the reader should refer to Figures 5 and 6 on pg. 1 of the August, 1951, issue. Figure 3 on pg. 5 illustrates how Hare found Cleft V to grow progressively less prominent with increasingly higher solar lighting, as one would expect with a cleft (or even a valley). Streak S, however, though often prominent to Reese and others, is scarcely recognizable on Hare's drawings. Fault B is apparently present on the central and lower drawings of Figure 3, but it here agrees poorly in position and in direction with Reese's observations. Should the white bands drawn by Hare in the eastern (right) half of the floor be regarded as ridges? On December 29 the second northernmost of them was apparently casting a shadow.

T. Saheki has contributed a drawing of Conon made with his 8-inch reflector on September 19, 1951, at colongitude 137°.3. Cleft V may be shown as a curving, fairly dark streak; but if so, positional agreement with several other observers is rather poor. Fault B, hill P, and wall bands A and B are shown, as well as a hill in the southeast quadrant of the floor. Saheki suggests that several streaks and shadings on his drawing may be the shadows of very low hills on the floor. Streak S was invisible.

T. E. Howe has submitted a map of Conon from observations with his 4-inch reflector at 168X in the summer and autumn of 1951. Streak S is prominently represented, and Mr. Howe sees several bright spots on the floor under high solar lighting. He suggests that he has a tendency to draw a dark space between light spaces where other observers draw narrow dark streaks. (May such dark features merely look wider with the lesser resolving power of a 4-inch telescope?) There is no sign of Cleft V or Fault B on Mr. Howe's map.

We learn from the November, 1951, issue of the Bulletin of the Black River Astronomical Society at Lorain, Ohio, that on October 5 (E.S.T. date) L. Rick spent 40 minutes in watching for possible lunar meteors on the unlit portion of the moon, using a 6-inch telescope. Results were negative. We are glad to note the interest of the Black River Astronomical Society in this project. Of course, it is always quite as important to report negative observations as to report positive ones in searches for possible lunar meteors or meteoritic impact-flashes. It would be especially valuable if simultaneous, cooperative searches could be planned and carried out by the Black River observers and individuals or groups within some hundreds of miles of them. The Society address is P. O. Box 231, Lorain, Ohio.

L. T. Johnson writes that at $9^h\ 39^m\ 55^s$, U.T. on October 26, 1951, while watching the earthlit hemisphere for possible lunar meteors, he "strongly suspected a very faint speck moving in an easterly direction between M. Crisium and M. Tranquilitatis. It was visible for perhaps three seconds and seemed to fade out and then reappear several times as I watched it. This flickering may have been real or may have been due to the difficulty of following such a faint object". As far as we know, no one else was observing the earthlit moon at the same time - worse luck, and with surely at least a thousand telescopes within 500 miles of Mr. Johnson's station near La Plata, Maryland.

H. P. Wilkins offers some interesting comments on the lunar walled plain Cleomedes, which may best be followed by referring to Section XII of the Wilkins map on the back inside cover of our October, 1951, issue. He writes in part: "As you know, old Schroeter thought that the small crater on the rim of the depression near the north wall was formed about 1789, October 5; and although Webb and Birt showed that this was improbable, and I agree, the matter is still not quite closed. At times Schroeter saw some craters, J, B, and A on my map, as to all appearances hills; and I find that some of my observations confirm this. Again Schroeter failed to see the small crater (β in his drawings) from time to time; and I could not see a trace of it on a date in 1944-with 8.5-inch speculum [reflector], although the companion ring was perfectly visible. How can we explain these things save on the basis of something hiding the true surface on occasion? Also Hallowes Goodacre, and myself have seen more craters on the north portion than are shown by Lohrmann, Maedler, Schmidt, or Schroeter. Cleomedes, like other formations, is very strange at times. Yet 'nothing ever happens on the moon'!"

D. P. Barcroft of Madera, Calif., has acquired a large set of back issues of The English Mechanic, for many years an important periodical for lunar and planetary observers. He has found these a veritable treasure trove and only fears that he will never live long enough to study them thoroughly and to index them! Mr. Barcroft mentions that in about 1910 an English lunar observer (Merlin?) discovered that the shadow of the central peak in the crater Arzachel is considerably darker than other shadows within this crater under early morning solar illumination. Mr. Barcroft had observed this difference very clearly in 1941 in several different lunations with a 6-inch reflector, and on August 30 of that year it was simultaneously observed by W.H. Haas with a 6-inch reflector. At that time neither Barcroft nor Haas knew of the old observations. Barcroft further learns from The English Mechanic that in about 1910 J. E. Mellish, now a famous telescope maker, observed a similar greater blackness of the shadow of the central mountain in Tycho. The explanation usually given for such differences in intensity between different lunar shadows is that sunlight is reflected into them and lightens one shadow more than another. If the appearance varies from one lunation to another or changes very rapidly on a given night, then lunar atmospheric effects may be involved.

We have spoken of Japanese and English observations of "Miyamori's Valley", a cleft-like feature connecting Lohrmann and Riccioli, in The Strolling Astronomer, Volume 5, No. 8, pg. 14, and No. 11, pg. 7, 1951. On September 27, 1951, at colongitude 235°.0 T. Saheki made another drawing of this lunar region with his 8-inch reflector. With the sunset terminator about 40 hours away the lighting was too high for best views of topographic detail. The Valley was seen only as a whitish streak, and it was uncertain whether more than its eastern half was a true Valley.

O. C. Ranck has made several drawings of the lunar crater Gassendi in recent months with his 4-inch refractor. He has represented a number of bright spots, probably chiefly low hills, on the floors of both Gassendi and Gassendi A, the small crater which intrudes into the north wall of Gassendi. Under high lighting he finds very dark areas along the foot of the south wall of Gassendi and along the foot of the east wall of A. These dark areas, which of course are not merely shadows, are well shown on Plates 14C and 14D in W. H. Pickering's Photographic Atlas of the Moon. Ranck has recognized the famous triangular formation, H, on the east wall; in both appearance and position there is a curiously similar feature in Plato. The usual appearance of Gassendi H in small telescopes is that of a depression on the crest with walls around it. East of H Ranck has drawn a large rectangular formation containing a cross-shaped bright feature. It is difficult to find these two geometric objects on maps and photographs, and perhaps they look much more irregular with larger apertures. Even so, other A.L.P.O. members might like to look for them. Mr. Ranck invites correspondence about Gassendi; his address is P. O. Box 161, Milton, Penna. On October 18, 1951, at 1^h 15^m, U.T., colongitude 121°.7, Ranck considered a near-central bright spot in Gassendi to be hazily defined, although both transparency and seeing were good and although other bright spots on the floor were sharp. Other observers might look for this appearance near this solar lighting. W. H. Haas has found that a hazy appearance may result from imperfectly seen minute details just beyond the limit of resolution of the telescope.

Dark objects seen against the sun or the moon continue to be reported in correspondence from time to time by different A.L.P.O. members. On October 18, 1951, O. C. Ranck observed a long and narrow dark object to cross the moon. It required about five or six seconds to cross the disc, a rather uncertain estimate. The object appeared to be in focus. No movement of wings was noticed. Ranck was observing with a 4-inch refractor. There is apparently little reason why Mr. Ranck's object should not be regarded as a bird.

Jupiter photographs by E. E. Hare with a 12-inch reflector were published in our September and October, 1951, issues. His procedure was to project the image of Jupiter through the eyepiece, a practice which E. K. White also has adopted. Mr. Allyn J. Thompson, the well-known writer on optics, offers some suggestions on an laternate technique in lunar and planetary photography. He proposes that the image be projected with a Barlow Lens; in other words, one would photograph the primary image amplified by a negative lens placed inside of focus rather than by a positive lens placed outside of focus. Mr. Thompson thinks that a cemented Barlow of short focus with coated optical surfaces should give better results than an eyepiece. We urge A.L.P.O. members to try the photographic method outlined above and shall be glad to learn of the results obtained.

We have now a couple final notes on Japanese observations of the 1950-51 apparition of Saturn. Mr. Tsuneo Saheki writes of determining a rotation-period for a dusky brown spot observed and drawn by himself and Mr. Toshihiko Osawa between the South Equatorial Belt and the South Temperate Belt in March-April, 1951. He obtained a period of 10 hrs., 36.9 mins., in fair agreement with the 10 hrs., 38 mins. occasionally determined for high-latitude markings in the past. Writing on October 29, 1951, about the bulge and hollow which he recorded on the limb of Saturn on April 4, 1951 (see Figure 1 on pg. 1 of our November issue), Mr. Osawa agrees that irradiation may be the explanation. Osawa's objects call to mind a reference in the October, 1951, <u>Planetary Observers' Bulletin</u> to nineteenth century observations of occasional gross distortions of the limbs of Jupiter and Saturn. There is described how three competent observers once found Jupiter II <u>outside</u> the limb of its primary a little <u>after</u> it had begun to transit. These remarkable appearances have not not been reported, to the editor's knowledge, for almost a century. The <u>Bulletin</u> is published at Venice, Calif., and contains many reproductions of planetary drawings.

We have on hand four observations of Saturn since conjunction last autumn, three by O. C. Ranck with a 4-inch refractor on November 20 and 21 and December 13 and one by W. H. Haas with a 6-inch reflector on December 2. The shadow of the rings on the ball was prominent just north of the projected rings. A doubled and intense North Equatorial Belt was the plainest belt. The South Equatorial Belt was much weaker, Haas considering that it faded greatly from early August to early December, 1951. As usual, the Equatorial Zone was the brightest part of the ball. On December 2 Haas thought the ball more dusky north of the N.E.B. than south of the S.E.B. In the rings he distinguished the Third Division near the inner edge of Ring B and the greater brightness of the outer portions of this ring. The rings are now opened more widely than they have been for several years, the Saturnicentric latitude of the earth reaching a maximum value of 9°.7 N. in January. It will be correspondingly easier to study fine detail in the rings, particularly the less well-known divisions or concentric shadings.

THE DETERMINATION OF CENTRAL MERIDIAN AND COLONGITUDE

by Walter H. Haas

In recent months we have received frequent inquiries about how to determine central meridian and colongitude. Thinking that still others, and perhaps especially our newer members, may have similar questions, we shall try to explain here just how these quantities are found. The determination of central meridian is essential to serious studies of Mars and Jupiter, and colongitude is similarly often necessary to worthwhile lunar observations.

In order to find these quantities it is very helpful to have the current annual Volume of The American Ephemeris and Nautical Almanac, which is sold by the Superintendent of Documents, Washington 25, D.C. Indeed, outside of this source I know of no tables of colongitude; and certainly the tables in the Ephemeris of central meridians of Mars and Jupiter are the most complete and convenient ones of my acquaintance for the American planetary observer. Since these tables are given for Universal Time the observer must first find the Universal Time of his observation. Universal Time is the local mean solar time on the meridian of Greenwich and is counted in a 24-hour system beginning with 0 hours at midnight. Universal Time is thus five hours later than Eastern Standard Time, six hours later than Central Standard Time, seven hours later than Mountain Standard Time, and eight hours later than Pacific Standard Time. We give some examples of corresponding times in these different systems:

U.T.	E.S.T.	C.S.T.	M.S.T.	P.S.T.
0^h, Jan. 12	7 P.M., Jan. 11	6 P.M., Jan. 11	5 P.M. Jan. 11	4 P.M., Jan. 11
7^h, Jan. 12	2 A.M., Jan. 12	1 A.M., Jan. 12	12 Mid, Jan. 12	11 P.M, Jan. 11
11^h, Jan. 12	6 A.M., Jan. 12	5 A.M., Jan. 12	4 A.M., Jan. 12	3 A.M., Jan. 12
23^h, Jan. 12	6 P.M., Jan. 12	5 P.M., Jan. 12	4 P.M., Jan. 12	3 P.M., Jan. 12

We shall speak of central meridian first. A system of longitude can be established for any planet by assuming a zero meridian of longitude and a period of rotation, but in practice the use of longitude is largely limited to Mars and Jupiter. On Mars the zero meridian passes through a particular surface feature, and the period of rotation has been established with great accuracy by combining modern observations and seventeenth century drawings. On Jupiter it has been found advantageous to use two systems of longitude; System I is chiefly employed for markings from the south edge of the North Equatorial Belt to the north edge of the South Equatorial Belt, and System II is chiefly employed for the rest of the planet. With Jupiter both zero meridians and periods of rotation are arbitrary, though the latter have been empirically chosen so as to minimize the change of longitude of the clouds at the visible surface of Jupiter in each system.

The central meridian of longitude is the one which passes through the center of the disc regarded as circular, which will differ from the center of the illuminated disc because of phase. (With Jupiter, however, the difference is slight.)

Now let us take in hand the 1952 American Ephemeris and Nautical Almanac. The central meridian of Jupiter at 0^h, U.T., is given for every day of the year, except from March 19 to May 14 when Jupiter is unobservable near conjunction, for System I on pg. 452 and for System II on pg. 453. The central meridian of Mars at 0^h, U.T., is given on pp. 443, 445, 447, and 449 for every day in the year. The data for Mars appear in two columns, one headed "central meridian of date" and the other headed "central meridian of intermediate date."

In this sad world, however, one will rarely have the good fortune to observe Mars or Jupiter at 0^h, U.T. Therefore, it will be necessary to allow for the rotation of the planet between 0^h, U.T., and the time of the observation. In the United States it will usually be convenient to take the Ephemeris value for 0^h of the U.T. date and to increase it by the amount of the planetary rotation since 0^h. For observations between 12^h and 24^h, U.T., it may be more convenient to subtract the proper amount from the value at 0^h of the following U.T. date. The amount of a planet's rotation in a given unit of time is not quite constant as observed from the earth, but the values in the following table are exact enough for any uses likely to be made of them.

Table 1. Planetary Rotation Rates.

Interval	Mars	Jupiter I	Jupiter II
1 min.	0°2	0°6	0°6
2 mins.	0.5	1.2	1.2
5 mins.	1.2	3.0	3.0
10 mins.	2.4	6.1	6.0
30 mins.	7.3	18.3	18.1
1 hr.	14.6	36.6	36.3
2 hrs.	29.2	73.2	72.5
5 hrs.	73.1	182.9	181.3
10 hrs.	146.2	365.8	362.6
15 hrs.	219.3	548.7	543.9

A few examples may clarify the computations involved.

Example 1. An observer finds the north base of a festoon across the Equatorial Zone of Jupiter to be on the central meridian at 8:38 P.M., P.S.T., on January 16, 1952. What is the longitude (I) of the object?

The U.T. of the observation is 4^h 38^m on January 17. Then by pg. 452 of A.E.N.A. and Table I:

C.M. (I) at 0^h on January 17	234°7
Increase in 2 hours	73.2
Increase in 2 hours	73.2
Increase in 30 mins.	18.3
Increase in 5 mins.	3.0
Increase in 2 mins.	1.2
Increase in 1 min.	0.6
C.M. (I) at $4^h\ 38^m$ on Jan. 17	404.2
(-)	360.0
	44.2

Rounding to the nearest whole degree, as is usually done, we have that the longitude (I) was 44°.

Example 2. An observer finds a dark spot in the South South Temperate Belt of Jupiter to be on the C.M. at 5:12 A.M., E.S.T., on August 24, 1952. What is its longitude (II)?

The U.T. of the observation is $10^h\ 12^m$ on August 24.

C.M. (II) at 0^h on August 24	202°4
Increase in 10 hours	362.6
Increase in 12 mins. (10 mins.+ 2 mins.)	7.2
C.M. (II) at $10^h\ 12^m$ on Aug. 24	572.2
(-)	360.0
	212.2

We round to 212° (II).

Example 3. If the longitude of the Syrtis Major on Mars is 289°, when will it be on the C.M. for an observer using C.S.T. on February 17, 1952?

The C.M. at 0^h, U.T., on February 17, an "intermediate date", is 131°7, rounding to one decimal by pg. 443 of the Ephemeris. We require an increase of 289°0 - 131°7, or 157°3.

Referring to Table 1, we find, maybe after some juggling:

Increase in 10 hrs.	146°2
Increase in 30 mins.	7.3
Increase in 15 mins. (10 mins.+ 5 mins.)	3.6
Increase in 1 min.	0.2
Increase in 10 hrs., 46 mins.	157.3

Hence, Syrtis Major will reach the C.M. at $10^h\ 46^m$, U.T. on February 17. The C.S.T. of the transit will be 4:46 A.M. on February 17.

Coming now to the determination of colongitude, we begin with a definition; colongitude is the lunar eastern longitude of the sunrise terminator measured at the equator from the zero meridian of longitude all the way around up to 360°. It thus provides an exact measure of the solar illumination of a lunar region, except for the rather small and usually negligible changes in the sun's selenographic latitude. It is very roughly equal to the phase or to the age of the moon; but neither of these quantities can be considered more than a very crude and inadequate measure of the solar illumination, for they ignore the rather large lunar libration in longitude. The moon's zero meridian of longitude is the one passing through the center of the lunar disc, regarded as circular, at mean libration.

The colongitude is given at 0^h, U.T., for each day in the year on pp. 432-439 of the 1952 A.E.N.A. It can be found at other times with sufficient accuracy by employing a rate of increase of $0\overset{\circ}{.}51$ per hour (actually not quite uniform). Indeed, results quite good enough for most purposes can be found merely by mentally calculating with the closely approximate rate of one degree in two hours or $0\overset{\circ}{.}1$ in twelve minutes. Again, examples may be helpful.

Example 1. A drawing of Plato is made at 2:30 A.M., M.S.T., on January 18, 1952. Find the colongitude.

The Universal Time is $9^h\ 30^m$ on January 18. We then look at pg. 432 of A.E.N.A. in the column headed "the sun's selenographic colongitude."

Colongitude at 0^h, U.T., on Jan. 18	$160\overset{\circ}{.}17$
$9^h.5 \times 0\overset{\circ}{.}51$ per hr.	4.84
Colongitude at $9^h\ 30^m$ on Jan. 18	165.01

The result would ordinarily be rounded to $165\overset{\circ}{.}0$.

Example 2. It is desired to observe the crater Conon at colongitude $34\overset{\circ}{.}0$. When can we do so in February, 1952?

The colongitude is $31\overset{\circ}{.}5$ at 0^h, U.T., on February 6. We desire an increase of $34\overset{\circ}{.}0 - 31\overset{\circ}{.}5$, or $2\overset{\circ}{.}5$. Dividing $2\overset{\circ}{.}5$ by $0\overset{\circ}{.}51$, we find 4.91 hours - say $4^h\ 55^m$. The observation should be made at $4^h\ 55^m$, U.T., on February 6.

We hope that this discussion will help A.L.P.O. members to compute central meridian and colongitude, for doing so makes observations more enjoyable and meaningful.

TWO ECLIPSES IN FEBRUARY, 1952

There will be an eclipse of both the sun and the moon next month, which eclipses may interest some of our readers.

The lunar eclipse is a partial one with a magnitude of only 0.088 lunar diameters. The circumstances are as follows:

Moon enters penumbra	1952, Feb. 10, $22^h 6^m$, U.T.
Moon enters umbra	Feb. 11, $0^h 3^m$
Middle of eclipse	$0^h 39^m$
Moon leaves umbra	$1^h 15^m$
Moon leaves penumbra	$3^h 12^m$

Only the north limb of the moon will enter the umbral shadow. In the United States the eclipse will be seen to best advantage on the East Coast and will occur at an extremely low altitude west of the Mississippi. In western Europe conditions will be excellent with the moon high in the sky.

Our principal A.L.P.O. projects at lunar eclipses are searches for possible lunar meteors during totality and examinations of apparently variable lunar areas for eclipse-caused changes. Searches for lunar meteors on this occasion should certainly be limited to the rather small portion of the moon covered by the umbral shadow. Even at mid-eclipse there will be considerable illumination from the uneclipsed portion of the moon so that chances for useful work are rather poor. However, coordinated and careful searches with fairly large telescopes - say ten inches in aperture and more - might be worthwhile. Eclipse-caused changes are most probable in the areas longest immersed in the umbra. It is just <u>possible</u>, however, that immersion in the penumbra alone <u>might</u> have some effect. Attention should be concentrated upon such northern craters as Plato, Atlas, and Aristarchus. Since pre-eclipse observations will be impossible in this country, the detection of eclipse-caused changes may depend upon the careful comparison of appearances just after emersion from the umbra and some hours later.

We shall be glad to try to supply any additional information desired by those planning to watch for either possible lunar meteors or possible changes caused by the shadow's passage.

A total eclipse of the sun on February 25, 1952, will not be total at the stations of any of our members but will be visible as a partial eclipse over all of Europe, much of Asia, and almost all of Africa. Mr. Lyle T. Johnson has suggested an interesting observational project at this eclipse for professional observatories having spectroscopic equipment. There has recently been some interest in whether the moon may possess a residual atmosphere, and it has been suggested that perhaps the gases keep migrating so as always to be on the unilluminated hemisphere. Mr. Johnson writes: "If some of the observatories in Europe and Africa could make spectrograms with the slit at the limb of the moon, there would be a good chance of detecting any atmosphere which the moon might have. It would be well to try this at both the eastern and western limbs since there might be evidence of a Doppler shift if the moon's atmosphere does move around the moon, staying on the shady side. There would be plenty of light so that high dispersion could be used.

"It would be best to try this at some of the observatories instead of on the eclipse expeditions. The partial phase is all that would be necessary, and the expeditions would be too busy with other observations."

We would appreciate it very much if members of the A.L.P.O. in Europe, Africa, and Asia would call this project just described to the attention of equipped professional observatories in their vicinity and of professional astronomers of their acquaintance. We shall, of course, be eager to learn of any results obtained during the solar eclipse on February 25, 1952.

SECTION XVI

OF

H.P. WILKINS 300-INCH MAP OF THE MOON

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