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ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

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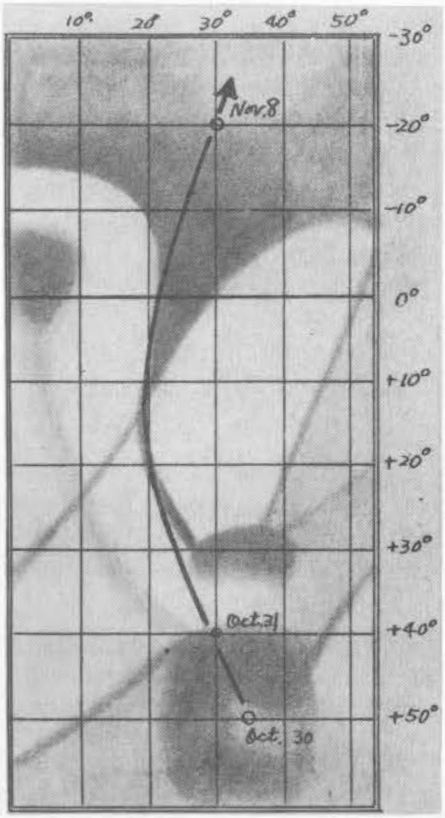


Figure 1

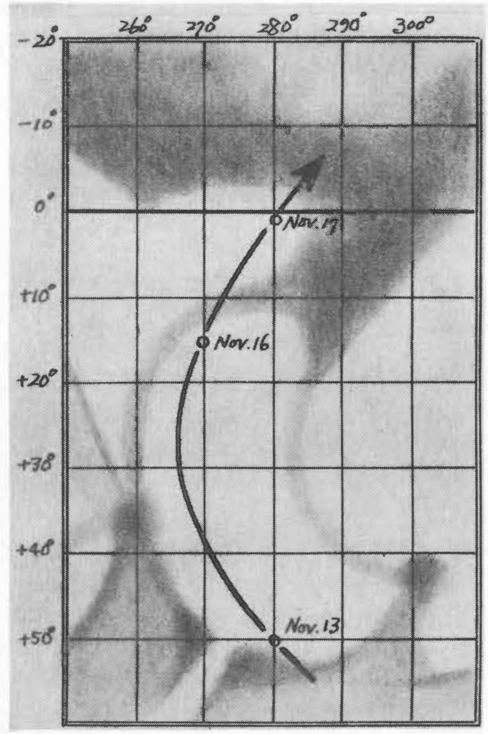
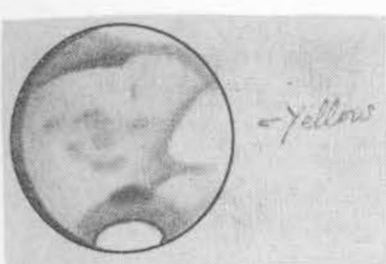


Figure 2

Motions of clouds over surface of Mars. Refer to "Observations and Comments"



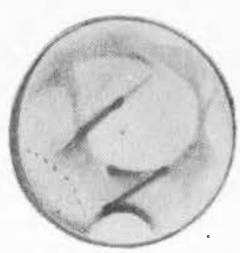


Figure 3. Saheki.
Oct. 18. 20^h45^m, U.T.
8-inch refl. 222X-500X.
C.M. = 171°.

Figure 4. Osawa.
Nov. 20. 21^h0^m, U.T.
6-inch refl. 230X.
C.M. = 213°.

Figure 5. Osawa
Nov. 8. 19^h50^m, U.T.
6-inch refl. 230X.
C.M. = 313°.

Errors in January and February, 1952, Issues. On pg. 14 of the January issue we stated that at the lunar eclipse on February 10-11, 1952, only the north limb of the moon would enter the umbral shadow. In reality, it was the south limb alone which was thus eclipsed. This mistake was made by the Editor, and he apologizes to any readers who were misled. On pg. 22 of the February issue Figure 11 is upside down from the customary astronomical orientation; it has north at the top and east at the left. On pg. 24, line 14, Mr. Robins' telescope is a 3.5-inch reflector. On pg. 26, line 15, of the same issue we referred, of course, to observations of Mars in the autumn of 1951. On pg. 26, line 33, Mr. Howe's observation of Plato was on November 9, 1951.

The First A.L.P.O. Secretary. As you may already have noticed on the front inside cover, our staff has been increased by the addition of a Secretary. Our first Secretary and his address are:

Attorney David P. Barcroft
Secretary, A.L.P.O.
1203 N. Alameda Street
Las Cruces, N. M.

We should perhaps hasten to assure Mr. Barcroft's friends that he is still living at Madera, Calif.; however, it is both his feeling and the Editor's that it will make for more efficient administration to use the address of the A.L.P.O. headquarters.

Mr. Barcroft is already well known to amateurs on the West Coast; he is an active observer of the moon and has an extensive personal library. His name has been mentioned from time to time in The Strolling Astronomer, as well as in some other astronomical journals. To his many astronomical correspondents he has been at all times a helpful friend.

The Secretary will answer routine inquiries about the nature and objectives of the A.L.P.O., about joining the Association, about where to send observational reports, etc. He may at times also answer more technical inquiries. It is our hope and intention that the appointment of a Secretary will lead to the more prompt answering of correspondence from members and associates.

The First A.L.P.O. Saturn Recorder. We are glad to be able to announce that Mr. Thomas A. Cragg has agreed to act as our first Saturn Recorder; his address is:

Thomas A. Cragg
246 W. Beach Ave.
Inglewood 3, Calif.

A member of the Los Angeles Astronomical Society, Mr. Cragg is well known among amateurs in southern California. He is an active observer; and his work upon several lunar regions and the different planets has been frequently mentioned in this periodical. In addition, he is an ardent student of the sun and of variable stars, having obtained as many as 100 estimates of variable stars in a single night! He has 6-inch and 12-inch reflecting telescopes and also observes with the 12-inch Zeiss refractor at the Griffith Observatory, where he has been employed as a guide.

All A.L.P.O. members should forward their observations of Saturn to Mr. Cragg at the address given above at regular intervals. He will analyze them and will write up the results in Saturn Reports in The Strolling Astronomer.

E. E. Hare Honored by Lunar Memorial. Mr. H. P. Wilkins writes that he has renamed the lunar crater Bailly B Hare in honor of Mr. Edwin E. Hare of Owensboro, Kentucky, one of our leading observers and one whose work has often been discussed in this periodical. The specific cause of this recognition of our colleague was an excellent map and photograph of Bailly submitted to Mr. Wilkins by Mr. Hare; the photograph was taken with Hare's 12-inch reflector and impressed Wilkins as superior to one recently obtained with the 36-inch reflector at Greenwich.

Hare is the largest crater on the floor of the walled plain Bailly, about 160 miles in diameter and lying very near the moon's east limb in far southern latitudes. It is on Section XXII of the Wilkins map. Bailly lies almost due east of the walled plain Clavius.

Concerning Back Issues. We receive orders from time to time for back issues of The Strolling Astronomer. These are filled when possible, but many back issues are now completely out of stock. It may be that some of our members have back issues which they would like to sell; if they will write to us, we can make a record of their names and refer future purchasers to them. If interested, please write to us at your early convenience, stating exactly which back issues you have for sale.

LONG-ENDURING BRIGHTER SECTIONS IN THE SOUTH TEMPERATE ZONE OF JUPITER

Mr. Elmer J. Reese, who was the A.L.P.O. Jupiter Recorder in 1949 and who is one of the foremost students of Jupiter in this country, has communicated an important contribution to one phase of the study of Jupiter. Directing attention to three brighter sections in the South Temperate Zone of the planet which several different A.L.P.O. members began to observe in 1946, he remarks that these were still very much in evidence late in 1951. He is also convinced that they are identical with long-enduring brighter sections observed by members of the British Astronomical Association in 1940-45. Those desiring further information on the British observations should refer to the Thirty Third Report of the B.A.A. Jupiter Section, pp. 13-14.

A graph of the motions of these features from 1940 to 1951 is on pg. 35. This graph is entirely the work of Mr. Reese. Longitude is plotted against time. The shaded strips represent dusky sections of the South Temperate Zone; the unshaded strips, bright sections. It is not possible to say in the present state of our knowledge of Jupiter whether the detail should be thought of as dark markings on a bright background or as bright markings on a dark background. Dark dots mark the position of each feature observed at each opposition from 1940 to 1951, omitting 1945. It will be noted that these sections made almost nine circumnavigations of Jupiter, relative to System II, from November, 1940, to October, 1951. The longitudes are based on B.A.A. Jupiter Reports from 1940 to 1943, on A.L.P.O. records in 1949 and 1950, and on Reese's personal observations in other years.

As can be readily verified on pg. 35, the drift-lines appear to be quite straight from 1940 to 1948 and from 1948 to 1951; in other words, the sections then had a constant rotation-period. There was a slight but sudden deceleration, thus a small lengthening of the rotation-period, in 1948. During the 1942-3 apparition British observations gave a mean rotation-period for the terminal ends of these sections of 9 hrs., 55 mins., 6 secs., corresponding to a decrease in longitude (II) of 25 degrees in 30 days. One notes on pg. 35 that the brighter sections of the South Temperate Zone were steadily narrowing in longitudinal extent from 1940 to 1951. If this trend continues, they must eventually cease to exist.

Reese points out that dusky section C-D is shown in the west part of the disc on Figure 4 on pg. 1 of The Strolling Astronomer for November, 1951, this figure being a drawing of Jupiter by T. Saheki on August 27, 1951.

Mr. Reese has performed a valuable piece of work in establishing beyond reasonable doubt the endurance for 11 years, from 1940 to 1951, of these brighter and darker longitudinal sections in the South Temperate Zone. Up to 1940 the only known long-lasting features on the Giant Planet were the Great Red Spot, known to have existed from 1878 (or perhaps earlier) to the present, and the South Tropical Disturbance, which was observed from 1901 to 1940. We must now add these South Temperate Zone features. Perhaps, indeed, we have stressed too much in our theories the changeableness of the Jovian visible surface. Although the Equatorial Zone is so active that the determination of reliable rotation-periods is often very difficult, it may be that assiduous examination of markings in higher latitudes would reveal more stability and greater length of visibility of features than is now supposed to exist. The features would have to be observed well enough to establish reliable rotation-periods, say at least three times a month; and it would be important to record them both very early and very late in each apparition in order to reduce the risk of faulty extrapolation over the period when Jupiter is unobservable near conjunction. A rather large telescope, perhaps ten inches in aperture or more, might be needed to deal effectively with such high-latitude markings; there can certainly be no doubt that a large telescope of good quality would have great advantages for securing large numbers of transits of Jovian spots in middle and high latitudes.

It is an intriguing fact, though of uncertain significance, that all long-enduring features so far determined to exist have been adjacent to the South Temperate Belt.

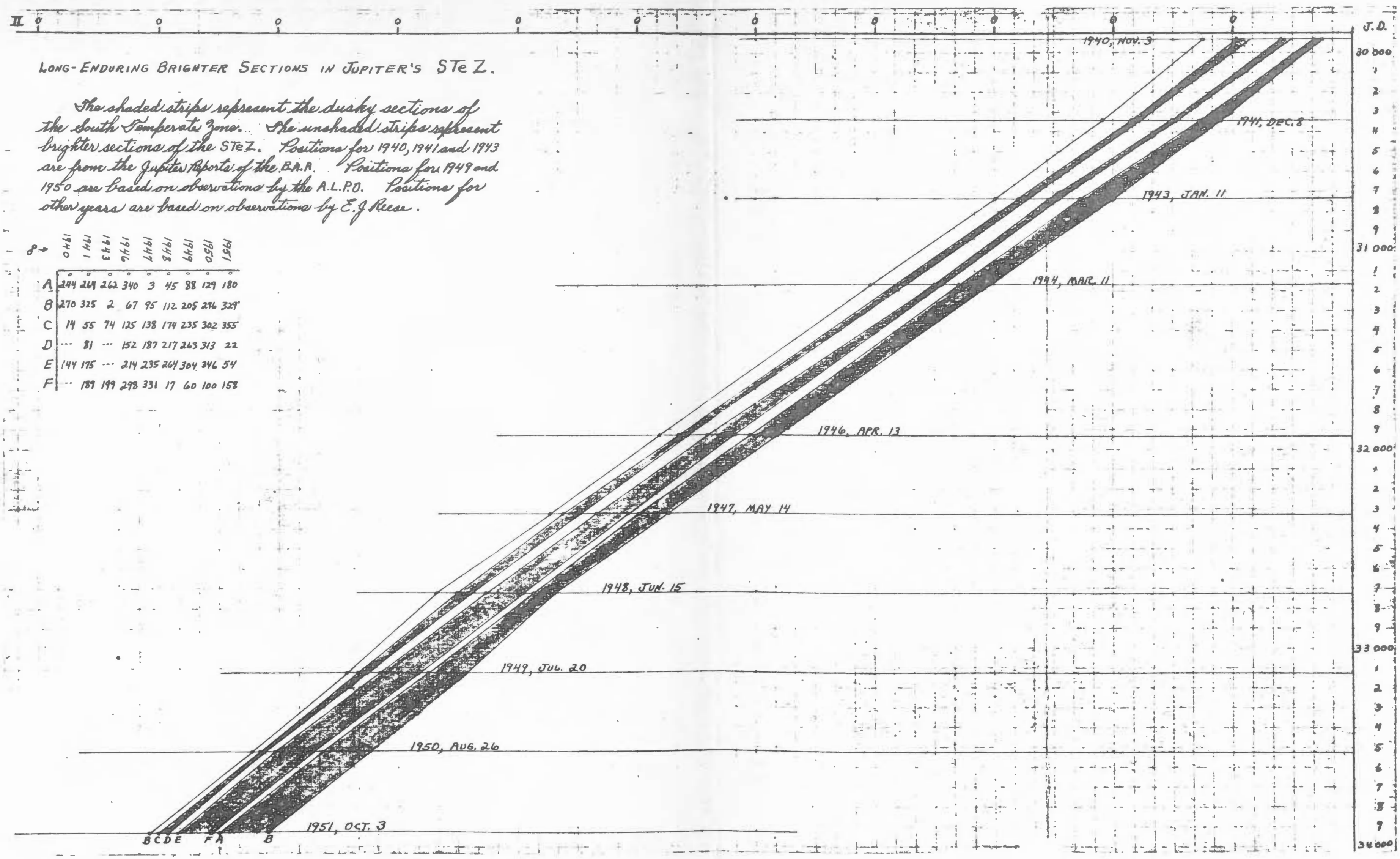
Foreword by Editor. We are glad to present here an article by a new contributor, Mr. T. E. Howe, 7226 Bennett Ave., Chicago 49, Illinois. Mr. Howe's subject will surely be of much interest to many of our readers, and it would be excellent if regular programs of lunar and planetary photography would be carried on by the A.L.P.O. Perhaps you will find some good ideas on possible methods and techniques in this article. Mr. Howe stresses that he has actually photographed with his 4-inch F:14 reflector all the "test objects" listed at the end of the article. The two Jovian objects, and the cusp-caps of Venus as well, may vary in conspicuousness, however.

Mr. Clyde W. Tombaugh, the famous authority on planetary photography, praised Mr. Howe's article and urged its early publication; Mr. Tombaugh does think however, and the Editor is inclined to agree that photographing detail only 1.5 seconds in diameter would be very excellent indeed with a 4-inch telescope.

LONG-ENDURING BRIGHTER SECTIONS IN JUPITER'S STeZ.

The shaded strips represent the dusky sections of the South Temperate Zone. The unshaded strips represent brighter sections of the STeZ. Positions for 1940, 1941 and 1943 are from the Jupiter Reports of the B.A.A. Positions for 1949 and 1950 are based on observations by the A.L.P.O. Positions for other years are based on observations by E. J. Reese.

ℓ →	1940	1941	1943	1946	1947	1948	1949	1950	1951
A	244°	264°	262°	340°	3°	45°	88°	129°	180°
B	270	325	2	67	95	112	205	276	329
C	14	55	74	125	138	174	235	302	355
D	...	81	...	152	187	217	263	313	22
E	144	175	...	214	235	264	304	346	54
F	...	189	199	298	331	17	60	100	158



Mr. Howe invites the attention of A.L.P.O. members to an old book called Astronomical Photography by H. H. Waters; it may be obtained for six shillings (about 84 cents) from Gall and Inglis, 13 Henrietta St., London W.C. 2, England. Though written in 1920, the book is not too dated to be helpful, according to Howe and D. P. Barcroft. Mr. Howe will welcome correspondence on astronomical photography from anyone.

LUNAR AND PLANETARY PHOTOGRAPHY WITH SMALL TELESCOPES

by T. E. Howe

In this article I intend to deal with the problem of photographing lunar and planetary detail with small, unguided telescopes such as the Sky-Scope, Reflectoscope, and the Harry Ross mirrors. The difficulties attendant upon photography with instruments of this type stem from the lack of guiding, which sharply limits the exposure, and the small light grasp combined with the need for a relatively large image, which tends to prolong it.

These difficulties may be overcome by the use of an extremely high film speed-on the order of ASA 400-3000. Unfortunately, while films of this variety are not impossible to manufacture, their life is so limited that they are not profitable from a commercial standpoint. It is necessary, therefore, to adapt existing makes of film to our purposes. There are two general methods of raising the film speed: hypersensitization and high-speed (not necessarily rapid) development.

The first includes processes which involve exposure of the film to various vapors, liquids, or faint lights before or after exposure. In general, these raise the fog level more and increase the speed less after exposure.

The film may be bathed in dilute (3-4%) solutions of ammonia, triethanolamine, borax, hydrogen peroxide, or plain water for 3-5 minutes at temperatures below 60° F. to raise the film speed from 2 to 4 times its original value. Bathing in silver ammonium chloride solution under the same conditions will increase the speed 3-8 times. There is a slight increase in fog and grain, which becomes pronounced as the solutions are used at higher temperatures, with all of the processes, which are most effective with slower speed films. (It is assumed that the fastest films available are used for astronomical photography). All bathed emulsions must be used within 36 hours of treatment.

The vapor treatments consist of exposure of the film to mercury vapor for 36 hours or to ammonia vapor for 5 minutes. The films should be used immediately at the cessation of the treatment. The speed will be increased from $1\frac{1}{2}$ to 4 times and will be greater with the ammonia treatment.

The speed will be increased from 2 to 4 times by giving the film a very short exposure, sufficient to give a fog density of .15-.4 when developed, before or after exposure. The grain will not show an increase greater than that engendered by the general increase in density.

During the development process itself, very great increases may be had by the use of suitable developers. Developing for 7-10 minutes in Ansco 125 or Dektol diluted 1:1 will raise the film speed to eight times the original figure. The best high-speed developing agent that I know of is known as Hydram and is manufactured by Chicago Photo Products Co., Box 3700BS, Merchandise Mart, Chicago. It is designed to be added to the developer at the rate of 1/8-1/4 ounce per quart and retails for $1.00 per half-ounce.

Hydram plus Ansco 17, with p-Phenylene Diamene added to restrain grain, development time 30-60 minutes, is my favorite compound. D-76, with 18 gms. Borax added per quart of developer, causes an 8-10 fold increase in speed, as does any developer treated with Hydram. I am currently experimenting with D-76f (added borax) plus Hydram, and there are indications that the hybrid will be successful. The high-speed developing processes generally give medium coarse grain (4-8 diameters enlargement). However, I have heard that May and Baker, Dagenham, Essex, England have produced a new developer, Promicrol, which increases the film speed up to 16 times while permitting 20-diameter enlargements. D-76 and Edwal-12, without treatment, increase the film speed twice. Edwal 12 gives much finer grain than D-76, however. It may be possible to increase the film speed, and to reduce the exposure, more than the figures given here, as the images will probably be enlarged considerably and "thin" negatives enlarge better than dense ones, in addition to being finer grained.

It is possible to use the hypersensitization and high-speed development processes together, the final speed increase being the product of the speed increases obtained by the individual treatments.

Having amassed the suitable developing equipment, we now proceed to the actual practice of astronomical photography with small apertures. It is necessary to choose a camera first. A $2\frac{1}{4}$ x $3\frac{1}{4}$-inch pack camera, with double extension bellows and a removable lens, is undoubtedly the most convenient instrument. A single or double frame 35 mm. camera with a focal plane shutter is a convenient accessory and is very useful for planetary work, due to its economy of film.

There are four methods of arranging the camera for lunar and planetary photography, all of which require that the eyepiece remain in the telescope. It is quite impractical to photograph the moon and planets at the prime focus of a small telescope, due to the minuteness of the images. For example, the image of the moon at the prime focus of the "Skyscope" is about 1/3 of an inch in diameter while that of Jupiter at an October opposition is only 1/100 of an inch in diameter! The four methods are: telescope and camera mounted separately, with the lens in the camera; same, with the lens out of the camera; camera attached to telescope, with lens in or out of the camera. The lens referred to is, of course, the camera objective.

When working with the lens in the camera, the camera should be set at infinity and the telescope focussed visually. The camera should then be set against the ocular and the exposure made. The diameter of the image varies directly both as the power of the telescope and the focal length of the camera lens. At 56 X with a 10cm. lens the image of the moon on the film will be almost exactly 2 inches in diameter.

With the lens removed from the camera, the formula for the image size is entirely different. The magnification of the prime focus image varies with the focal length of the eyepiece and the distance of the film from the eyepiece, and the size of the prime focus image varies with the focal length of the objective. The magnification of the enlarging system is approximately equal to the distance between eyepiece and film divided by the focal length of the eyepiece. An eyepiece of about 1 inch focal length is ideal for this purpose.

The diameter of the prime focal image of the moon is equal to the focal length of the objective divided by 111. In either case (camera lens in or out) the entire system must have an effective focal length greater than 167 inches (corresponding to a $1\frac{1}{2}$ inch lunar image) for best results. This corresponds to a magnification of 4.3 for a Skyscope or 3.0 for the writer's 4-inch Harry Ross mirror.

If the lens-out method is used, it is essential to employ a ground-glass focusing camera.

Due to the differences in the diameter and brightness of the various planets, different exposures will have to be calculated for each case. The following table gives the brightness (moon = 1), apparent diameter at average opposition or elongation (moon = 1), and the maximum exposure commensurate with good results (assuming angular motion of 15 seconds of arc per second of time):

Planet	Brightness	App. Dia.	Max. Exp.
Venus	30	1/60	1/25-1/50 sec.
Moon	1	1	1/10-1/25 "
Mars	1	1/90	1/10-1/25 "
Jupiter	.3	1/45	1/5 -1/10 "
Saturn	.1	1/90 disc 1/45 rings	1/2 -1/5 "

It would be wise to use the largest image possible within the limits on exposure time given above, not only for greater ease in enlarging but also for more efficient focusing - the depth of focus being considerably greater at f/140 than at f/32, for example. It is usually impossible to focus on a planet, because of the grain of the ground glass; focusing should be done on the sun or the moon. (The exposure varies as the square of the image size.)

There are several methods of improving definition and print quality after development of the negative. First, print on contrasty paper, glossy or semi-matte. The enlarger must be focused exactly. It is sometimes possible to improve definition by stopping down the enlarging lens. Planetary photographs may be improved by enlarging several of the best images of a single nights work onto pieces of process film, superimposing two or more of the resulting images, enlarging them onto a film such as Reprolith, and printing the final images from this negative. This process has been used with much success by the workers at the Pic du Midi in France.

A print from a 4-inch telescope may be considered excellent if the smallest detail shown thereon is around 1½ seconds in diameter and good if the smallest detail is on the order of 3 seconds in diameter. Several of the writer's prints show markings down to 2 and 3 seconds, and he will be pleasantly chagrined if this 'record' is exceeded by one of the A.L.P.O.'s large number of Skyscope-owning members.

Some "practice marks" for the amateur telephotographer to try to record are:

The 'tail' of Messier and Pickering
The largest craterlet in Plato
The central peaks of Tycho, Copernicus, and Eratosthenes
The SEB and STB of Jupiter
The zone between the SSTB and the SPR of Jupiter
The cusp-caps of Venus

These are all within reach of a 4-inch telescope and may be regarded as test objects.

THE METEORITE OF RELIEGOS, SPAIN

by Anthony Paluzíe-Borrell

[Foreword by Editor. The following information on a recent meteoritic fall in Spain has been communicated by Mr. Anthony Paluzíe-Borrell, the Librarian of the Sociedad Astronómica de España y América at Barcelona, Spain. Mr. Paluzíe is an active member of that Society and often writes for the Spanish astronomical journal Urania. His studies of the moon have been recognized through the naming of a large lunar walled plain in his honor. His address is Diputacion 337, Barcelona, Spain.]

Dr. J. Gómes de Llarena, professor of the Peñaflorida Institute at San Sebastián, has published in the Boletin de la Real Sociedad Española de Historia Natural (Bulletin of the Spanish Royal Society of Natural History), 1950, pp. 303-315, the detailed description of a meteorite which fell at Reliegos, province León, on December 28, 1947 at $7^h\ 30^m$, Universal Time. A dense fog covering the countryside, the inhabitants of this village near the Esla River and of other villages in its neighborhood heard strange noises and thought that an airplane, from a nearby base of León, was falling. The inhabitants of Reliegos announced that an object like a bomb had fallen. An engineer, Mr. Arango, and a military authority examined the object and recognized it to be a stony meteorite. The report of Mr. Joseph A. Alvarez and Mr. Lewis López, adjunct masters of the Mines of the León District, states the following:

On December 28, 1947, at $7^h\ 30^m$, U.T., a meteorite weighing 38 pounds, 6 ounces, fell only 6 yards from the front of a house on the Royal Street of Reliegos, making a hole 13.7 inches deep in ground consisting of loose soil and stones. The windows and walls of the house vibrated. The stone rebounded and came to rest 32 inches from the hole. Upon touching the stone at 9^h, U.T., Mr. Bonifacio Ferreras remarked that it was hotter than his hand; another man at 10^h found the stone already cold. The reports of the people of this village and of others three or four miles away indicate that the meteorite moved from north-northwest to south-southeast and that its path was inclined 65^o to the horizontal. These data mean that it came from the direction in space toward which the earth is moving in its orbit, although statistics show that the majority of meteorites come from the opposite direction.

Its shape is that of a lengthened quadrangular prism with rounded edges and with a predominant flat face, the other faces having typical conoidal depressions. Its dimensions are 9 inches by 4 inches by 4 inches. The crust is 0.02 inches thick. Underneath this crust is an irregular hexagonal pattern, indicating rapid cooling after fusion. The internal structure is cataclastical and brechoidal, with gray grains 0.02 to 0.1 inches in size and some clear or white grains 0.25 inches in size. There are several clefts, which may perhaps be filled with troilite since iron oxide stains surround them. The density is 3.33 times that of water.

Preliminary chemical analysis by Mr. Laborde showed the presence of silica, aluminum, lime, magnesium, and iron oxide. By a spectroscopic method Dr. Peres-Mateos and Miss Mary Gárate obtained this composition: chronium 2%, manganese 1%, cobalt less than 1%, magnesium 10%, silicon 10%, traces of aluminum, vanadium, copper, and titanium, substantial amounts of nickel and considerable iron, positive test for calcium and sodium, and negative test for gallium and germanium. Gravimetrical analysis by Miss Encarnación Gárate resulted as follows: silica 38.53%, aluminum 0.85%, phosphoric anhydride 0.15%, free iron 7.90%, ferrous oxide 15.60%, sulphur (in pyrite) 2.40%, iron (in pyrite) 4.30%, lime 2.70%, Magnesium 9.70%, nickel 11.05%, cobalt 0.30%, manganese 0.11%, and chromic oxide 5.75%. The mineralogical composition is: taenite 15.20%, troilite 6.70%, olivine and rhomboidal pyroxene 74.58%, plagioclase 2.37%, and tricalcic phosphate 0.35%. This composition resembles that of the Hvittis, Finland, meteorite.

A micrographical study was made, on thin plates ground by Mr. J. Mendizabal and Mr. J. Romero of the Spanish Geological and Miner Institute, by Mrs. C. N. Airey of Leeds, England, by Miss S. E. Trimm of London, and by Dr. M. H. Hey of the British Museum of Natural History. Polarized light shows the cataclastical structure of the olivine and plates of troilite; the plagioclase is shown poorly in the preparations. The pyroxene is formed by crossed beams of thin divergent filaments; the olivine, by broad ones. The meteorite of Reliegos is an olivine-enstatitic chondrite.

OBSERVATIONS AND COMMENTS

Observations of Mars in October-December, 1951, were reported by R. M. Baum (3-inch refractor), W. H. Haas (6-inch reflector), T. Osawa (6-inch reflector), O. C. Ranck (4-inch refractor), and T. Saheki (8-inch reflector). A few other members have written of looking at Mars without seeing any markings. Actually, Saheki and Osawa made almost all of the observations; and Mr. Saheki secured his forty-first drawing of the apparition on December 20 - a remarkable example for the rest of us. Mars was still distant from the earth during this period, the angular diameter increased from 4".1 on October 1 to 6".0 on December 31. Quantity ⊙, the heliocentric longitude of the planet measured so as to be 0° at the vernal equinox of the northern hemisphere, increased from 36° on October 1 to 77° on December 31. Therefore, the Martian season was spring in the northern hemisphere and autumn in the southern hemisphere. The north pole was tipped toward the earth by 21 to 24 degrees in October-December.

Baum made his only observation on November 1, Haas secured his only view on December 2, and Ranck's only drawing here considered was on December 13. These three observers obtained only imperfect views of the main markings. Baum's drawing is attractive because made in natural colors; against an ochre background he shows Mare Sirenum, Mare Cimmerium, and Propontis with a dull bluish cast. Using Wratten Filters on December 2 at C.M. 321°, Haas found the north cap moderately brilliant with all filters, as one might expect of a surface cap; on the contrary, a diffuse south cap was much brighter with a blue filter than with other filters. Ranck and Baum confirm this south cap. It was presumably a blue cloud. In the same view Haas found a small bright area on the sunrise limb near the equator also to be brightest with a blue filter. We now pass to the much more extensive observations of Saheki and Osawa, both at Osaka, Japan. It will help in following our discussion here to have at hand a good map of Mars, such as the one by Flammarion and Antoniadi reproduced in our April, 1950, issue.

Figures 1 and 2 on pg. 31 illustrate the motions of two clouds followed as they moved over the surface of Mars. Such data are of great importance in the study of Mars, and we congratulate our Japanese colleagues upon their success in obtaining them. The cloud whose path is shown on Figure 1 first revealed itself to Saheki on October 30 when Mare Acidalium was faint while southern maria were darker and more sharply defined. The cloud being farther south on October 31, Saheki then found Niliacus Lacus and the south part of Acidalium faint, whereas the north part of Acidalium was much darker. On November 8 the cloud was seen as a white spot on the sunrise limb south of Sinus Margaritifer; and Indus canal, over whose course the cloud had passed, was intensely dark, as dark as Margaritifer. The cloud whose path is shown on Figure 2 was first recorded on November 13, when Saheki noted that part of Utopia was faint and vaguely outlined. On November 16 and 17 Osawa recorded it as a white area near the west shore of Syrtis Major, and on these dates Thoth-Nepenthes canal was very dark.

Saheki deduces that the October 30 - November 8 cloud had an average rate of motion of 13 miles per hour and that the November 13-17 cloud had an average rate of motion of 21 miles per hour. Such velocities for winds on Mars are in excess of what has usually been observed. Saheki proposes that these clouds brought moisture from the melting north polar cap toward the equator and thus caused a marked development of Indus canal for one cloud and of Thoth-Nepenthes for the other. This idea accords with the theories of some past students of the planet, including W. H. Pickering, but accords much less well with modern astrophysical evidence about the atmosphere, G. de Vaucouleurs considering rain on Mars quite impossible.

The north polar cap was very brilliant in October; and such was certainly its usual aspect as late as December 20, even though it may have been occasionally dimmed by overlying clouds or mists after the middle of November. The surrounding north polar band was very dark, perhaps the darkest feature on Mars, in October and was black in color. On October 21 Saheki saw two darker knots in the north polar band, one near longitude 120° and the other near 160°. As time passed, this polar band became less dark and less wide; and on several dates in late November and December it was invisible. The spring melting of the north polar cap is summarized in the following table. The angular diameters are those subtended at the center of the disc; in the true diameters allowance has been made for the tip of the axis of Mars toward the earth.

Interval	☉	No. Observations	Angular Diameter	Corrected True Diameter
1951, Oct. 16-21	44°-46°	7	42°	2310 kms.
Oct. 25-31	48°-50°	6	38	2060
Nov. 8-13	54°-56°	4	30	1620
Nov. 29-Dec. 1	63°-64°	4	28	1510
Dec. 8-12	67°-69°	6	23	1240
Dec. 17-20	71°-72°	5	23	1360

The apparent cessation of melting in mid-December may well be due to a ring of clouds at the edge of the cap, which would naturally conceal the dark polar band. The data above all rest upon Mr. Saheki's observations.

The south polar cap was usually invisible and was at best undistinguished.

A number of clouds were seen, especially on the sunrise limb (Figure 3) and the sunset terminator; and a few others may have revealed themselves indirectly through the faintness and diffuseness of surface markings, as discussed above. On November 29 at $21^h\ 5^m$, U.T., C.M. = 127°, Saheki thought that a very bright small cloud on the limb near Sinus Titanum projected a little; by $21^h\ 15^m$ this cloud was less bright and finally faded out. On December 8 at C.M. 36° Saheki drew a large brilliant cloud on the limb near the equator also to project. It is, of course, very difficult to distinguish between true cloud-projections and the false effects of irradiation upon bright areas at the edge of the disc, particularly with Mars as remote as in the last months of 1951. Some careful experimenting with artificial discs might be instructive in this connection - and why should not an A.L.P.O. member make these desired experiments?

Sinus Meridiani was very dark, although the distance of the planet did not permit the forks of Aryn to be separately distinguished. Sinus Margaritifer, Mare Erythreum, Aromatum Promontorium, and Sinus Aurorae had their usual forms and were fairly dark. Argyre exhibited a dull yellowish white color on the south limb. Mare Acidalium was very dark and was readily divided from Lacus Niliacus (Figure 1 on pg. 31). Tempe Regio exhibited a dusky yellowish color. Jamuna canal, connecting Niliacus to Aurorae, was the most conspicuous canal in its vicinity; however, Indus was also strong from November 8 onward. Gehon, Ganges, and Nilokeras were regularly seen; and Ceraunius was broad and faint. Lunae Lacus and Mareotis Lacus showed up as darker condensations. On December 8 Saheki drew a "new", small, darker shading in Chryse at the junction of Hydraotes and Jamuna canals, a feature recorded by Ebisawa and Murayama in April and May, 1950 (The Strolling Astronomer, Volume 4, No. 7, Figure 4 on pg. 1 and text on pg. 11). This feature may well be new to Mars since it is lacking from maps of the planet and should hence be carefully watched.

Thaumasia was sometimes whitish and perhaps was then covered by clouds. At any rate Solis Lacus was almost always invisible. Tithonius Lacus, however, was fairly dark in the best views. Sinus Aonius was dark and had a beautiful green color to Saheki on November 29. Mare Sirenum was extremely dark, probably the darkest *mare* on the whole planet (Figure 3 on pg. 31). Its color was black. Detail in the equatorial and northern deserts between longitudes 80° and 180° was extremely difficult. Nodus Gordii and Pyriphlegethon canal were seen in the midst of a dusky Amazonis Regio, but other markings were exceedingly uncertain. Propontis was conspicuously dark, consisting of Propontis I and Propontis II as separate spots.

Mare Cimmerium, bluish gray in color, was much lighter than Mare Sirenum. Eridania was brilliant bluish white on the limb on October 17, being probably overlaid by cloud. Trivium Charontis was seen well. Cerberus canal was plain enough; it was intense where it formed the southwest border of Elysium, fainter where it continued eastward to Sinus Gomer (Figure 4 on pg. 31). Elysium was a bright region, usually yellow in hue, bounded by canals. On October 18 Saheki found Elysium a brilliant bluish white, fully as bright as the north cap, on the sunrise limb at $19^h\ 50^m$, U.T.; but by $20^h\ 45^m$ it was much dimmer and had its ordinary yellow hue (Figure 3). On October 21 Elysium was again a brilliant white on the limb. Canals Hades, Styx, and Laestrygon were also recorded in this vicinity. We have already described in our December, 1951, issue the remarkable prominence of Pactolus canal to Saheki on October 17 (Figure 2 on pg. 1, text on pg. 13). Pactolus, or possibly Eunostos, was seemingly a one-day wonder; for it was scarcely visible at all to Saheki on October 16 and 18 under conditions as good or better as on October 17, nor did Osawa or Saheki recover Pactolus on subsequent dates. Mars still has its mysteries! On November 20 Osawa found several far northern canals and oases north of Charontis to be very dark (Figure 4 on pg. 31). Osawa observed Adamas canal to be extremely dark on November 16 and on both this date and November 17 drew it at the edge of a slightly shaded region. Sinus Gomer was extremely dark to Osawa on November 16, and he perceived Hesperia as a strait between Mare Cimmerium and Mare Tyrrhenum.

The rather dark Mare Tyrrhenum was a dull yellowish green color to Osawa on November 17. Syrtis Major was sometimes very dark and sometimes less so, perhaps varying according to the presence of occasional clouds above it. Saheki twice recorded the color of Syrtis Major in bluish gray and once reported it as dark green. The white "Libya gap" indented the southwest shore of Syrtis Major, as also in 1950 (Figure 2). We might here note that on pg. 49 of his excellent The Planet Mars G. de Vaucouleurs speaks of the seasonal narrowing of Syrtis Major near perihelion resulting from the brightness then of the adjacent Libya and Isidis Regio; however, the effect observed in 1950 and in late 1951 has come at the very opposite season, with Mars near aphelion. Hellas was regularly observed as a white area, sometimes dull in tone and sometimes almost as bright as the north polar cap. As in 1950, the Casius-Utopia shading was large and prominent, though usually only moderately dark (Figures 2 and 4). The color of Casius-Utopia was gray or bluish gray, and Alcyonius canal formed a darker border on its southwest shore. Thoth-Nepenthes canal was regularly seen and was very dark to Osawa on November 16 and 17, Moeris Lacus being an even darker spot on the canal. On November 17 Osawa found Thoth-Nepenthes to consist of a chain of dark spots. Neith Regio to Osawa was pinkish on November 16 and pure white on November 17. Hellespontus was very broad and dark, and Pandorae Fretum was an inconspicuous streak at the border between the whitish Deucalionis and the dusky Noachis. Sinus Sabaeus was rather dark, though perhaps less dark than Mare Acidalium; and it is remarkable that Osawa on November 8 drew the two "carets" of Portus Sigeus on the north shore of Sabaeus (Figure 5). In this same view Osawa found Nilosyrtis canal, Coloe Palus, and Phison canal to be extremely dark; and Dioscuria to their north was white. These appearances may have been very temporary, for Saheki on various dates saw Nilosyrtis and Coloe as only fairly dark and did not record Phison at all. Other canals seen in these longitudes were Euphrates, Hiddekel, Pierias-Callirhoe, and Protonilus-Deuteronilus. Ismenius Lacus was a poorly defined small shading. Hiddekel and Gehon formed the edges of a dusky triangular shading with its apex at Sinus Meridiani.

On the whole, colors on Mars were apparently rather subdued in October-December, 1951.

In December Saheki began to observe central meridian transits of suitable features. This simple method of obtaining Martian longitudes is recommended for wide usage by our members.

On March 15, 1952, the angular diameter of Mars will be 11".4, and all interested readers able to observe during the latter half of the night should at once begin a program of regular drawings and observations. On this date the north pole will be tipped 14 degrees toward the earth. Since the summer solstice of the northern hemisphere occurred on January 30 the season will be early summer in the northern hemisphere and early winter in the southern hemisphere. The coming opposition in early May will be the closest one since 1943 and the very closest one that many of our younger and newer members have yet had an opportunity to observe.

A drawing of Saturn by O. C. Ranck on January 19 with a 4-inch refractor at 480X shows the North Equatorial Belt still doubled and prominent. The South Equatorial Belt was single and rather faint. As usual, the Equatorial Zone was the brightest part of the ball. The Crape Band was prominent just north of the projected Rings A and B, where the visibility of the Ring C projection was reenforced by the presence of the shadows of Rings B and C. Mr. Ranck saw Cassini's Division near the ansae. With Saturn scheduled to reach opposition on April 1 and now well-placed before midnight we look forward to a great increase soon in the number of observations of this planet.

On January 19 Ranck drew the lunar crater Gassendi at colongitude 178°.5, using a 4-inch refractor at 480X. He recorded both the triangular depression H in the east wall and a very dark spot (perhaps shadow) on the south wall, the latter being almost opposite the crater Gassendi A which intrudes into the north wall. It is curious that Ranck's drawing of January 19 shows nothing of a very dark shading at the south end of the floor which he had found to be prominent on November 21, 1951, at colongitude 180°.8. This dark area is very prominent on

Plates 14D, 12E, and 14E in W. H. Pickering's Photographic Atlas of the Moon; their respective colongitudes are 172°, 185°, and 198°. Was this dark area, then, abnormally faint on January 19 of this year?

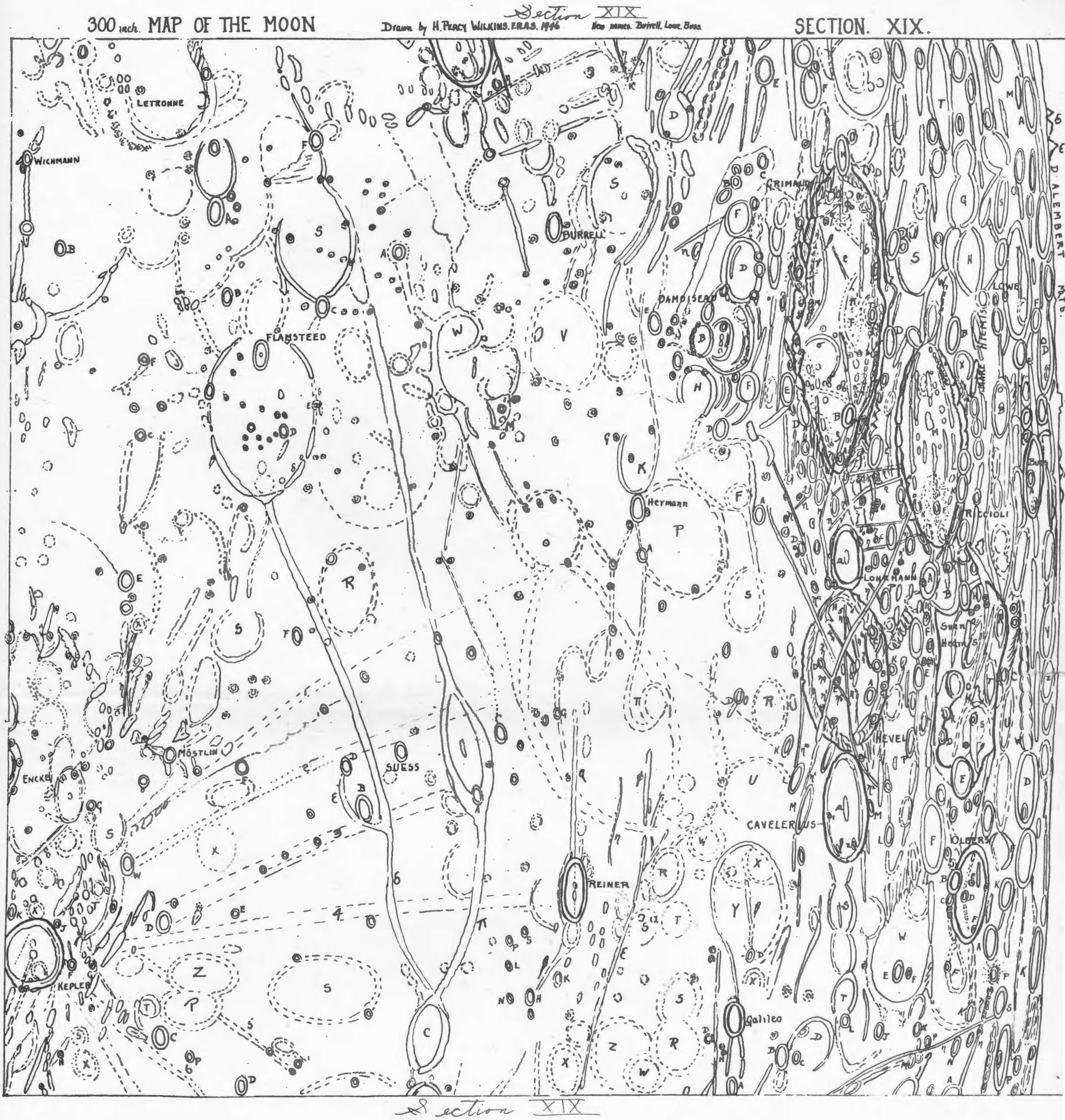
E. J. Reese offers some comments on recent views of the lunar crater Conon by various observers. Speaking first of T. E. Howe's results with a 4-inch reflector, he congratulates Mr. Howe on seeing Streak S with so little aperture. He then draws attention to Howe's observation on August 12, 1951, at colongitude 25°0 of a bright spot in the middle of the west inner wall. W. H. Haas with a 6-inch reflector drew a rather dim bright band in this same position on August 2, 1941, at 21°8. Usually, however, shadow covers this position near colongitude 25°. A sunlit ridge on the terraced inner wall can explain the appearance observed; but it is very surprising, Reese thinks, that observational errors or small changes in the sun's selenographic latitude can cause such striking variations in appearance.

Mr. Reese next comments upon an interesting sequence of drawings of Conon made quite independently by three different observers on three successive dates: by T. Saheki with an 8-inch reflector on September 19, 1951 at colongitude 137°3, by L. T. Johnson with a 10-inch reflector on September 20 at 143°1, and by E. J. Reese with a 6-inch reflector on September 21 at 155°2. The nomenclature used here is given on Figures 5 and 6 on pg. 1 of our August, 1951, issue. None of the three observers saw Streak S, although it has often been visible at this illumination; and all of them saw Cleft V. Johnson and Reese saw a sharp apex to the triangular, bright "floor cloud" in the northwest quadrant of Conon. Johnson recorded a deep ravine between hills P and R, a ravine observed also by E. E. Hare with a 12-inch reflector and (at its west end) by F. R. Vaughn with an 18-inch refractor on one date.

Johnson also drew Conon on September 10 and 12, 1951, at colongitudes 18°7 and 43°1 respectively. The September 10 drawing shows only a faint north end to Cleft V, often prominent at this solar illumination. On September 12 Mr. Johnson drew dark streaks S and A and Fault B, the last-named reaching all the way to a dark area on the north inner wall. (Johnson has often found the northeast half of Fault B invisible). He shows nothing at all of bright area Q in the south part of the floor; Reese has found the appearance of Q near colongitude 40° to vary from conspicuousness to complete invisibility.

In reply to a specific question from the Editor, Mr. D. L. Bellot writes that the lunar "flash" observed by his former neighbor, Mrs. James Finn (The Strolling Astronomer for December, 1951, pg. 15), was stationary on the lunar surface. A meteorite striking the lunar surface would cause a stationary impact-flare. A shooting star in the earth's atmosphere moving exactly toward the observer and seen projected against the more distant moon can also appear to be stationary, but the latter should be a phenomenon of very great rarity. If we had information (we don't) that others were watching the position on the moon where Mrs. Finn saw the "flash" at the time of its appearance and saw nothing, then a terrestrial explanation would be indicated.

Mr. Joaquín A. García of the University of Puerto Rico, Rio Piedras, Puerto Rico, has kindly sent us a reprint of an article he published about an interval timer of his own design and construction. Mr. García suggests that the timer could be used for lunar occultation work in places where the line frequency is maintained at its nominal frequency of 60 cycles per second. (In Puerto Rico the usefulness of the timer is limited to very short intervals.) Perhaps some of our readers would like to correspond with Mr. García about his invention.



SECTION XIX

OF

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

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