The ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

# The Strolling Astronomer

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16-inch Dall-Kirkham reflecting telescope on summit of Infiernillo Peak near Galeana, Nuevo Leon, Mexico. Professor Paul R. Engle (left), Director of Pan American College Observatory, and Mr. Bernardo Levi, physics student at the Instituto Tecnologico of Monterrey. Telescope built by Astro-Dome, Inc., Canton, Ohio. Erected and adjusted on Infiernillo Peak in June and August, 1961. Photograph by Mr. Gary L. Kraus, astro-science major at Pan American College. The telescope will be jointly operated by Pan American College, Edinburg, Texas, U.S.A., and the Instituto Tecnologico y de Estudios Superiores, Monterrey, Nuevo Leon, Mexico.

THE STROLLING ASTRONOMER

Pan American College
Observatory
Edinburg, Texas

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# THE EIGHTH CONVENTION OF THE ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

By: Thomas R. Stoeckley

Early this summer, July 1-3, 1961, the Eighth Convention of the Association of Lunar and Planetary Observers was held in Detroit, Michigan at the Henrose Hotel, just a few short blocks from the shores of the busy Detroit River. As in past years, the convention was held in conjunction with the National Convention of the Astronomical League. The Detroit Astronomical Society served as the host society for the convention.

As eager amateur astronomers from across the country, and several from our northern neighbor Canada, began arriving at the convention headquarters Friday night, June 30, and Saturday morning, July 1, they immediately found themselves greatly outnumbered by a huge square dance convention being held at the same time. This apparently had no deterring effect on the enthusiasm of the convention participants, however, and many got right to work setting up exhibits and generally getting set for the three exciting days ahead.

Thanks to the adequate space allotted by the Henrose Hotel, many excellent astronomical exhibits could be displayed. Among the non-A.L.P.O. exhibits was a fine display of amateur telescopes, including a Goto 4-inch refractor and two catadioptric 'scopes. Our A.L.P.O. Exhibit Chairman, Clark Chapman, did a marvelous job in assembling a very fine and complete display of photographs and drawings which are representative of the recent observational work done by A.L.P.O. members. It is a difficult and time-consuming job to secure and arrange material for such a complete exhibit, and we wish to express our gratitude to Clark Chapman and to all those who contributed to the success of the display.

At 9:30, A.M., Saturday, July 1, the convention was officially opened by Norman Dalke, President of the Astronomical League. Dr. William E. Howard, from the University of Michigan, gave an interesting and informative talk on "Radio Waves from Our Galaxy" in preparation for a field trip to the University of Michigan radio telescopes in the afternoon. After a noon recess, nearly all of the convention participants climbed into chartered buses for the highlight of the convention--a trip to the U. of M. optical and radio telescope facilities at Peach Mountain, near Ann Arbor, Michigan. Included at the site are a solid-dish 85-foot radio telescope, fourth largest in the world; a 28-foot radio telescope, used exclusively for solar observation to supplement the work done by the U. of M. McMath-Hulbert Solar Observatory at Pontiac, Michigan; and a 24-36 inch f/3.5 Schmidt telescope, located at nearby Portage Lake, down a very narrow gravel road (nearly impassable by the buses!) through the woods from Peach Mountain. The location of the Schmidt telescope, apparently in the center of a dense wilderness, is certainly a haven for harried astronomers who seek a bit of solitude!

The more-than-hour-long bus ride to and from Peach Mountain afforded well-used time for everyone to get together and chat with old friends whom they rarely get a chance to be with except at conventions such as this.

Saturday night, following the field trip, the Detroit Astronomical Society held an open house at its Headquarters and Telescope Workshop, with free bus transportation provided. Also, a star party was held on the roof of nearby Cobo Hall, overlooking the Detroit River. Except for a few brief glimpses of Jupiter and Saturn, however, clouds prevented any extensive observations. Nevertheless, a large group remained on the roof well into the night. Their varied conversations were interrupted from time to time by the deep whistles of steamships offshore and the rhythmic vibrations of the roof due to thousands of square dancers in the building below.

On Sunday, July 2, most of the day was devoted to the A.L.P.O. Convention, conducted by our "leader," Walter H. Haas. During the remainder of the morning and most of the afternoon, the following papers were presented by various members of the A.L.P.O.:

FIGURE 1. Clark Chapman presenting paper at Eighth A.L.P.O. Convention at Detroit, Mich., on July 2, 1961. Mr. Chapman there received the A.L.P.O. Award for his outstanding services to the Assoc. This photograph and others on this page taken and contributed by Wm. E. Shawcross.

FIGURE 2. David Meisel, A.L.P.O. Comets Recorder, presenting paper at Eighth A.L.P.O. Convention, held as part of the National Convention of the Astronomical League.

FIGURE 3. Dr. Helen Sawyer Hogg, of David Dunlap Observatory, delivering lecture on "Astronomy in Canada Today" during Astronomical League National Convention at Detroit, Michigan, July 1-3, 1961.

1. Some Notes Concerning Mercury Observations, by Geoffrey Gaherty, Jr. Slides.

2. The Availability of Cometary Information in the Current Literature, by David Meisel.

3. Combining Your Observations, by Wm. E. Shawcross.

4. A Large-Aperture Confirmatory Service for A.L.P.O. Observers, by James J. Mullaney and George A. Doschek.

5. Observation of Planetary Color, by Joseph P. Vitous. Read by Ernst Both.

6. Considerations on the Color Variations of Lunar Features, by G. A. Wegner. Slides.

7. Molds, Mosses, and Martians, by James J. Bartlett, Jr. Read by Thomas Stoeckley.

8. The 1960-61 Apparition of Mars, by Clark R. Chapman. Slides.

9. The Man From Space, by Carlos E. Rost. Read by Phillip W. Budine.

10. About the A.L.P.O. Library, by E. Downey Funck.

11. Venus Observations of the Montreal Centre of the R.A.S.C., by Klaus R. Brasch. Slides.

12. The Lunar Program of the Montreal Centre of the R.A.S.C., by George E. Wedge. Read by Constantine Papacosmas. Slides.

13. Remarks on a New Interpretation of Martian Phenomena, by Minick Rushton. Read by Walter H. Haas.

Before the resumption of the A.L.P.O. session in the afternoon, an enlightening talk, entitled "Astronomy in Canada Today," was presented by Dr. Helen Sawyer Hogg, an authority on star clusters, from the David Dunlap Observatory of the University of Toronto. In a very interesting manner and with a good sense of humor, Dr. Hogg made us all aware of the extent of Canadian facilities and the tremendous amount of work being done in Canada to advance the science of astronomy.

On Sunday evening the customary Honors Dinner was held. After dinner, Dr. Harvey Merker addressed the group with "Adventures in Medicine from Witchcraft to World Health," a welcomed temporary departure from the major theme of the convention. Following the dinner, Walter Haas made the annual award presentation to the most outstanding member of the A.L.P.O. during the past year. This year, a beautiful tieclasp, bearing the inscription "ALPO 1961," was fittingly presented to Clark Chapman, one of the younger members of our organization. As Prof. Haas aptly pointed out in his wonderful introduction, Clark Chapman has contributed extensively and well to the A.L.P.O. over his past one and a half years of membership with his excellent observational studies. His accomplishments are well known to recent readers of The Strolling Astronomer, but perhaps it is not out of place to mention a few at this time. Besides producing a great number of excellent drawings of Mars and Jupiter (and other planets, to a lesser extent), including a map of Mars, Mr. Chapman has originated the extended orthographic projection method of drawing both of these planets, which allows a continued observation and drawing of the disk as it rotates throughout the night. Aside from these accomplishments is a simultaneous observation program which Mr. Chapman presented in the May-June, 1961, issue of The Strolling Astronomer. Because of its attempts to solve several serious problems in visual lunar and planetary observing, and in order to provide constructive criticism of the work of individual amateurs as well, this worthy program deserves the support of every A.L.P.O. member.

On Monday, the final day of the convention, the time was devoted to the presentation of papers by members of the Astronomical League. And then, about 3:00 in the afternoon, Carroll D. Marshall, General Chairman of the Convention Committee, officially called the three-day convention to a close.

After such a convention as this, the delegates certainly had a right to be satisfied that the program was indeed well planned and executed, thanks to the many people who had devoted much of their time and energy to its preparation. The time had now come for all the delegates to return home, only to begin work on and to look forward to the next convention, when again they will be able to get together with other amateur astronomers from across the continent and learn what new fields have been advanced at the telescope in the realm of the moon, the comets, and the planets.

For those who were fortunate enough to remain in Detroit on Monday night, July 3, a fine display of fireworks was exploded over the waters of the Detroit River, commemorating the independence days of both bordering countries--Canada on July 1 and the United States on July 4. Certainly this was a fitting climax to three fun-filled and informative days. And perhas the astronomer with an imagination too vivid to be of scientific use at the eyepiece could find consolation by interpreting the fireworks as an unsurpassable display of northern lights over the international waters between the cities of Detroit and Windsor that night!

Postscript by Editor. Other descriptions of the Detroit Convention have appeared in Review of Popular Astronomy for September-October, 1961, pp. 16-19 (we especially enjoyed Editor Don Zahner's "side lights") and in Sky and Telescope for September, 1961, pp. 136-137.

## A CRITICISM OF DR. BARTLETT'S ARTICLE ON THE LIMB BAND OF VENUS

By: Joseph Eyer

While the "Limb Band of Venus: A Piece for the Puzzle," pp. 133-137 of The Strolling Astronomer for July-August, 1961, is an interesting and stimulating article, revealing, among other things, the observational usefulness of small telescopes, its interpretation of the phenomena observed on the Cytherean disc must be regarded with considerable doubt.

The author makes mention of bright and dark limb bands. He offers as explanation for the former the increase in angle of solar rays on a highly scattering atmosphere, further supposing that scattering is at a maximum at an angle of 90° between the Sun and observer. This is not an unreasonable assumption, since the limb at dichotomy would receive the greatest intensity of sunlight, while the central and terminator regions of the disc would receive rays much weakened by upper atmospheric absorption before they reached the scattering (misty, cloudy) layer. However, his explanation of the dark limb (or within-the-limb) band as the shadow of an immense cloud system passing off the edge of the disc seems certainly unreasonable.

The first assumption that must be made to explain the phenomena in this manner is a rotation period on the order of twenty days or less. While this is no great speed, yet it quite fully eliminates the possibility of a frontal (cloud) system from pole to pole moving in unison with the rotation of the planet. For, on any planet with an extensive atmosphere, the winds have a tendency to move in a north-south direction at low levels and a south-north direction at high levels in the northern hemisphere, and the reverse in the southern. This is due to the coldness of the poles relative to the higher temperature of the equator--cold air masses (winds) descend to the equator, where they become heated and rise to upper levels, producing a higher-altitude wind in the opposite direction to replenish the polar flow. Note that northern and southern hemisphere wind systems are separate, turning at the equator. This alone is enough to discount the description of the Venusian clouds as "greater than the similar extension of terrestrial systems." However, when rotation is imposed on such a dynamical system, coriolis phenomena come into play; and the winds become distorted into east-west and west-east currents, with areas of no winds, and areas of extreme turbulence. It is only when a turbulence appears that a mixing of air masses of different temperatures can cause a cloud system by condensation. And turbulences are by nature local phenomena, certainly not extending from pole to pole. But, given the Venus atmosphere, with its perhaps far-different constitution from our own, perhaps such a cloud system (of non-thermal nature?) might momentarily form. Obviously, however, it would then be swept away in different directions by differing northern and southern hemisphere winds so that it becomes an impossibility on this ground also.

A third objection to Dr. Bartlett's explanation is the very size and width of the limb band. If we are to assume a dense low-level scattering atmosphere, over which passes the cloud system, the shadow cast could be no longer than fifty miles at the most; else the clouds would occur at heights of 40-50 miles themselves, at least, above the true surface. Terrestrial clouds occur no higher than about seven or eight miles, and this limit due solely to lack of sufficient cloud material (moisture). But again, due to differences in atmosphere, we may postulate for Venus fifty-mile-high clouds. Still, the thinnest limb band on Dr. Bartlett's drawings shows a width of at least two hundred miles! If, on the other hand, we assume such clouds to be "floating" atop a dense diffusing atmosphere, whose lower levels are sensibly cloudless, but whose depth is on the order of 300 miles from the cloud system downward, we could account quite reasonably, but with some difficulty, for the high albedo of Venus. We could also account for the wide shadow, and its hazy boundaries. But to retain such an atmosphere, Venus would require a mass comparable to that of Jupiter, and a density below the true surface on the order of 500 g./cc. No known compound or element satisfies this criterion.

So, we must reject Dr. Bartlett's analysis of the Cytherean dark limb-band categorically, and all of the attendant corollaries.

In addition, it can be noted that his explanation for the brownish color of the interior shading of Venus' disc as compared with the bright limb also appears to be in error. Sunlight passing through a hazy Venus atmosphere will appear reddened, to be sure, to an observer on Venus. In the same way, we observe starlight to be reddened by interstellar dust. However, it is the image of the Sun or star that is reddened, and the reddening of the surrounding atmosphere or dust by scattering seldom extends 20° beyond the light source. This can be verified at sunset here on Earth. Not only that, but the image appears reddened due to the fact that the atmosphere scatters blue light, transmitting the red. Were we above our atmosphere, the sunset line would appear blue! In like manner, Venusian haze, if it were at all similar to the Earth's atmosphere, would also scatter blue. For the Cytherean atmosphere to scatter red (necessary to the brown color), it would necessarily be radically different in composition.

Consideration of Dr. Bartlett's theory from these points of view yields the following conclusions:

I. No correlation in meteorology or composition between the atmosphere of the Earth and that of Venus can be drawn from Dr. Bartlett's analysis.

II. The rotation period, again considering his analysis, is not necessarily short.

III. Finally, no definite evidence can be derived for "west to east rotation."

A fourth point might be added:

IV. Qualitative analysis has its place as a description of quantitative theory; however, the order should not be reversed, as Dr. Bartlett has done.

Postscript by Editor. We are always glad to have our readers discuss and criticize articles appearing in this periodical and likewise glad to publish articles like Mr. Eyer's as space allows and as the ideas presented appear to contribute to the problems involved. Some of our readers might like to correspond with Mr. Eyer; his address is 1606 N. 52nd St., Philadelphia 31, Pa.

The Editor must confess, with many blushes, that the last sentence in his postscript at the bottom of p. 137 of the July-August, 1961, Str.A., is pure nonsense. The dark limb-band in the drawings on p. 135 is not between the bright limb-band and the sun, a fact allowing as a geometric possibility an interpretation that the dark band is the shadow of the bright one (this interpretation may be wrong for other reasons, as Mr. Eyer discusses). The Editor apologizes to Dr. Bartlett and to our readers for the confusion which his faulty thinking may have caused.

## A PLANETARY CAMERA FOR A 12½-INCH TELESCOPE

By: F. Jack Eastman, Jr.

(Paper read at the Sixth A.L.P.O. Convention at San Jose, California, on August 24, 1960.)

Planetary cameras have ranged from shoe boxes tied to the eyepiece to the most complex devices of the professional observatories. It is the purpose of this paper to describe a useful planetary camera which can be constructed for as little as $10.00, and yet can yield better than average results.

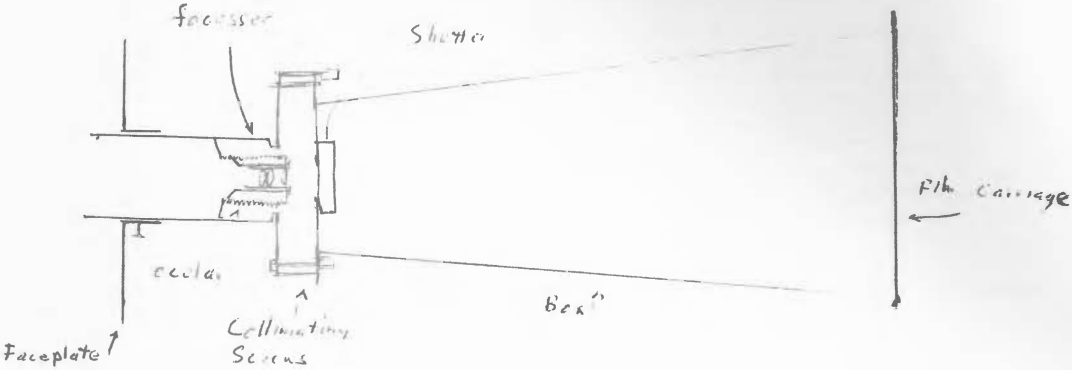


**FIGURE 4.** Rough diagram of planetary camera constructed by Mr. F. Jack Eastman, Jr., and described in his article in this issue. Figures 4 through 11 were contributed by Mr. Eastman.

**FIGURE 5.** View of Jack Eastman's disassembled planetary camera.

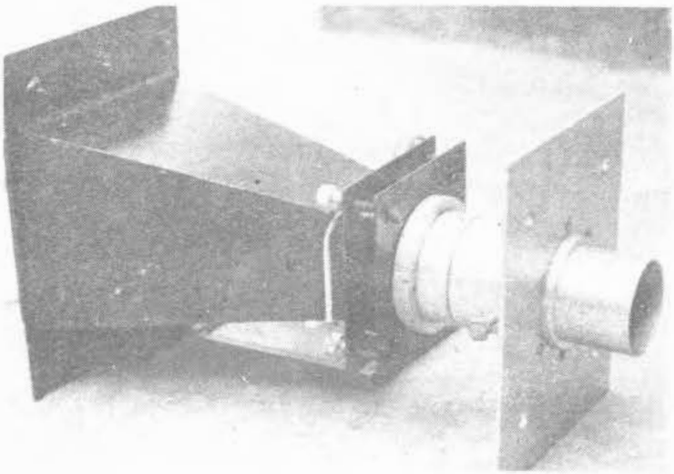

**FIGURE 6.** The assembled planetary camera.

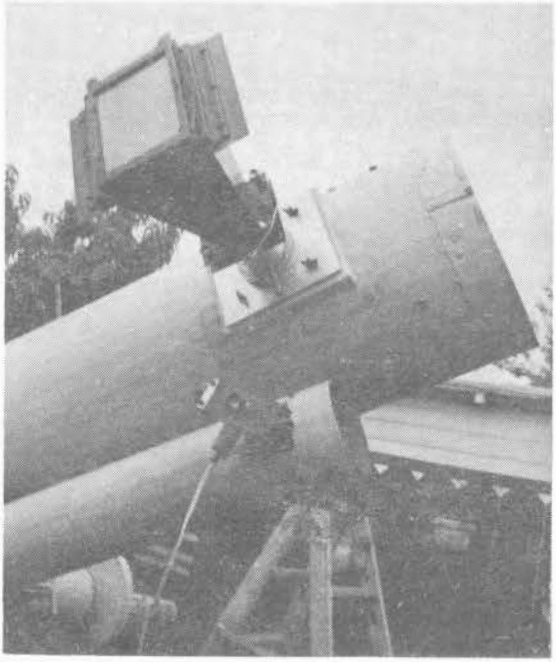

FIGURE 7. The planetary camera attached to the 12.5-inch reflecting telescope. Note the 4-inch guide telescope used to monitor the seeing.

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The question is now asked, "What is a planetary camera anyway?" A planetary camera is simply a device which projects the prime focus image of the telescope through an eyepiece so as greatly to increase the magnification. Such a camera usually consists of a long, light-tight box, with a shutter and occular at one end and a film carrier at the other. A Barlow Lens is commonly substituted for the occular, but the results are the same. See Figure 4.

My earlier design of a camera consisted of nothing more than a box with a shutter at one end and a film holder at the other. This camera was hung on the eyepiece and gave surprisingly good results, but it lacked stability. The design described in this paper was mainly due to L. J. Robinson, who built the box, while this writer built the nosepiece and focusser. I had originally built the telescope with a removable eye-end, with the thought of later adding a camera and other accessories. The camera was made to bolt on in place of the regular focusser.

There are three things of prime importance in planetary photography, stability, focus, and good seeing. Obviously we shall consider only the first two in the construction of the camera. This camera was constructed with both of these in mind. The instrument is bolted directly to the telescope tube, and is quite stable. The helical focusser is built directly into the camera, which allows for easy, trouble-free focussing. The front part of the camera, made of aluminum, consists of the faceplate and focusser. The latter screws into a small steel plate. The camera box fastens to this plate by means of four sets of push-pull screws, which permit exact alignment of the box and ocular assembly. The gap left by the collimating system allows the observer to reach in and focus the instrument. The box itself is made of sheet steel and has a shutter at the small end, permanently set on bulb. Exposures are made by the use of external timers. The box is about 10 inches long and has a 4 x 5 inches press camera back on it, focussing being done on ground glass. This entire instrument was built, not including ocular, for $6.

In order to use such a camera effectively, one must know the effective focal length. Here are the formulae:

Let d = distance of eyepiece from the prime focus of the telescope. Usually within 10% of the ocular's focal length.

Let D = distance from ocular to film (when focussed).

Then $\frac{D}{d}$ = M, and M x F.L. of telescope

= E.F.L. of the entire system.

Earlier I mentioned three items for good photographs, the third being the seeing. In order to make the exposures at the best moments of seeing, one must have a guide-'scope at least 1/3 the aperture of the main

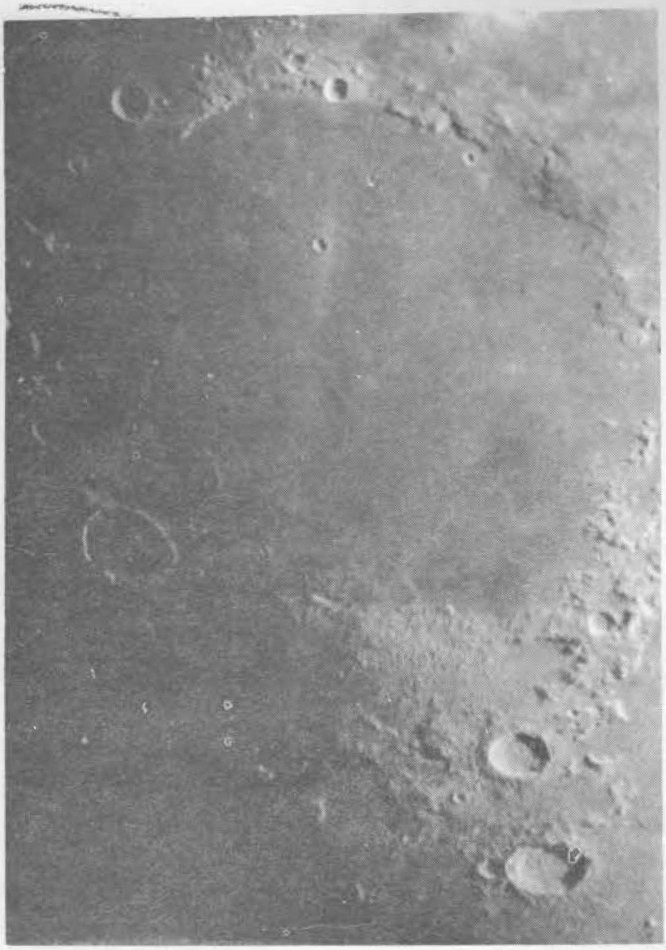


FIGURE 8. Photograph of portion of moon by Jack Eastman with 12.5-inch reflector on July 25, 1959, at $9^h\ 50^m$, U.T. Effective focal length 65 ft. Seeing very good. Ansco superhypan film, developer D-19. Mare Serenitatis and vicinity. Colongitude=$149^\circ.9$. On Figures 8 through 11 some of the detail present on the positive prints used may be lost in publication.

FIGURE 9. Photograph of portion of moon by Jack Eastman with 12.5-inch reflector on January 9, 1960, at $3^h\ 45^m$, U.T. Focal length 65 ft. Ansco superhypan film, developer D-19. Colongitude=$34^\circ.3$. Copernicus, Eratosthenes, and vicinity.

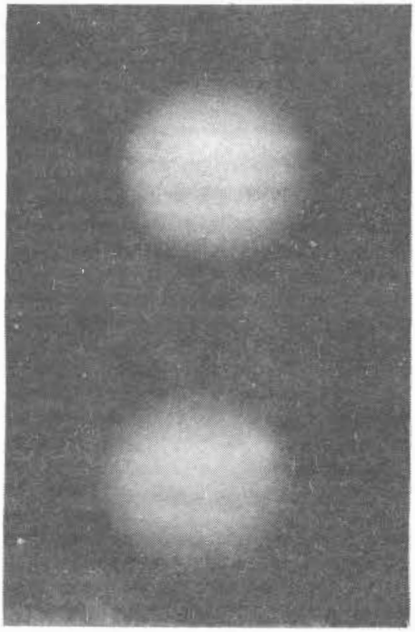


FIGURE 10. Photographs of Jupiter by Jack Eastman with 12.5-inch reflector on July 23, 1960, at $7^h 45^m$, U.T. Focal length 170 ft. Seeing good, transparency very poor. Ansco superhypan film, exposure 2½ secs. Development in D-19 for 5 minutes at 75°F. $CM_1$=295°. $CM_2$=30°. Note Red Spot at upper left on disc.

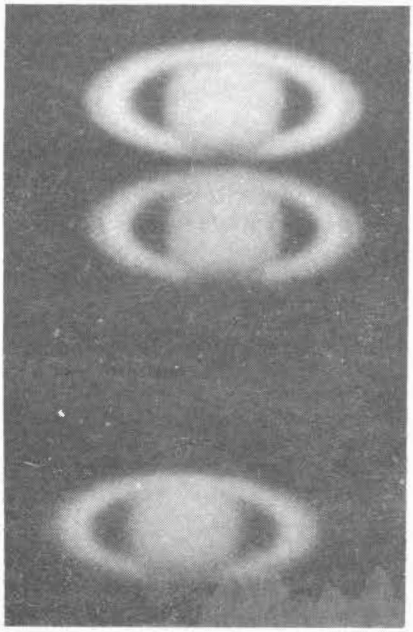


FIGURE 11. Photographs of Saturn by Jack Eastman with 12.5-inch reflector on July 12, 1960, at $7^h 45^m$, U.T. Focal length 170 ft. Seeing poor; transparency fairly good. Ansco superhypan film, exposure 6-8 seconds. Development in D-19 for 7 minutes at 72°F.

instrument, 1/2 or 2/3 being that much better. The object can be observed in the guide 'scope and the exposure made only at the best moments.

A good planetary camera, similar to this one, can easily be built for less than ten dollars, and when used on an instrument of at least 8 inches aperture represents a system truly capable of serious research. It is often a complaint that amateurs contribute little to astronomy. I think that if more of us would equip our instruments with cameras and take more photographs of the moon and planets, there would be much to gain. A photograph represents a permanent, accurate record of what is seen and can be later reduced to give valuable information concerning position, intensity, etc.

In conclusion, let me make a few suggestions concerning the photo itself, namely the information required to make the record of value.

1. Date, including year, in Universal Time.
2. Time, also by U.T.
3. Instrument, size, E.F.L., type, and make.
4. Film type.
5. Exposure.
6. Filter data.
7. Developing data.
8. Physical data like C.M., colongitude, etc.
9. Seeing and transparency.
10. Personal comments.

With the camera above described, a good telescope, and a little care, I think that the amateur can make a valuable contribution to astronomy.

# AN AMATEUR'S LUNAR AND PLANETARY PHOTOGRAPHY

By: Robert R. Cassell

(Paper read at the Sixth A.L.P.O. Convention at San Jose, California, on August 24, 1960.)

Amateur astrophotography has been a favorite hobby of mine for about five years. During that time I have tried several homemade photographical arrangements on my telescope, with which I have obtained more or less successful results. Due to a lack of time, I shall only describe here the arrangement with which I have obtained the best photos. My present setup hasn't been in use too long, and consequently I don't have as many pictures as I would like to have; but I will show the best of those that I have obtained up to the present time. [Mr. Cassell showed a number of slides, not available for publication here.]

My telescopic equipment consists of an 8" f/7 Newtonian reflector and a 4" f/6 astrograph, both of which are of commercial construction. All of my lunar and planetary photographs are taken with the 8" instrument, the astrograph being reserved solely for wide field stellar work such as star fields, nebulae, and the like.

My photo arrangement is, in actuality, quite simple. It consists of a 9" length of plumber's tubing containing a Goodwin Barlow Lens, which can be attached to a Topcon 35 mm. single-lens reflex camera. The larger end of the tubing has a bayonet-type mount and can be screwed into the camera in place of the regular lens. The image size can be varied by changing the position of the Barlow Lens in the tubing. I have found that best results are obtained when the lens is spaced about 6" from the film plane. This is in conjunction with Kodak's Microfile copy film, which is now obtained under the trade name of High Contrast Copy. I have found from past experience that this film gives about the best results on the moon and planets with my 'scope. With normal development the emulsion of this film microscopically shows an almost grainless structure. In additon, it possesses an extremely high resolution of over 200 lines per millimeter. The main disadvantage of this film is an inherent slow speed. With small apertures or telescopes with long focal lengths this disadvantage is a serious one, for many subjects will thus necessitate exposure times of several seconds. An alternate may be long development times. I have found, however, that the film has a remarkably low fog value, permitting development times upward of one hour or more. I have arrived at a proper development time of 40 minutes at 70°F. for my camera and equipment. This is in Ethol UFG developer, an extremely fast, fine-grain developer which works remarkably well for most astronomical photographs. However, under a development time of 40 minutes there is bound to be some grain present, as can be seen on my photos where the enlargement value is greater than 10 times.

Exposure times with my setup will vary considerably, depending on the subject to be photographed. In general, the planets will require more exposure than the moon. A typical exposure of Jupiter, for example, will run around 3/4 of a second, and of Saturn around 3 seconds. These values are, as I have mentioned before, with the Barlow Lens at a distance of about 6" from the focal plane. On the same film scale, an average exposure of the moon will be about 2 seconds. Unfortunately, although I have several dozen fairly good lunar shots, I have as yet only obtained a few usable planetary photos.

On a night when the seeing is average I shall generally catch three or four belts on Jupiter, and in extraordinarily clear weather I can sometimes faintly get a fifth. When the seeing is very good I shall, in addition, generally get a little belt detail, such as notches, spots, and the like. I find Saturn a more difficult object to photograph than Jupiter, owing to the longer exposure time necessary. I would estimate that about 90% of my Saturn negatives are unusable, due to atmospheric blurring of the image, drive mechanism error, or some other fault.

I have found from past experience that the use of a mechanical shutter will often cause an otherwise steady image to be blurred on the film. As a result, I have resorted to a method of exposure used by several other amateurs. When the image in the camera finder has been properly focused, it is brought to the edge of the field and the drive mechanism is allowed to run for a minute or two. After this an 11 x 14 inch cardboard is placed in front of the telescope tube and the camera shutter opened on bulb and locked in that position. Then the cardboard shutter is rapidly moved aside, the proper exposure made, and the cardboard returned to its original position in front of the tube. The drive is then turned off for four or five seconds and another exposure made. However, it is a good practice each time the subject has been advanced to a new position to wait for about 10 or 15 seconds to make sure that all vibrations have ceased and that the drive mechanism has caught hold. With this method of exposure, it would theoretically be possible to fill a whole frame full of images at one setting. However, I generally try to get about 10 or 15 images per frame at the most; in case the focus was slightly off, not so much time would have been wasted in vain. Such economy as this will always pay off in the long run.

For my lunar pictures the same method of exposure is used, but of course only one picture per frame can be taken. Most exposures on the moon with a 6" lens-to-film distance will be around 2 seconds.

It may be of interest to some amateurs to tell how I obtained my black and white slides of the moon and planets. For Jupiter and Saturn, enlargements were simply made of the original negatives onto 35 mm. Panatomic-X film, thus obtaining a positive slide from a negative film. For the moon, I made 8 x 10 enlargements from the original negatives, and these in turn were copied with Kodachrome color film.

One of the newest applications that have been made in astronomical photography is the use of color film. While I myself haven't done any extensive experimentation with color film, I have obtained a few fairly good lunar slides. The one big disadvantage of color film is its slow speed. There are a few notable exceptions to this rule, however, such as Kodak's High-Speed Ektachrome and Ansco's Super Anscochrome, both of which in turn are excessively grainy. The only really fine-grain color film presently on the market is Kodachrome. Although this film has a microscopically fine grain structure rivaling that of Microfile, it possesses in addition an extremely low ASA value. If it were possible for me to force develop the film, I could in all probability secure pictures superior to my present ones. Since at the present I have neither the time, nor, more specifically, the money to process the film, all I can do is hope for such a thing.

Summing up my presentation, I would like to say I feel my camera setup has doubly repaid whatever small cost was put into its construction. In additon, I think that any amateur possessing a telescope and a 35 mm. camera who tries this method of astrophotography will find it worthwhile, enjoyable, and very economical.

## A LARGE APERTURE CONFIRMATORY SERVICE FOR A.L.P.O. OBSERVERS

By: James J. Mullaney and George A. Doschek

(Paper read at the Eighth A.L.P.O. Convention at Detroit, Michigan, on July 2, 1961.)

The purpose of this paper is to propose before the A.L.P.O. a "confirmatory service" for its members. The availability of several large aperture instruments, a shortage of available observing time, and the frequent requests in The Strolling Astronomer for confirmation of observations of "new" lunar and planetary features have all combined to prompt me to bring forth this proposal.

As a staff member of the Allegheny Observatory of the University of Pittsburgh, I have complete use of an excellent 13" f/15 visual refractor and partial use of a 31" f/25 Cassegrain reflector and a 30" f/18 refractor. Since I spend nearly every clear hour in research work with the larger instruments, I have very little free observing time for serious work on the moon and planets. The idea of doing confirmatory work appears attractive to me under these conditions. Under good sky conditions, such observations should take relatively little time.

Perhaps it would be well to say a few words about each of the instruments and the time open for observing in each case. The 30" refractor and the 31" reflector were made in Pittsburgh by the John A. Brashear Co. The 30" is both a photographic and a visual instrument, in the former case being the world's largest photographic refractor. It can easily be converted into a visual telescope by the insertion of a correcting element. The instrument has been a leader in the field of astrometric astronomy. Parallax determinations made with it are considered the most accurate in the world; indeed, an Allegheny parallax is considered the standard. Very little time is available with this instrument due to its very heavy schedule; but occasionally, especially during midnight hours, there is some free observing time.

The 31" reflector is used in spectroscopic binary research. This is the telescope which F. Schlesinger used in 1909 to detect for the first time stellar rotation. The attached spectrograph is one of the most modern in the world. It can yield the spectrum of a fifth magnitude star in just five minutes! I have secured many lunar and planetary spectra with it, including the Martian polar zone, the Red Spot, and the central peak in Alphonsus. The instrument can be used visually, having a fixed low-power of 600X. Under good seeing, the telescope can give marvelous views. The time available with the 31" would be about twenty or thirty minutes each night.

Lastly we come to the little 13" refractor, made over a hundred years ago by Henry Fitz of New York. It is still in excellent optical and mechanical condition. One French authority claims it to be the finest visual telescope ever made! S. P. Langley's drawings of sunspots in the 1870's show detail so fine that only today have they been confirmed-by balloon-borne telescope. This telescope's chief claim to glory is the discovery J. E. Keeler made with it concerning the nature of Saturn's rings. By the use of a prism spectrograph he proved spectroscopically that the rings are not all one solid piece. The old spectrograph is still in use in the 13" dome, for demonstration purposes. Time on this telescope is at a <u>maximum</u>. So nearly every evening after visitors' hours, the 'scope is free for use. With a battery of several dozen oculars, a filar micrometer, photometer, and astrocamera, this telescope proves to be the most useful of the three for visual work. Many fine lunar and planetary drawings which have appeared in <u>The Strolling Astronomer</u> have come from its lens. R. Schmidt's and C. McClelland's drawings of Mars and Venus Recorder W. K. Hartmann's drawings of Venus have all been made with the 13".

These, then, are the instruments of Allegheny Observatory. At least one can always be ready to fulfill your requests--all you need do is ask.

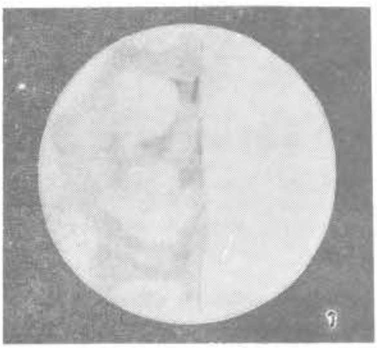
<u>Postscript by Editor</u>. We are very much open to ideas and suggestions as to how this service may best be used. For example, should a Section Recorder always approve a request made of Messrs. Mullaney and Doschek? Or if not, who should be authorized to make these requests in order that simple blunders will not waste the time of the Allegheny Observatory instruments? Clearly too, with restricted time, the requests should be only for information where large apertures and professional equipment are important or even essential.

## OBSERVATIONS OF VENUS BY THE MONTREAL CENTRE OF THE R.A.S.C.

By: Klaus R. Brasch

(Paper read at the Eighth A.L.P.O. Convention at Detroit, Michigan, on July 2, 1961.)


COPY OF CHART OF VENUS
AS ILLUSTRATED
IN THE
LA ROUSSE ENCYCLOPEDIA
OF
ASTRONOMY



COPY OF CHART OF VENUS
OBTAINED FROM MORE
THAN THIRTY OBSERVATIONS
BY MEMBERS OF THE
MONTREAL CENTRE OF THE
R.A.S.C.

**FIGURE 12. Contributed by Klaus R. Brasch. See also his article in this issue.**

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Serious observations of Venus by members of the Montreal Centre were begun during the apparition of 1959-60.

Because accurate visual observations of surface markings, Ashen Light, and other phenomena of the planet are difficult to make, no definite observations program was undertaken at that time. An effort was made, however, to try to obtain simultaneous observations by different observers, with various instruments, for the purpose of confirmation. In this we were quite successful on several occasions; and if nothing else was accomplished, it gave us experience and encouragement to continue observing this rather unrewarding planet.

For 1960-61, a much more ambitious and elaborate program was undertaken. Observations were again to be made simultaneously, in the afternoon and early evening; in addition, however, intensity estimates of the markings were to be made. The same scale as that used by the A.L.P.O., with 0 as sky black up to 10 for the brightest features, was adopted. On this scale the darkest markings seldom were judged below 8, illustrating the faintness of these features.

A further and very interesting type of observation was made with a violet Wratten 47-B filter. The planet was first observed without a filter; and if anything was seen, a drawing was made. Then the planet was observed with the filter, and a second drawing was made. In general the markings were more conspicuous with the filter, and often appeared to have different shapes than when seen without it. On several occasions parallel

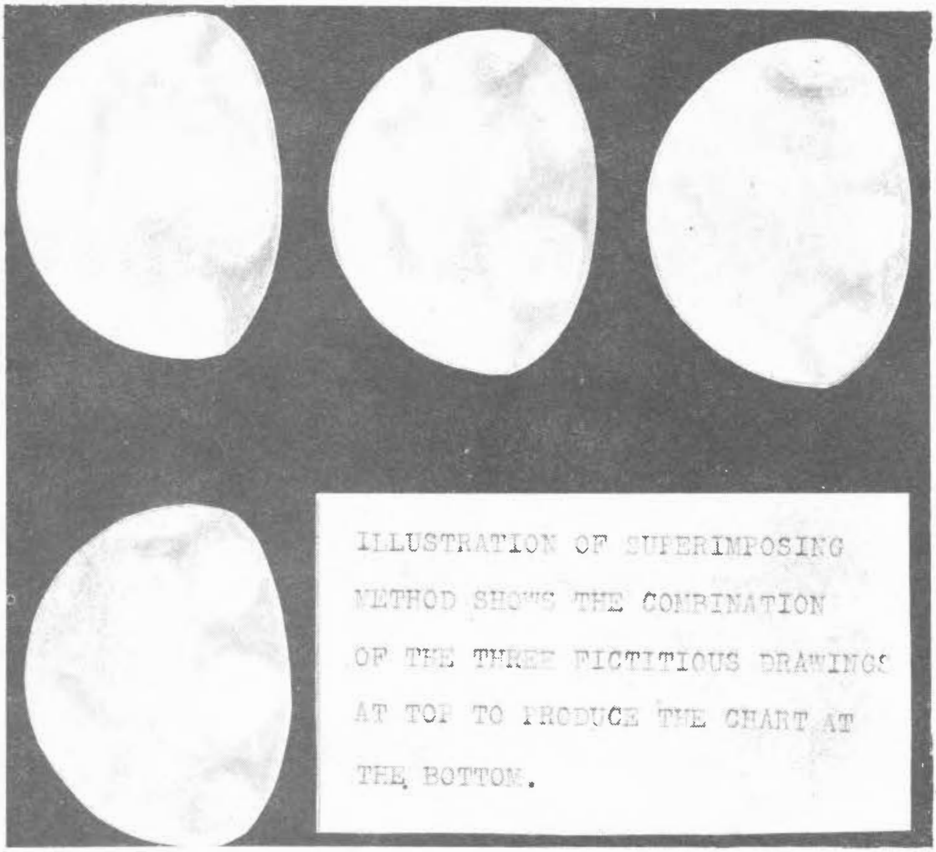


FIGURE 13. Contributed by Klaus R. Brasch. The method of superimposition can also be used to advantage in photographing the more difficult features on the moon and the planets.

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band-like structures were seen, beginning at the terminator and thinning out toward the limb. The cusp areas at the north and south ends of the terminator were often seen much more definitely with the filter. On the whole, a blue or violet filter was found to have considerable use in revealing sharper and more conspicuous detail than could otherwise be seen.

Another, rather intriguing experiment was undertaken more or less for curiosity's sake. As is generally known, no definite rotation period for Venus has as yet been established. Although indications are that the period is more than a week and less than a month, times ranging from a few hours to one Venusian year have been quoted. Certain observers at the Pic du Midi Observatory in France hold the opinion that Venus like Mercury has a rotation period of the same length as one year for the planet and consequently always presents us with the same face. It is the belief of these people that Venus is covered with high, dense clouds, in which occasional breaks sometimes reveal markings of lower levels. By superimposing numerous observations they have thus produced a map of what they believe to be more or less permanent markings. A reproduction of this map can be found in the La Rousse Encyclopedia of Astronomy.

Based on the above assumption, and for a lack of a more concrete program, we have attempted a similar experiment despite the fact than none of us has much faith in the idea. Several of the best drawings by the most experienced observers and only those made with instruments of 6" or over under fair and favorable seeing conditions were transferred on to tracing paper, superimposed, and an outline was then made of the darkest, and most prominent markings. In this manner a map of each observer's observations was made; and finally, with allowances made for different drawing styles, a final map was produced from about 30 observations. From Figure 12 it can be seen that, although a limited degree of agreement is indicated, it cannot be said to be very convincing. However, it should be borne in mind that our map is based on rather few observations made with smaller instruments, inferior seeing, and less experienced observers than the one made at Pic du Midi. Furthermore our map was based almost entirely on direct observations, while the French map is based mainly on filter observations.

A further experiment that may be undertaken is one in which the same superimposing method may be used coinciding with a certain rotation period, in which case appropriate calculations and corrections would have to be made (Figure 13). This, however, would be very difficult to do and extremely time-consuming.

Thus as with all experiments and observations of Venus, nothing is definitely proven or disproven, no conclusions can be reached, and in fact one knows no more about the planet than before except that people will go on observing and speculating about this truly fascinating planet.

## A RECONNAISSANCE CHART OF THE CENTRAL OCEANUS PROCELLARUM

By: John E. Westfall

### I. Introduction

At the 1958 Convention of the Association of Lunar and Planetary Observers, a paper of the author's was read concerning a lunar mapping project.[1] The map described here forms a rather fragmentary realization of the initial phases of such a project. This map appears as Figure 15 on pages 162 and 163.

### II. Procedure

#### A. Region

The region studied (Central Oceanus Procellarum) was chosen for two reasons; (i) the excellent horizontal control afforded by the efforts of D. W. G. Arthur,[2] and (ii) the fact that the author had studied the region previous to the commencement of this chart. The exact boundaries of the area are the 40° and 60° meridians east, and the equator and the parallel 25° north. This quadrangle is bounded by a 25-kilometer marginal zone, for overlap with other possible charts. Such hypothetical future charts form the reason for the code designation IIC, referring to chart C of the second quadrant, as in Figure 14.

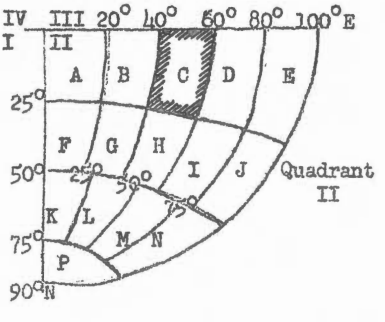


FIGURE 14. Sketch by Mr. John E. Westfall showing scheme of possible future lunar charts and associated proposed code, by quadrant and region.

#### B. Projection

The projection selected reproduces the region with little distortion, far less than with the conventional central orthographic. The projection is the transverse case of the cylindric equivalent (equal-area), having its equator as the 50° meridian east, the central meridian of the map. For optimum distribution of error, the chart has been rendered conformal on parallels 4°50', from the central meridian, giving a scale distortion on the central meridian of 0.36% and a 1.18% distortion in the corners (for a tabulation of scale distortion, see appendix 1).

The adopted scale is 1:1,000,000 (15.78 mis./in.), and the reproduction included here is at a scale of 1:2,000,000 (31.57 mis./in.). The reference sphere has a radius of 1738.0 kms. (1080.0 mis.). Latitudes and longitudes were computed at $2^{\circ}$ intervals and are given in appendix 2. The formulae used were:

$$(1)\quad \sin \phi' = \cos \phi_x \sin \Delta\lambda \qquad (3)\quad x = \alpha \sin \phi'$$
$$(2)\quad \sin \lambda' = \cos \phi_x \sin \Delta\lambda \sec \phi' \qquad (4)\quad y = \beta \lambda',$$

for scale, 1:1,000,000; radius, 1738.0 kms., standard parallels, $\phi' = 4^{\circ}50'$, $\alpha = 174.44$ cms., $\beta = 0.050379$ cms./minute of lunar arc. [Mr. Westfall's scale has been altered in the published reproduction of his map on pages 162 and 163.--Editor.]

## C. Relief and Tone Representation

Measured altitudes were far too sparse and unreliable to justify the use of contour lines, so the hachure method was employed to indicate relief. Slopes were divided into nine classes, with a corresponding spacing of hachure lines, as follows.

| Class | Slope | Spacing | Class | Slope | Spacing |
|---|---|---|---|---|---|
| 1 | $1^{\circ}$ - $2^{\circ}$ | 2.00 mms. | 6 | $15^{\circ}$ - $20^{\circ}$ | 0.50 mms. |
| 2 | 2 - 4 | 1.67 | 7 | 20 - 25 | 0.35 |
| 3 | 4 - 7 | 1.33 | 8 | 25 - 30 | 0.25 |
| 4 | 7 - 11 | 1.00 | 9 | Over 30 | Solid |
| 5 | 11 - 15 | 0.75 | | | |

The classes are stepped due to the uncertainties of the slopes, while the hachure spacing is non-linear due to the wide range of slope values and the relatively low range of visibility. Also in order to improve visibility, light hachures are drawn thicker than the dark.

Slopes were determined by computation from measured altitudes (Schmidt), and from observations of shading as a function of solar altitude (visual and photographic). Dark hachures are used for eastward-sloping gradients; light hachures are used for westward-sloping gradients. Grey represents level, while light and dark tones represent light and dark areas as they appear under high lighting. The intention is not to produce a "photographic" or even a realistic effect but merely to give the map a degree of plasticity as well as of cartographic stylization.

## D. Crater Dimensions

Visual measures were found to differ consistently (but not systematically) from photographic measures, due probably to irradiation. For this reason, visual measures were rejected, and the following photographic determinations were used:

| Weight | Source |
|---|---|
| 6 | Arthur |
| 6 | Saunder |
| 6 | Young |
| 1 | Blagg and Müller |
| 1 | Paris Atlas, #57 (Measured by J. Westfall) |
| 1 | " " #62 ( " " " " ) |
| 1 | " " #71 ( " " " " ) |
| 2 | Mt. Wilson, #256a ( " " " " ) |
| 2 | Lick Observatory Set ( " " " " ) |

The adopted diameters are given in appendix 4.

## E. Insertion of Detail

### 1. Control:

The control points used are divided into 2nd. order (p.e. ±0.0003 R or less) and 3rd. order (p.e. ±0.001 R or less). The 91 2nd. order points were derived from Arthur, Young, and Saunder, while the main source for the 41 3rd. order points was the Blagg and Müller catalogue. Thus, control was established with 132 measured points, whose coordinates were transferred from the orthographic projection to the chosen projection, using the formulae given above and the equalities, $\sin \phi_x = \eta_x$ and $\sin \lambda_x = \xi_x \sec \phi_x$. The probable error of most points on the 1:1,000,000 projection is about ½ mm.

### 2. Photographic Detail:

Four sources were consulted: (i) The Paris Atlas (Pl.57,62,71), (ii) Mount Wilson Lunar Photographs 253, 256a, (iii) Lick Observatory Lunar Set, and (iv) the author's photographs taken with the 8-inch Leuschner Observatory reflector and the Chabot Observatory 20-inch refractor.

### 3. Drawings:

During the period 1952-1960, the author made a series of thirty-one sketches of the region under a wide range of lighting conditions and with 3½, 4½, and 8-inch reflectors and 4, 5, and 20-inch refractors. Drawings were mainly used to supplement photographs. Detail was accepted if shown on at least two drawings, excepting low ridges, which might be accepted if only shown once, due to the necessity for low lighting.

### 4. Plotting of Detail:

Positions were transferred from photographs or drawings to an orthographic projection (100 ins./lunar radius) on transparent acetate, by radial trisection from three known points (the triangle of error obtained was almost always under 1 mm.). Finally, the orthographic chart was transferred to the desired projection.

## F. Nomenclature

The author has attempted to follow strictly the International Astronomical Union's standard nomenclature.[3] Names have generally been placed to the right and above the appropriate formation, save in marginal cases where this would be awkward. The accepted designations are listed in appendix 5.

## III. Critique

While compiling the chart, the author was impressed by the inadequacy of his efforts--hence the term, "reconnaissance." It is apparent that an individual can no longer materially advance selenography without aid from others. The map is not intended as an authoritative representation of the lunar surface but rather as a demonstration of the application of cartographic principles in selenography. Thus, this work is presented as a suggestion and basis for future study. Specifically, it is hoped that larger scale (perhaps 1:500,000) charts can eventually be compiled for this region, utilizing relief representation, on a more-or-less true projection, and drawing in part upon the material given in the appendix and bibliography--all to be executed by a group of interested selenographers.

If future work is encouraged by this effort, it will have more than served its purpose.

## Appendices

### I. Scale Deviation of Projection

Scale in terms of basic scale = 1:1,000,000

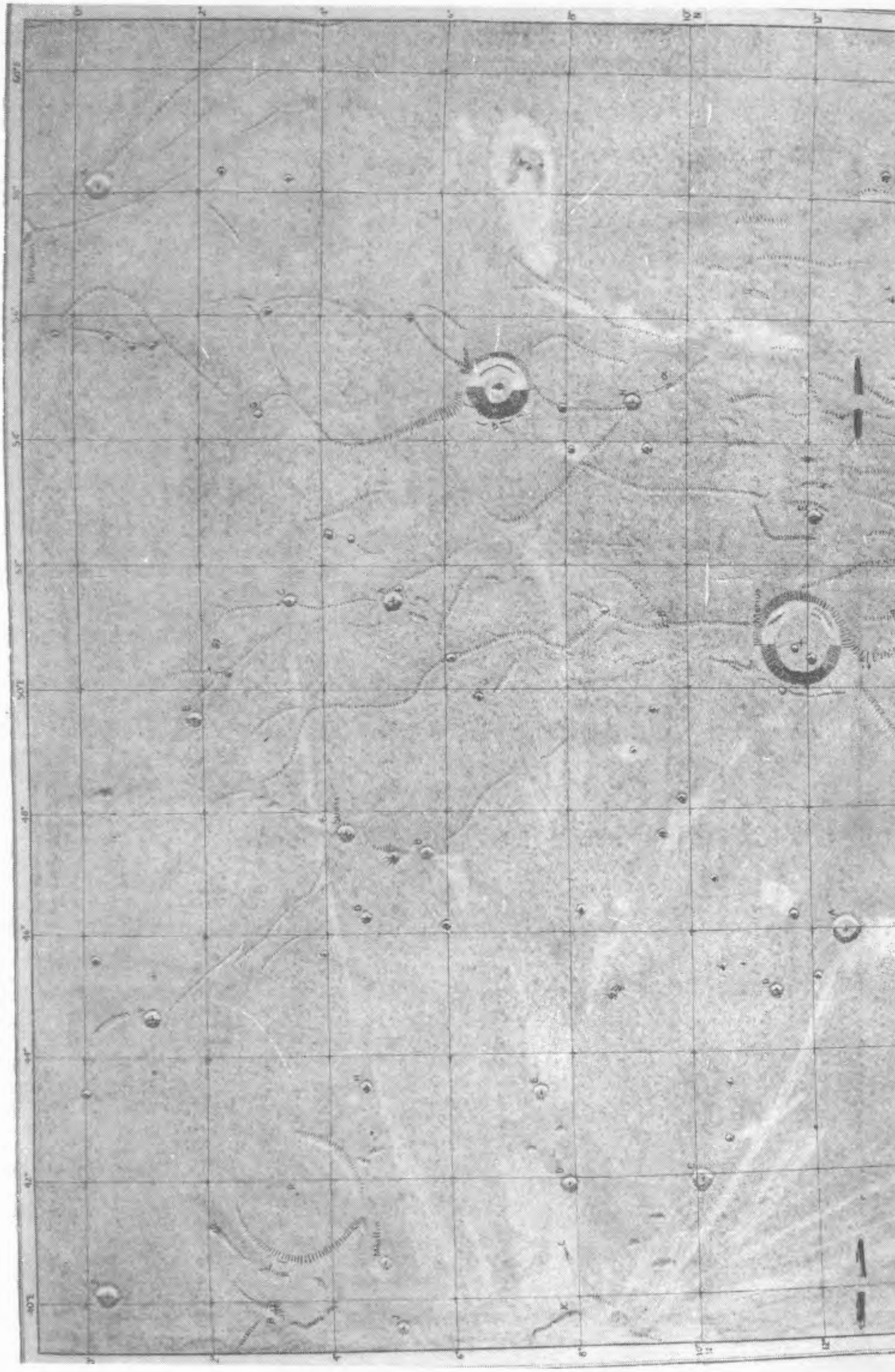

FIGURE 15. Chart of central portion of Oceanus Procellarum constructed by John E. Westfall. See article "A Reconnaissance Chart of the Central Oceanus Procellarum" in this issue. Approximate extent of chart in lunar latitude 0° to 25°N., in lunar longitude 40°E. to 60°E.

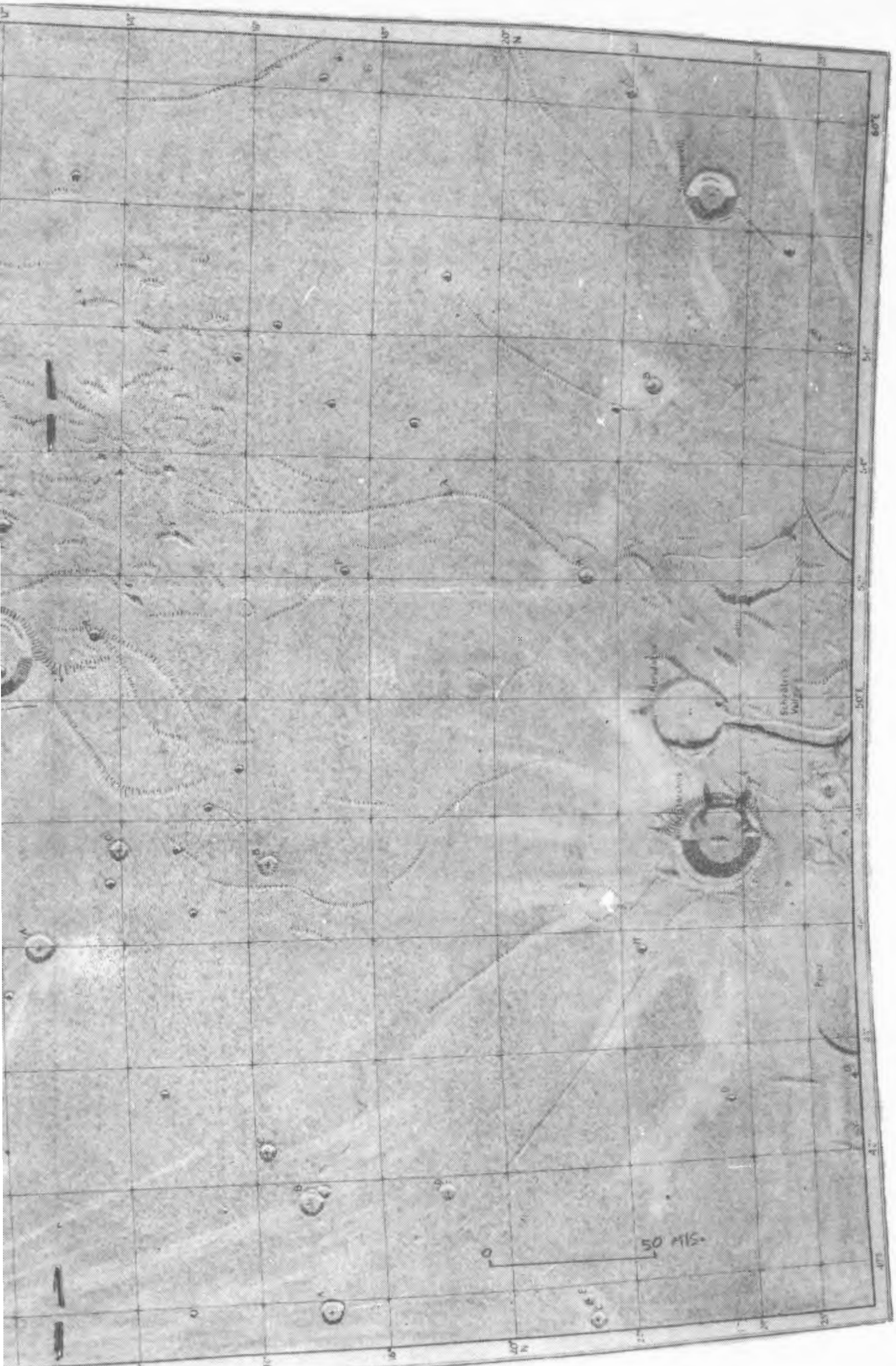


Chart on transverse cylindric equivalent projection, with "equator" at $50^{\circ}$E. meridian of longitude and conformal at $\varphi' = 4^{\circ}50'$. Lunar radius= 1738.0 kms. Nomenclature by I.A.U. Control: D. Arthur, S. Saunder. Cartography: J. E. Westfall, 1960. Original scale, 1:1,000,000 or 15.78 miles=1 inch. Note scale of published reproduction near lower right corner.

| Arc Distance from Central Meridian | N-S Scale | E-W Scale | Areal Scale | Max. Deformation |
|---|---|---|---|---|
| 0° | 0.9964 | 1.0036 | 1.000000 | + 0° 35' |
| 1 | 0.9966 | 1.0034 | 1.000000 | + 0 33 |
| 2 | 0.9971 | 1.0030 | 1.000000 | + 0 29 |
| 3 | 0.9978 | 1.0022 | 1.000000 | + 0 21 |
| 4 | 0.9989 | 1.0011 | 1.000000 | + 0 11 |
| 4°50' | 1.0000 | 1.0000 | 1.000000 | 0 00 |
| 5 | 1.0003 | 0.9998 | 1.000000 | - 0 02 |
| 6 | 1.0019 | 0.9981 | 1.000000 | - 0 19 |
| 7 | 1.0039 | 0.9961 | 1.000000 | - 0 38 |
| 8 | 1.0062 | 0.9938 | 1.000000 | - 1 00 |
| 9 | 1.0089 | 0.9912 | 1.000000 | - 1 25 |
| 10 | 1.0118 | 0.9883 | 1.000000 | - 1 53 |

II. Coordinates of Latitude and Longitude Intercepts

Longitude from Central Meridian (50° East). X,Y in cms. X positive to east.

| Latitude | 0° X Y | 2° X Y | 4° X Y | 6° X Y | 8° X Y | 10° X Y |
|---|---|---|---|---|---|---|
| 0° | 00.00,00.00 | 06.09,00.00 | 12.17,00.00 | 18.23,00.00 | 24.28,00.00 | 30.29,00.00 |
| 2 | 00.00,06.05 | 06.08,06.05 | 12.16,06.05 | 18.22,06.10 | 24.26,06.10 | 30.27,06.15 |
| 4 | 00.00,12.09 | 06.07,12.09 | 12.14,12.14 | 18.19,12.19 | 24.22,12.24 | 30.22,12.29 |
| 6 | 00.00,18.14 | 06.05,18.14 | 12.10,18.19 | 18.13,18.24 | 24.14,18.29 | 30.13,18.39 |
| 8 | 00.00,24.18 | 06.03,24.18 | 12.05,24.23 | 18.06,24.33 | 24.04,24.43 | 30.00,24.53 |
| 10 | 00.00,30.23 | 06.00,30.23 | 11.98,30.28 | 17.96,30.38 | 23.91,30.50 | 29.83,30.68 |
| 12 | 00.00,36.27 | 05.96,36.27 | 11.90,36.37 | 17.83,36.47 | 23.75,36.63 | 29.63,36.83 |
| 14 | 00.00,42.32 | 05.91,42.32 | 11.81,42.42 | 17.69,42.57 | 23.56,42.72 | 29.39,42.92 |
| 16 | 00.00,48.36 | 05.85,48.41 | 11.70,48.46 | 17.53,48.62 | 23.34,48.82 | 29.12,49.07 |
| 18 | 00.00,54.41 | 05.79,54.46 | 11.57,54.56 | 17.34,54.66 | 23.09,54.91 | 28.81,55.22 |
| 20 | 00.00,60.46 | 05.72,60.51 | 11.43,60.61 | 17.13,60.76 | 22.81,61.01 | 28.46,61.31 |
| 22 | 00.00,66.50 | 05.66,66.55 | 11.28,66.65 | 16.91,66.85 | 22.51,67.05 | 28.08,67.41 |
| 24 | 00.00,72.55 | 05.56,72.60 | 11.12,72.70 | 16.66,72.90 | 22.18,73.15 | 27.67,73.50 |
| 25 | 00.00,75.57 | 05.52,75.62 | 11.03,75.72 | 16.53,75.92 | 22.00,76.22 | 27.45,76.58 |

III. Coordinates of Control Points

Only points which have been positively identified and shown on the chart are given below. An asterisk (*) denotes a point in the marginal zone.

Second Order Points:

| Name or D.W.G. Arthur Designation | $\xi$ | $\eta$ | $\lambda$ | $\phi$ | x(cms.) | y(cms.) |
|---|---|---|---|---|---|---|
| Encke E | -.6444 | .0058 | 40°07'E. | 00°20'N. | -29.93 | 01.01 |
| gA8080 | -.6877 | .0004 | 43 27 | 00 01 | -19.90 | 00.05 |
| Mästlin H | -.6862 | .0807 | 43 31 | 04 38 | -19.62 | 14.06 |
| Kepler C | -.6564 | .1740 | 41 48 | 10 01 | -24.49 | 30.78 |
| gB5863 | -.6648 | .1833 | 42 33 | 10 34 | -22.24 | 32.19 |
| gB7864 | -.6763 | .1839 | 43 29 | 10 36 | -19.47 | 32.24 |
| gB9591 | -.6988 | .1506 | 44 59 | 08 40 | -15.09 | 26.30 |
| Marius D | -.6928 | .1976 | 44 58 | 11 24 | -15.00 | 34.56 |
| Bessarion C | -.6497 | .2760 | 42 31 | 16 01 | -21.82 | 49.32 |
| gC6572 | -.6667 | .2520 | 43 33 | 14 36 | -18.96 | 44.38 |
| gC9140 | -.6938 | .2095 | 45 12 | 12 06 | -14.27 | 36.68 |
| gC9671 | -.6967 | .2608 | 47 52 | 15 07 | -06.26 | 45.74 |
| Bessarion D | -.6256 | .3378 | 41 40 | 19 45 | -23.79 | 58.24 |
| Suess F | -.7026 | .0199 | 44 39 | 01 08 | -16.26 | 03.48 |
| hA1043 | -.7143 | .0034 | 45 35 | 00 12 | -13.43 | 00.60 |
| hA1210 | -.7113 | .0201 | 45 21 | 01 09 | -14.15 | 03.48 |
| hA1649 | -.7137 | .0688 | 45 41 | 03 57 | -13.10 | 11.94 |
| Suess D | -.7231 | .0812 | 46 16 | 04 39 | -11.32 | 14.11 |

| Name or D.W.G. Arthur Designation | $\xi$ | $\eta$ | $\lambda$ | $\phi$ | x(cms.) | y(cms.) |
|---|---|---|---|---|---|---|
| Suess | -.7368 | .0757 | 47°38'E. | 04°20'N. | -07.19 | 13.15 |
| hA3319 | -.7313 | .0887 | 47 14 | 05 05 | -08.39 | 15.42 |
| Reiner B | -.7316 | .0983 | 47 19 | 05 38 | -08.13 | 17.08 |
| hA4077 | -.7468 | .0068 | 48 19 | 00 23 | -05.13 | 01.16 |
| hA4609 | -.7398 | .0688 | 47 52 | 03 57 | -06.47 | 11.94 |
| Reiner E | -.7604 | .0328 | 49 32 | 01 53 | -01.41 | 05.69 |
| hA6482 | -.7681 | .0423 | 50 15 | 02 25 | 00.77 | 07.30 |
| hA7349 | -.7735 | .0392 | 50 43 | 02 15 | 02.18 | 06.80 |
| Reiner A | -.7786 | .0895 | 51 25 | 05 08 | 04.29 | 15.52 |
| Reiner C | -.7803 | .0606 | 51 25 | 03 28 | 04.31 | 10.48 |
| hA9711 | -.7911 | .0713 | 52 29 | 04 05 | 07.54 | 12.39 |
| hB0802 | -.7002 | .1825 | 45 25 | 10 31 | -13.71 | 31.89 |
| hB0808 | -.7000 | .1884 | 45 28 | 10 52 | -13.54 | 32.95 |
| hB1074 | -.7172 | .1039 | 46 09 | 05 58 | -11.63 | 18.09 |
| hB1473(S. of 2) | -.7166 | .1426 | 46 23 | 08 12 | -10.90 | 24.84 |
| hB1871 | -.7174 | .1812 | 46 51 | 10 26 | -09.44 | 31.59 |
| hB2686 | -.7282 | .1658 | 47 36 | 09 33 | -07.20 | 28.87 |
| hB3741 | -.7345 | .1712 | 48 12 | 09 51 | -05.39 | 29.82 |
| hB4548 | -.7441 | .1576 | 48 58 | 09 04 | -03.10 | 27.41 |
| hB5623 | -.7518 | .1632 | 49 38 | 09 24 | -01.10 | 28.41 |
| hB6076 | -.7670 | .1059 | 50 29 | 06 05 | 01.47 | 18.39 |
| hB6104 | -.7596 | .1138 | 49 52 | 06 32 | -00.40 | 19.75 |
| hB7510 | -.7709 | .1499 | 51 14 | 08 37 | 03.72 | 26.05 |
| hC0073 | -.7071 | .2026 | 46 14 | 11 41 | -11.22 | 35.42 |
| Marius A | -.7019 | .2181 | 45 59 | 12 36 | -11.93 | 38.19 |
| Marius B | -.7048 | .2812 | 47 16 | 16 20 | -07.99 | 49.42 |
| hC1308 | -.7103 | .2385 | 47 00 | 13 48 | -08.86 | 41.76 |
| hB9672 | -.7971 | .1621 | 53 53 | 09 20 | 11.65 | 28.26 |
| Marius C | -.7160 | .2413 | 47 33 | 13 58 | -07.24 | 42.21 |
| hC1537 | -.7131 | .2569 | 47 33 | 14 53 | -07.22 | 45.04 |
| hC1696 | -.7191 | .2655 | 48 14 | 15 24 | -05.18 | 46.55 |
| hC2744 | -.7241 | .2736 | 48 50 | 15 53 | -03.42 | 48.01 |
| hC5049 (in Marius) | -.7543 | .2090 | 50 28 | 12 04 | 01.38 | 36.47 |
| Marius | -.7574 | .2058 | 50 43 | 11 53 | 02.13 | 35.92 |
| Marius E | -.7790 | .2096 | 52 49 | 12 06 | 08.37 | 36.63 |
| hC8088 | -.7883 | .2079 | 53 42 | 12 00 | 11.01 | 36.32 |
| hC8142 | -.7835 | .2118 | 53 18 | 12 14 | 09.82 | 37.03 |
| hC8909 (diffuse) | -.7801 | .2987 | 54 50 | 17 23 | 14.02 | 52.70 |
| hC9148 | -.7940 | .2176 | 54 26 | 12 34 | 13.15 | 38.09 |
| hC9743 | -.7935 | .2731 | 55 34 | 15 51 | 16.27 | 48.11 |
| hC9864 | -.7962 | .2837 | 56 08 | 16 29 | 17.86 | 50.08 |
| Herodotus A | -.7334 | .3666 | 52 02 | 21 30 | 05.76 | 65.04 |
| hD5793 | -.7590 | .3733 | 54 54 | 21 55 | 13.82 | 66.50 |
| Herodotus B | -.7593 | .3835 | 55 18 | 22 33 | 14.88 | 68.41 |
| hD7221 | -.7718 | .3207 | 54 34 | 18 42 | 13.15 | 56.72 |
| Schiaparelli | -.7836 | .3962 | 58 35 | 23 20 | 23.92 | 71.29 |
| hD9228 | -.7921 | .3282 | 57 00 | 19 10 | 20.08 | 58.34 |
| hE6197 (diffuse) | -.7687 | .4169 | 57 44 | 24 38 | 21.35 | 75.07 |
| iA2146 | -.8238 | .0161 | 55 29 | 00 55 | 16.68 | 02.82 |
| iA2160 | -.8257 | .0095 | 55 40 | 00 33 | 17.22 | 01.66 |
| iA2242 | -.8238 | .0224 | 55 29 | 01 17 | 16.68 | 03.88 |
| iA2594 | -.8286 | .0545 | 56 05 | 03 07 | 18.46 | 09.47 |
| iA2955 | -.8250 | .0948 | 55 58 | 05 26 | 18.05 | 16.52 |
| Hermann A | -.8488 | .0067 | 58 05 | 00 23 | 24.53 | 01.16 |
| iA4597 | -.8489 | .0572 | 58 15 | 03 17 | 25.00 | 10.03 |
| iA5402 | -.8501 | .0419 | 58 19 | 02 24 | 25.21 | 07.30 |
| iB0378 | -.8068 | .1382 | 54 33 | 07 57 | 13.69 | 24.08 |
| iB0401 | -.7996 | .1406 | 53 52 | 08 05 | 11.63 | 24.48 |
| Reiner H | -.8054 | .1577 | 54 39 | 09 04 | 13.97 | 27.51 |
| Marius $\alpha$ | -.8062 | .1686 | 54 53 | 09 42 | 14.64 | 29.42 |
| Reiner | -.8118 | .1205 | 54 51 | 06 55 | 14.65 | 20.96 |
| iB4298 (center of Reiner r) | -.8448 | .1284 | 58 25 | 07 23 | 25.33 | 22.52 |
| iC0448 | -.8035 | .2477 | 56 02 | 14 21 | 17.76 | 43.58 |
| iC3209 | -.8296 | .2289 | 58 27 | 13 14 | 24.96 | 40.40 |

| Name or D.W.G. Arthur Designation | $\xi$ | $\eta$ | $\lambda$ | $\phi$ | x(cms.) | y(cms.) |
|---|---|---|---|---|---|---|
| Aristarchus | -.6755 | .4020 | 47°32'E. | 23°42'N. | -06.87 | 71.69 |
| Bessarion A* | -.6116 | .2936 | 39 47 | 17 04 | -29.58 | 52.40 |
| iC3842* | -.8339 | .2822 | 60 23 | 16 24 | 30.16 | 50.33 |
| iC3904* | -.8295 | .2935 | 60 12 | 17 04 | 29.53 | 52.39 |
| iC3918* | -.8313 | .2978 | 60 34 | 17 20 | 30.54 | 53.20 |
| Seleucus A* | -.8053 | .3746 | 60 17 | 22 00 | 28.87 | 67.46 |
| iD2086* | -.8281 | .3056 | 60 26 | 17 48 | 30.07 | 54.61 |
| ia2065* | -.8260 | -.0046 | 55 41 | 00 16 S. | 17.27 | -00.81 |
| Hermann* | -.8418 | -.0152 | 57 21 | 00 52 S. | 22.31 | -02.67 |

Third Order Points (IAU, Young, Arthur, Moore):

| Name or Designation | $\xi$ | $\eta$ | $\lambda$ | $\phi$ | x(cms.) | y(cms.) |
|---|---|---|---|---|---|---|
| Bessarion B | -.636 | .290 | 41°39'E. | 16°51'N. | -24.25 | 51.49 |
| Dome Kepler 1* | -.630 | .150 | 39 35 | 08 38 | -31.13 | 26.50 |
| Aristarchus D | -.625 | .401 | 43 01 | 23 38 | -19.43 | 72.04 |
| Aristarchus F | -.674 | .369 | 46 29 | 21 39 | -09.94 | 65.64 |
| Aristarchus H | -.662 | .380 | 45 42 | 22 20 | -12.11 | 67.71 |
| Aristarchus $\epsilon$ | -.684 | .409 | 48 33 | 24 09 | -04.03 | 73.00 |
| Herodotus | -.701 | .394 | 49 42 | 23 12 | -00.84 | 70.13 |
| Herodotus $\epsilon$ | -.722 | .421 | 52 45 | 24 54 | 07.59 | 75.27 |
| Herodotus $\delta$ | -.715 | .409 | 51 36 | 24 09 | 04.45 | 73.00 |
| Marius P | -.752 | .303 | 52 06 | 17 38 | 06.09 | 53.30 |
| Marius R | -.756 | .235 | 51 04 | 13 36 | 03.16 | 41.11 |
| Marius $\beta$ | -.766 | .168 | 50 59 | 09 40 | 02.97 | 29.22 |
| Marius $\gamma$ | -.768 | .258 | 52 39 | 14 57 | 07.78 | 45.19 |
| Marius $\delta$ | -.760 | .246 | 51 38 | 14 14 | 04.81 | 43.02 |
| Marius $\lambda$ | -.758 | .330 | 53 24 | 19 16 | 09.77 | 58.44 |
| Marius $\iota$ | -.810 | .232 | 56 23 | 13 25 | 18.87 | 40.71 |
| Marius $\kappa$ | -.750 | .225 | 50 20 | 13 00 | 00.99 | 39.30 |
| Reiner $\alpha$ | -.807 | .121 | 54 23 | 06 57 | 13.22 | 21.01 |
| Reiner r | -.845 | .133 | 58 30 | 07 39 | 25.55 | 23.12 |
| Möstlin R | -.665 | .060 | 41 46 | 03 26 | -24.87 | 10.58 |
| Encke $\iota$ | -.658 | .038 | 41 11 | 02 11 | -26.72 | 06.60 |
| Encke $\chi$ | -.649 | .020 | 40 28 | 01 09 | -28.89 | 03.48 |
| Kepler D | -.661 | .138 | 41 52 | 07 56 | -24.44 | 24.13 |
| Kepler E | -.681 | .130 | 43 23 | 07 28 | -19.92 | 22.77 |
| Kepler $\zeta$ | -.646 | .136 | 40 42 | 07 49 | -27.93 | 23.98 |
| Möstlin | -.649 | .085 | 40 38 | 04 53 | -28.29 | 14.90 |
| Reiner G | -.812 | .052 | 54 24 | 02 59 | 13.35 | 09.06 |
| Aristarchus A* | -.667 | .436 | 47 50 | 25 51 | -05.93 | 78.19 |
| Aristarchus Z* | -.675 | .430 | 48 23 | 25 28 | -04.45 | 76.98 |
| Brayley C* | -.591 | .364 | 39 23 | 21 21 | -29.93 | 65.54 |
| Brayley E* | -.596 | .362 | 39 44 | 21 13 | -28.97 | 65.09 |
| Encke J* | -.634 | .089 | 39 32 | 05 06 | -31.57 | 15.72 |
| Encke $\beta$ * | -.640 | .053 | 39 52 | 03 02 | -30.65 | 09.32 |
| Kepler F* | -.623 | .145 | 39 02 | 08 20 | -32.83 | 25.64 |
| Kepler $\delta$ * | -.618 | .200 | 39 06 | 11 32 | -32.32 | 32.52 |
| Kepler $\kappa$ * | -.633 | .136 | 39 43 | 07 49 | -30.84 | 24.03 |
| Kepler $\iota$ * | -.625 | .126 | 39 03 | 07 14 | -32.88 | 22.27 |
| Harbinger $\alpha$ * | -.618 | .434 | 43 18 | 25 43 | -18.33 | 78.19 |
| Harbinger $\gamma$ * | -.606 | .435 | 42 18 | 25 47 | -21.05 | 78.54 |
| Prinz* | -.630 | .435 | 44 24 | 25 47 | -15.33 | 78.29 |
| Aristarchus $\zeta$ * | -.682 | .432 | 49 08 | 25 36 | -02.37 | 77.38 |
| Herodotus $\epsilon$ * | -.752 | .426 | 56 13 | 25 13 | 17.19 | 76.58 |

IV. Adopted Crater Diameters. (For weights, see text above.)

| Name or Designation | Dia.(kms.) | Weight | Name or Designation | Dia.(kms.) | Weight |
|---|---|---|---|---|---|
| Aristarchus | 38.4 | 14 | Möstlin | 6.4 | 6 |
| Aristarchus D | 3.5 | 4 | Möstlin H | 5.2 | 4 |
| Aristarchus F | 18.1 | 14 | Reiner | 30.1 | 17 |

| Name or Designation | Dia.(kms.) | Weight |
|---|---|---|
| Aristarchus H | 3.5 | 4 |
| Bessarion B | 12.2 | 4 |
| Bessarion C | 8.7 | 4 |
| Bessarion D | 8.7 | 4 |
| Encke E | 12.2 | 4 |
| Hermann A | 13.9 | 4 |
| Herodotus | 35.6 | 16 |
| Herodotus A | 9.6 | 10 |
| Herodotus B | 7.0 | 4 |
| Herodotus C | 3.5 | 4 |
| Kepler C | 11.8 | 10 |
| Kepler D | 8.7 | 4 |
| Kepler E | 7.0 | 4 |
| Marius | 41.2 | 17 |
| Marius A | 14.6 | 17 |
| Marius B | 10.4 | 12 |
| Marius C | 10.4 | 12 |
| Marius D | 7.3 | 13 |
| Marius E | 7.0 | 4 |
| Marius P | 3.5 | 4 |
| hC1308 | 5.4 | 5 |
| gC9140 | 4.2 | 7 |
| hC0073 | 4.9 | 6 |

| Name or Designation | Dia.(kms.) | Weight |
|---|---|---|
| Reiner A | 9.4 | 12 |
| Reiner B | 6.8 | 6 |
| Reiner C | 6.3 | 6 |
| Reiner E | 7.0 | 4 |
| Reiner G | 3.5 | 4 |
| Reiner H | 7.5 | 11 |
| Schiaparelli | 24.0 | 13 |
| Suess | 8.3 | 17 |
| Suess D | 5.9 | 7 |
| Suess F | 8.7 | 4 |
| | | |
| Aristarchus A* | 9.0 | 6 |
| Aristarchus Z* | 8.3 | 8 |
| Bessarion A* | 11.6 | 6 |
| Brayley C* | 8.0 | 6 |
| Brayley E* | 5.0 | 6 |
| Encke J* | 5.2 | 2 |
| Hermann* | 15.3 | 6 |
| Kepler F* | 7.0 | 2 |
| Prinz* | circa 40.8 | 2 |
| Seleucus A* | 5.2 | 2 |

## V. Named Objects on Chart (IAU).

Aristarchus, A, D, F, H, Z, $\alpha$, $\delta$, $\epsilon$, $\nu$, $\eta$, Ir, IIr.
Bessarion A, B, C, D.
Brayley C, E.
Encke E, J, $\beta$, $\iota$, $\kappa$.
Harbinger $\alpha$, $\gamma$.
Hermann, A.
Herodotus, A, B, C, $\epsilon$, $\theta$, $\delta$.
Kepler C, D, E, F, $\delta$, $\iota$, $\kappa$, $\xi$.
Marius, A, B, C, D, P, R, $\alpha$, $\beta$, $\gamma$, $\delta$, $\lambda$, $\iota$, $\kappa$.
Möstlin, H., R.
Oceanus Procellarum.
Prinz.
Reiner, A, B, C, E, G, H, $\alpha$, r (or $\gamma$).
Schiaparelli.
Schröter's Valley.
Seleucus A.
Suess, D, F.

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General: The works listed below concern, in whole or in part, the region covered by the chart. This is not a comprehensive bibliography, but merely consists of those references noted by the author; this list could, no doubt, be greatly augmented by any others studying this area. Some brief descriptions are included.

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Postscript by Editor. We congratulate Mr. Westfall most heartily on the quantitative and painstaking job of lunar mapping which he has carried out so very well. May his efforts find many imitators! His bibliography, if not intended to be exhaustive, demonstrates extensive reading and is a needed example of organizing and tabulating lunar literature on a limited subject. Mr. Westfall's address is Apartment 3, 3104 Varnum St., Mt. Rainier, Maryland. It would be a very worthwhile project for the A.L.P.O. to carry out from group observations similar chartings of other portions of the moon.

## MUTUAL PHENOMENA OF JUPITER'S SATELLITES, NOVEMBER 18-DECEMBER 31, 1961

One satellite of Jupiter can occult another satellite when the earth is close to the plane of the satellite-orbits, which is also the plane of Jupiter's equator. Likewise, one satellite can be eclipsed in the shadow of another when the sun is near the plane of Jupiter's equator. These mutual occultations and eclipses hence occur in "seasons" at intervals of about six years, one-half the period of Jupiter's revolution around the sun. Such a series began on August 7, 1961. The list below continues ones on page 104 of the May-June, 1961, Str.A. and on pages 123-124 of the July-August, 1961, Str.A. The data are taken from pages 38-40 of the 1961 *Handbook of the British Astronomical Association*. In our table dates and times are by Universal Time. In the second column below E denotes eclipse and O, occultation. The third column tells which satellites are involved. An eclipse may be penumbral only. Magnitude in the rightmost column is the fraction of the diameter of the eclipsed satellite covered by umbral shadow.

We invite all A.L.P.O. members to observe these mutual phenomena closely. We would be especially interested in observed times (first and last contacts, mid-eclipses and mid-occultations), notes on comparative colors and surface brightnesses of two satellites in contact and on possible optical effects then remarked, and especially in careful descriptions of the phenomena which will indicate how well our telescopes resolve detail on these small discs.

On August 22, 1961, Mr. Frank C. Clark and the Editor confirmed the occurrence of the occultation of J.II by J.III from $3^h\ 56^m$ to $4^h\ 1^m$, U.T., with Mr. Clark's 6-inch reflector at Cocoa Beach, Florida. The Editor made more detailed observations of the occultation of II by III on August 29, 1961, with a 6-inch reflector at 298X, seeing poor (3-4) and transparency good (4). This occultation was predicted to last from $7^h\ 4^m$ to $7^h\ 11^m$, U.T.

Notes follow: "As expected, the disc of II was readily seen to be smaller, brighter, and whiter than that of III. The occultation was partial, with the center of II passing south of the center of III; at mid-occultation perhaps 3/10 of the diameter of II was unocculted. First contact was observed at $7^h 1^m.3 \pm 0^m.8$, U.T. Last contact was observed at $7^h 12^m.7 \pm 0^m.9$. No anomalous effects were remarked on the images of the satellites. The disc of III was somewhat orangeish."

Mr. A. C. Larrieu observed the eclipse of II in the shadow of III on September 12, 1961, with his 8-inch Cassegrain reflector at 120X and 240X from Marseille, France, seeing 3-4 and transparency 4. This eclipse was predicted to be total, penumbral contacts $18^h 04^m$ and $18^h 27^m$, U.T., and umbral contacts $18^h 07^m$ and $18^h 24^m$. Mr. Larrieu detected a fading of II, watching on a daylight sky, at $18^h 9^m$; by $18^h 13^m$ the satellite had become invisible. It reappeared faintly at $18^h 17^m 50^s$ and was similar in brightness to III, but not in size, at $18^h 24^m$. At $18^h 30^m$ II was entirely normal. The Editor watched an eclipse of II by the shadow of III on September 27, 1961, with a 12.5-inch reflector at 303X, seeing 3, transparency 4. The predicted first and last penumbral contacts were $4^h 28^m$ and $5^h 38^m$, U.T., respectively; the corresponding umbral contacts were $4^h 36^m$ and $5^h 30^m$. The predicted magnitude was 98%. Fading of II was first perceived at $4^h 43^m$. At $4^h 49^m$ the shadow of III appeared to be on the southeast side of II (upper right in a simply inverted view with south at the top). By $4^h 56^m$ II was perhaps three magnitudes dimmer than III. From $5^h 1^m$ to $5^h 9^m$ II was very dim, perhaps eleventh magnitude; the aspect was that only the north rim of II was visible. Brightening was first definite at $5^h 14^m$, and at $5^h 17^m$ and $5^h 21^m$ the dwindling shadow appeared to lie on the northwest side of J.II. At $5^h 26^m$ normal brightness had been regained. It will be noted that the penumbral phase of both these eclipses was not detectable by a loss of light.

## Phenomena of Jupiter's Satellites

| Date 1961 | E or O | Sats. | Occultation Begins | Occultation Ends | Eclipse Penumbra Begins | Eclipse Penumbra Ends | Eclipse Shadow Begins | Eclipse Shadow Ends | Mag. |
|---|---|---|---|---|---|---|---|---|---|
| Nov. 18 | O | II by I | $14^h 20^m$ | $14^h 22^m$ | --- | --- | --- | --- | --- |
| 18 | E | II by I | --- | --- | $16^h 16^m$ | $16^h 22^m$ | 16 17 | 16 20 | 0.21 |
| 19 | E | I by II | --- | --- | 23 18 | 23 23 | 23 20 | 23 21 | 0.24 |
| 20 | E | III by II | --- | --- | 07 56 | 08 04 | --- | --- | s.t.a. |
| 22 | O | II by I | 03 33 | 03 36 | --- | --- | --- | --- | --- |
| 22 | E | II by I | --- | --- | 05 26 | 05 31 | 05 27 | 05 30 | 0.15 |
| 23 | E | I by II | --- | --- | 12 25 | 12 30 | 12 26 | 12 29 | 0.32 |
| 23 | E | I by III | --- | --- | 18 12 | 18 24 | 18 15 | 18 21 | 0.57 |
| 24 | E | I by III | --- | --- | 11 02 | 11 45 | 11 10 | 11 37 | 0.33 |
| 24 | E | I by III | --- | --- | 14 49 | 15 21 | --- | --- | --- |
| 25 | O | II by I | 16 47 | 16 50 | --- | --- | --- | --- | --- |
| 25 | E | II by I | --- | --- | 18 36 | 18 41 | 18 47 | 18 39 | 0.09 |
| 27 | E | I by II | --- | --- | 01 32 | 01 37 | 01 33 | 01 36 | 0.33A |
| 27 | E | III by II | --- | --- | 11 11 | 11 19 | 11 13 | 11 17 | 0.003A |
| 29 | O | II by I | 06 01 | 06 04 | --- | --- | --- | --- | --- |
| 29 | E | II by I | --- | --- | 07 45 | 07 50 | 07 47 | 07 48 | 0.03 |
| 30 | E | I by II | --- | --- | 14 39 | 14 44 | 14 40 | 14 43 | 0.33A |
| 30 | E | I by III | --- | --- | 21 41 | 21 56 | 21 44 | 21 54 | 0.89 |
| Dec. 1 | E | I by III | --- | --- | 08 52 | 09 17 | 08 55 | 09 14 | 0.79 |
| 1 | E | I by III | --- | --- | 19 48 | 19 59 | --- | --- | --- |
| 2 | O | II by I | 19 15 | 19 18 | --- | --- | --- | --- | --- |
| 2 | E | II by I | --- | --- | 20 55 | 20 59 | --- | --- | --- |
| 4 | E | I by II | --- | --- | 03 46 | 03 51 | 03 47 | 03 50 | 0.33A |
| 4 | E | III by II | --- | --- | 14 27 | 14 34 | --- | --- | --- |
| 4* | E | III by I | --- | --- | 22 14 | 22 20 | 22 16 | 22 18 | 0.03 |

| Date 1961 | E or O | Sats. | Occultation Begins | Occultation Ends | Eclipse Penumbra Begins | Eclipse Penumbra Ends | Eclipse Shadow Begins | Eclipse Shadow Ends | Mag. |
|---|---|---|---|---|---|---|---|---|---|
| Dec. 6 | O | II by I | $08^h28^m$ | $08^h31^m$ | --- | --- | --- | --- | --- |
| 6 | E | II by I | --- | --- | $10^h04^m$ | $10^h08^m$ | --- | --- | --- |
| 7 | E | I by II | --- | --- | 16 53 | 16 58 | $16^h54^m$ | $16^h57^m$ | 0.34A |
| 8 | E | I by III | --- | --- | 02 07 | 02 45 | 02 13 | 02 39 | 0.93 |
| 8 | E | I by III | --- | --- | 06 33 | 07 17 | 06 39 | 07 11 | Total |
| 8 | E | I by III | --- | --- | 23 22 | 23 31 | --- | --- | Graze |
| 9 | O | II by I | 21 41 | 21 45 | --- | --- | --- | --- | --- |
| 9 | E | II by I | --- | --- | 23 13 | 23 17 | --- | --- | --- |
| 11 | E | I by II | --- | --- | 06 00 | 06 05 | 06 01 | 06 04 | 0.35A |
| 11 | E | III by II | --- | --- | 17 43 | 17 49 | --- | --- | --- |
| 12* | E | III by I | --- | --- | 00 58 | 01 04 | 00 59 | 01 02 | 0.13A |
| 13 | O | II by I | 10 55 | 10 59 | --- | --- | --- | --- | --- |
| 14 | E | I by II | --- | --- | 19 07 | 19 12 | 19 08 | 19 11 | 0.35A |
| 15 | O | I by III | 09 19 | 09 35 | --- | --- | --- | --- | --- |
| 16 | E | I by III | --- | --- | 02 34 | 02 42 | 02 36 | 02 40 | 0.16 |
| 16 | E | II by III | --- | --- | 06 44 | 06 50 | --- | --- | --- |
| 17 | O | II by I | 00 08 | 00 12 | --- | --- | --- | --- | --- |
| 18 | E | I by II | --- | --- | 08 15 | 08 19 | 08 16 | 08 18 | 0.35A |
| 19 | E | III by I | --- | --- | 03 43 | 03 49 | 03 43 | 03 47 | 0.13A |
| 19 | E | IV by II | --- | --- | 14 40 | 15 36 | 14 55 | 15 20 | 0.03A |
| 20 | O | II by I | 13 21 | 13 25 | --- | --- | --- | --- | --- |
| 21 | E | IV by III | --- | --- | 19 19 | 19 34 | --- | --- | --- |
| 21 | E | I by II | --- | --- | 21 22 | 21 27 | 21 23 | 21 25 | 0.35 |
| 23 | E | I by III | --- | --- | 05 35 | 05 43 | 05 37 | 05 41 | 0.36 |
| 23 | E | II by III | --- | --- | 10 04 | 10 12 | 10 07 | 10 08 | 0.02 |
| 24 | O | II by I | 02 35 | 02 39 | --- | --- | --- | --- | --- |
| 25 | E | I by II | --- | --- | 10 29 | 10 34 | 10 30 | 10 33 | 0.27 |
| 25 | O | III by II | 22 01 | 22 06 | --- | --- | --- | --- | --- |
| 26 | E | III by I | --- | --- | 06 27 | 06 34 | 06 29 | 06 32 | 0.14A |
| 27 | E | III by IV | --- | --- | 13 57 | 14 10 | --- | --- | --- |
| 27 | O | II by I | 15 48 | 15 52 | --- | --- | --- | --- | --- |
| 28 | E | II by IV | --- | --- | 01 19 | 01 32 | 01 25 | 01 26 | 0.03 |
| 28* | E | I by IV | --- | --- | 20 05 | 20 11 | --- | --- | --- |
| 28 | E | I by II | --- | --- | 23 37 | 23 41 | 23 38 | 23 40 | 0.19 |
| 30 | E | I by III | --- | --- | 08 30 | 08 38 | 08 32 | 08 36 | 0.57 |
| 30 | E | II by III | --- | --- | 13 23 | 13 32 | 13 25 | 13 29 | 0.40 |
| 31 | O | II by I | 05 01 | 05 05 | --- | --- | --- | --- | --- |

A= Annular Eclipse.
s.t.a.= Shadow tapered away.
*= Jupiter possibly renders phenomena invisible.

## AD ASTRA PER ASPERA

By: Jay L. Lemke

There are only, perhaps, some forty-odd people who can appreciate what truly great justice this classic Latin phrase does to the events of the 1961 Summer Institute in the Astro-Sciences, sponsored by the National Science Foundation and held at the Pan American College of Edinburg, Texas. Indeed our program may be summed up in the double connotation of these words--TO THE STARS THROUGH DIFFICULTIES. That's where most of the members of the Institute were headed, the stars; at the time the other was our means of reaching those heights, difficulties. I think that if we examine the program in more detail, you'll see just what I mean.

I divide the time spent during those six weeks into three catagories: study, observation, and...uh...miscellaneous.

The study was carried on in the classrooms at the college's newly finished Engineering Building and "at home," i.e. the Echo Motor Hotel's wonderful facilities. Our course of study was along the lines of astronomy proper, astronautics, astrophysics, and other interesting sidelights of this broad field. Each of us was asked to prepare a research paper on some specialized area of interest in the astro-sciences and to read it before the group. I found these sessions one of the best parts of the Institute. Professor Engle, Director of the program, asked me to deliver a lecture on Relativity in addition to my paper--the type of opportunity which is one of the significant merits of this National Science Foundation effort. The lectures on astronomy were delivered by Professor Walter Haas, Editor of this journal and a man most accomplished in the subtle art of getting ideas across to his students. Guest lecturers were another highlight of the study phase. Mr. David Meisel, a contributor to The Strolling Astronomer of many excellent articles, and Mr. Carlos Rost, a devilishly persistent lunar and planetary observer, gave lectures that were, indeed, great aids toward our maturing outlook on the astro-sciences.

The observational phase of our system included direct study through the equipment on Mt. Infiernillo and at the college Observatory, photography, and work in the techniques of operating such apparatus. Available to us were the 17" reflector, 12.5" reflector, and three catadioptric 6" 'scopes at the Observatory, and on the mountain the 6-inchers, a 4" refractor, a 5" RFT, and regrettably only one night's badly collimated viewing through the 16" which we erected on the summit of the High Altitude Observatory there in Mexico. In Texas we observed the planets Mars, Jupiter, Saturn, Uranus, and Neptune, many star clusters such as the very impressive Omega Centauri visible from that latitude, and other deep space objects. On the mountain, day-time work on the Sun and Venus was very rewarding; and many observations of common objects at night provided interesting comparisons to visibility at our home locations as opposed to those at 10,400 feet. The Moon was, of course, observed also. Still another aspect which I should mention is the interesting if somewhat undependable Moonwatch program which we carried on. I, myself, am quite content to watch Echo, naked-eye.

This brings us to that catch-all class of miscellaneous. Here, mostly, I include recreation, side trips to such places as the Harlingen Air Force Base Planetarium and Padre Island, and most of all our well remembered aspera, the Infiernillo trip. For those of us who had never been to Mexico, it was a fascinating, enlightening, and sometimes depressing experience to tour the towns and villages of this south-of-the-border land. We bought our souvenirs and tried to act a little better than the typical "turistas." We had the opportunity to see Monterrey and the Monterrey Institute of Technology (MIT?), Saltillo, and Linares. We saw most of Mexico from our usually air-conditioned bus, but at times we would have to walk or climb while the bus took some detour it couldn't have made with a full load. Our little excursion through the state of Nuevo Leon in this manner was a little tiring but most impressively beautiful as the sun set over a tremendous precipice across the gorge from us in the midst of the Sierra Madre Oriental range. Part of this same range is Mt. Infiernillo. I don't know who named it, but whoever it was chose rightly in calling it the "little Hell." It doesn't always do justice to Danté's ideas; but, then, THAT I don't mind. There were a few hardships such as no food or water to speak of--for a while. It was as hot as Danté might want during the day, but it got down to 0° Centigrade (which sounds more impressive than 32°F.) at night. The climb up and down was pretty hard, and luckily I managed to get a horse for most of the second half of the journey; considering that our party climbed the wrong mountain and had to cross over, I am very happy for having that horse. All in all the mountain was quite an experience.

These then were six weeks of our aspera. Next year another group will have the opportunity to participate in such a wonderful program thanks to the NATIONAL SCIENCE FOUNDATION and PAN AMERICAN COLLEGE. Ahead lie more aspera, but beyond are the ASTRA, T H E S T A R S!

# HAPPENINGS AT THE PAN AMERICAN COLLEGE SECOND SUMMER INSTITUTE IN THE ASTRO-SCIENCES, 1961

By: Basil H. Boyd, Jr.

During the months of June and July, 1961, a seminar in the Astro-Sciences was conducted for the second time by Pan American College in Edinburg, Texas, a program sponsored by the National Science Foundation. It gave an opportunity to thirty-two carefully selected high school students. For six long and wonderful weeks the students ate, lived, and breathed astronomy on the campus as well as at the Echo Motor Hotel, which became our "Home, Sweet Home" away from home. Sixteen students were from Texas; and the other sixteen were from the following states: three from California, two from Illinois, two from Ohio, and one each from Arkansas, Indiana, Minnesota, Missouri, Nebraska, Oklahoma, Oregon, South Dakota, and Wisconsin. The majority of the students had been Juniors in the spring of 1961, but there were Sophomores and Seniors too. All this program was made possible by the efforts of two great men in their fields, Professor Paul R. Engle and Professor Walter H. Haas, who conducted the class lectures, the Institute, and the night observations and made arrangements for the field trips.

This year our day was about the same as last year except that it began at a later time. We were down to breakfast by 7:30 A.M. in the gracious dining room area of the Echo Hotel. At 8:30 A.M. Prof. Engle started his class lectures on Astronautics and Space Technology, in which he is well known, as well as for Moonwatch. He kept us up to date on current developments. At 10:00 A.M. the group was recessed for fifteen minutes, which we used to get refreshments and to look at books in the new Student Center. From 10:15 until 11:50 A.M. Prof. Haas lectured to us on pure Astronomy--about the realm of the stars and the planets and their make-up. Again this year the textbook was Theodore Mehlin's Astronomy. With lunch over, we were at the new College Library by 1:30 P.M., and within five minutes the books on Astronomy were no longer on the shelves. At 4:00 P.M., with studying over, many students headed straight for the swimming pool back at the hotel and waited for supper at six. Some went to bed later on, but other lucky ones got to go to the Observatory in shifts.

Among the various projects accomplished during the Institute were: Moonwatch (fully 40 sightings were made by the students), rocketry (four rockets were fired, one landing over a mile away), deep-sky observation, lunar and planetary work, and astrophotography. Several students did noteworthy work in various fields, although diversification was stressed during the seminar. Some of them were: In the field of photography Alfred Hulbert from El Paso, Texas, showed his skill. In rocketry Bobby Bason from Longview, Texas, did some experimenting. James Tippett from Rankin, Texas, did very well in deep-sky studies. In Moonwatch Bruce Bowman from Carmichael, California, and Ronald Hoy from Whittier, California, displayed tremendous enthusiasm and got a large amount of work done. In the lunar and planetary division, there was Bob Webb from Palmdale, California. In meteors Stanton Wyllie from McAllen, Texas, and Michael Wiseman from Mountain Home, Arkansas, did good work. There are others in these fields who also did a good job, and the writer apologizes for any possible errors in the list.

This year, as also last year, the group had some guest speakers. First was Mr. David Meisel, who is the Comets Recorder of the A.L.P.O. He lectured on the Sun, Comets, Meteors and Meteor Streams, Asteroids, and the Earth. He gave the students a test upon his material. Our second guest speaker was Mr. Carlos Rost. His talks were on the Moon and Jupiter. Our last speaker was one of the students in the Institute itself. He was Jay Lemke of Rolling Meadows, Illinois, who was a Sophomore of age fifteen. His lecture was on "Relativity and Einstein's Theories."

Frequent and interesting field trips were taken to relieve the boredom of the classes and library, it it existed in such a group. Among these were a day spent at Padre Island and a tour of the Harlingen Air Force Base. Everyone enjoyed Padre Island and the Gulf and the visit to Harlingen

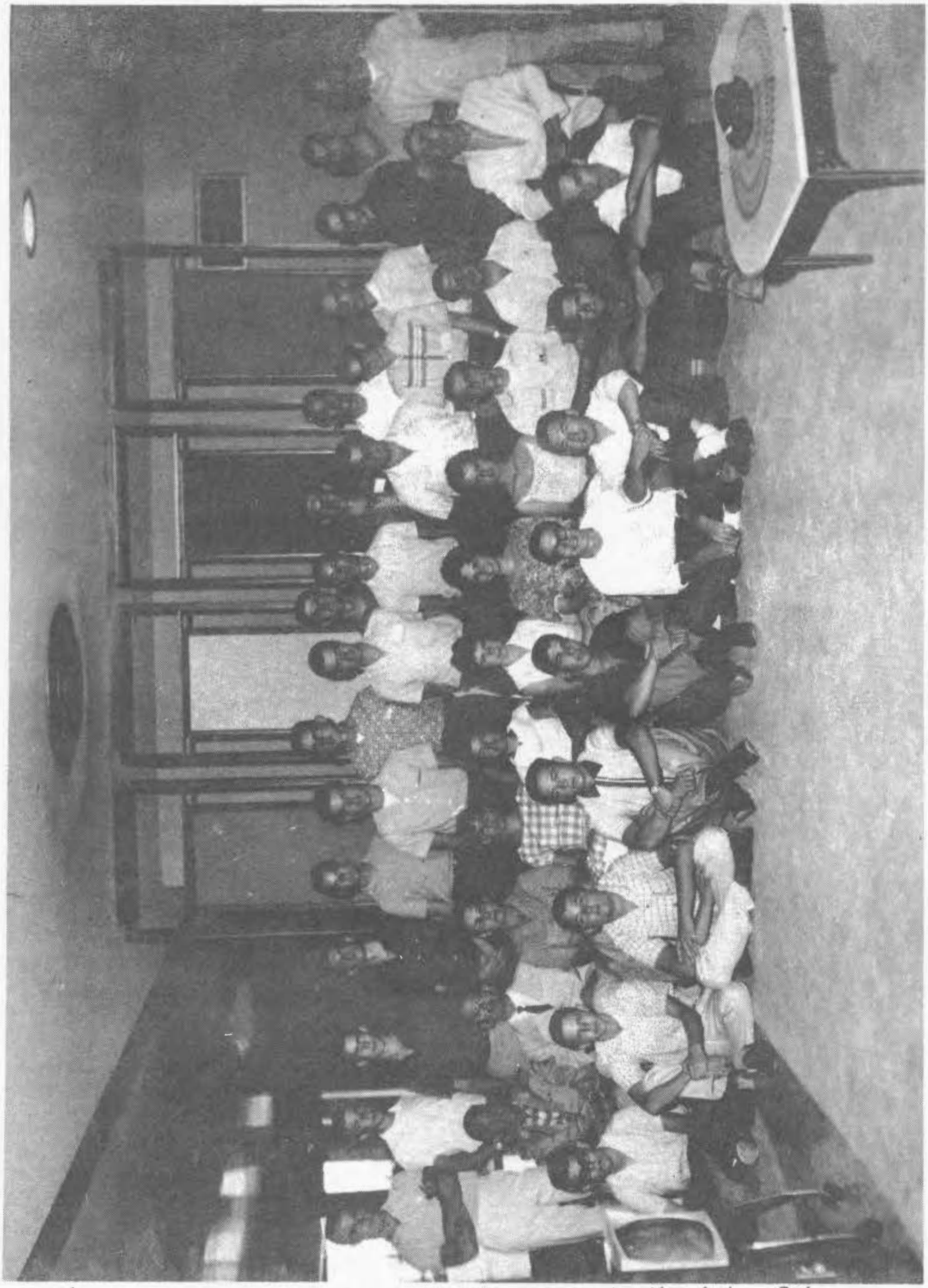

FIGURE 16. Pan American College Summer Institute in the Astro-Sciences, 1961. Max Kerr Photography, Edinburg, Texas. Front row (sitting), left to right: Thomas E. DeMary; Bruce R. Bowman; Alfred J. Hulbert; Robert L. Webb, Jr.; Robert F. Loewenstein; Ted F. Schmeckpeper; Karl R. Moore; James M. Tippett; Ronald C. Hoy. Middle row, left to right: Carlos E. Rost, guest lecturer; Prof. Walter H. Haas; Mrs. Mary Kies, Counselor; Fredrica W. Wiegand; Nellie M. McGrath; Carol A. Foreman; Patricia K. McCoy; Sandra A. Hanson; Gary L. Kraus, student assistant; David Meisel, guest lecturer; Prof. Paul R. Engle, Director. Top row, left to right: Michael D. Bell; Philip M. Kelly; Peter G. Backes; Henry C. Fallen; Gerald R. Thrasher, Jr.; Stanton E. Wyllie; Michael L. Wiseman; Basil H. Boyd, Jr.; Dale A. Gillette; Billy C. Wilkinson; William R. Eason; John D. Garner; Ronald D. Silver; Jay L. Lemke; Royce D. Brough; Nevel T. Gladd; Donald L. Nelson; Lewis A. Duncan.

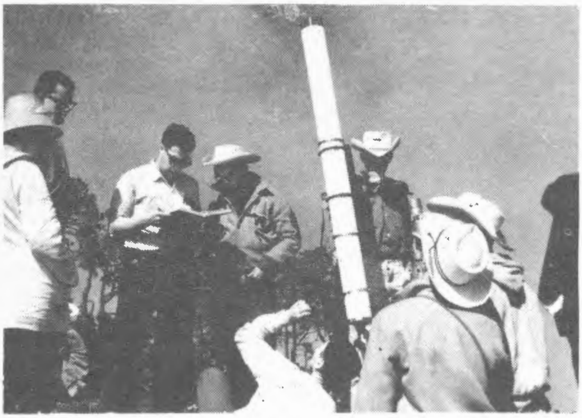

FIGURE 17. Pan American College Summer Institute students studying Sun and Venus from summit of Infiernillo Peak, Nuevo Leon, Mexico, in June, 1961. Telescope is Dr. William Brashear's 4-inch refractor. Figures 17 through 20 are photographs taken by Dale Gillette, one of the Institute students.

FIGURE 18. Student Dale Gillette observing with 16-inch Dall-Kirkham reflector erected on Infiernillo Peak by Pan American College Summer Institute personnel. Telescope built by Astro-Dome Corporation, Canton, Ohio.

FIGURE 19. "A sea of clouds", seen from above. A frequent sight from near top of Infiernillo during week spent there by Summer Institute students. Elevation of summit of mountain 10,392 feet above sea level.

FIGURE 20. Living cabin built near top of Infiernillo with funds provided by the Instituto Tecnológico y de Estudios Superiores, Monterrey, Nuevo Leon, Mexico. Cabin occupied during Pan American College Summer Institute in June, 1961. Edge of temporary tent showing in right foreground.

Air Force Base, where the students saw a planetarium demonstration. While they were at the base, they got to see some sunspots through a sextant.

Of course, the greatest highlight of the Institute was the trip into Mexico, including the visit to the Instituto Tecnológico in Monterrey, which is co-operating with Pan American College in the erection of an Observatory on Infiernillo Peak. The peak, which is presently accessible only by mountain trails, was the location of the group for one week in June. Several telescopes were taken along, including a 16-inch reflector, which we helped to assemble on the top of the peak, and two six-inch Cassegrainians. It was the first time in Mexico for many of the students, and the trip is worthy of several comments. It was a tight squeeze indeed, with all the luggage and telescopes, in the school bus, which was initially air-conditioned; but the air-conditioning system broke down that evening. We had more room in the bus after we ate our box lunches. Upon reaching Monterrey late that evening, the students visited the Instituto Tecnológico. Since it was late and our hosts were in the midst of their tests, the students did not get to see the Instituto's equipment; but we were able to make room for two of their staff members, who went with the group. Reaching Saltillo late that night, we waited until morning before a hunt for some large hats was started. After the hunt, the group left for the mountain, Infiernillo Peak. Around 4 P.M. we reached the base camp, where ten of the students had to spend the night; but the rest then went up into the midst of the cloudy peak. The temperatures at the peak ranged from about 30°F. at night to about 70°F. in the daytime. The humidity was rather high; when a cloud was near, which was most of the time, it was around 100%, but one night with the clouds below us the humidity indicator <u>read</u> over 120%! During the days it was cloudy, but there were usually clear skies at night, with the clouds down below us.

The view from the peak was tremendous, even though there were a few trees to block it. Potosi, the highest mountain in Northern Mexico, was visible to the northwest. Immediately adjacent to Infiernillo was San Francisco Peak, which we had to go around and cross a part of before ascending Infiernillo itself. On previous expeditions there were reports of seeing the Gulf of Mexico from the top with binoculars, but it was not possible for us to do so because of the clouds that we were in most of the time. After a few days on the top, we began to settle down to doing our jobs. On one night there was some hail. The observing was very rewarding, despite the coldness. Some students were lost with the beauty of the stars. The Milky Way stood out like a long narrow cloud with stars coming through it, as well as appearing almost as a solid mass of stars. Jupiter, Saturn, and Venus were seen superbly. With no Moon the view was spectacular, several bright meteors were seen, and just before sunrise the Green Flash was remarked by some. On the final Saturday the walk down to the base camp began, but the group did not leave there until about 3 P.M. and got as far as Linares by nightfall. The trip back to Edinburg the next day went by very quickly, for everyone was thinking about Infiernillo and was sorry that the journey was over.

It was truly an unforgettable experience that we had, and next year the students will have even a greater time than we did, if that is possible. The writer will be wishing that he could be with them. Good luck to those who may be fortunate enough to be chosen!

## ANNOUNCEMENTS

<u>Changes in A.L.P.O. Section Recorders and Their Addresses</u>. Mr. William K. Hartmann, the Venus Recorder, has changed his address from 1025 Manor Road, New Kensington, Pa., to Lunar and Planetary Laboratory, University of Arizona, Tucson, Arizona. He has joined Dr. G. P. Kuiper's staff to carry on graduate study at the Lunar and Planetary Laboratory. We wish Mr. Hartmann every success in his new position.

Mr. Philip R. Glaser, the Jupiter Recorder, has changed his address from 400 E. Park Ave., Menomonee Falls, Wisc., to 200 Albert St., Waukesha, Wisc.

In the Saturn Section Mr. Thomas A. Cragg and Dr. Joel W. Goodman have interchanged places; i.e., Dr. Goodman is now the Saturn Recorder, and Mr. Cragg is now the Assistant Saturn Recorder. As before, all observations of Saturn should be mailed to Dr. Goodman, who requests members to submit quickly their records on Saturn in 1961 now that the apparition is almost ended. Dr. Goodman also has a new address; it is: Dept. of Microbiology, University of California School of Medicine, San Francisco 22, Calif.

Mr. David Meisel, the Comets Recorder, has changed his address from 800 8th St., Fairmont, West Virginia, to Box 3017, University Station, Columbus 10, Ohio. Mr. Meisel is beginning graduate study in astronomy and/or astrophysics at the Ohio State University, where we wish him every success.

Mr. Alika K. Herring, long a Lunar Recorder of the A.L.P.O., has joined the staff of Dr. Kuiper's Lunar and Planetary Laboratory and finds it necessary to give up his A.L.P.O. post. Mr. Herring's help to our lunar observers has been considerable, and he has regularly given very generously of his time in guiding the studies of young or inexperienced colleagues. The high quality of his personal lunar studies is well enough known to require no discussion, and indeed his appointment to do professional lunar research speaks for itself. We wish Mr. Herring all possible good fortune in this new endeavor. We are very sorry to lose him from our staff, and we hope that he will find it possible to continue to contribute lunar papers to this periodical from time to time. Up to now no replacement for Mr. Herring has been found.

In Memoriam. Mr. Beaufort Ragland of Richmond, Virginia, died some months ago. A tribute by one of our members will appear in the next issue.

Mr. George H. Aderhold of Saxonburg, Pa., passed away on June 9, 1961. He was the Founder and President of Saxonburg Ceramics, Inc. He had been a member of the A.L.P.O. since 1953 and had attended at least one A.L.P.O. Convention. We express our sympathies to his survivors and friends.

Suspension of A.L.P.O. Photoduplication Service. Mr. William E. Shawcross finds it necessary to drop this service for at least a year because of active military duty.

Orders of A.L.P.O. Jupiter Handbook. Mr. Philip R. Glaser reports a very gratifying amount of interest in the Jupiter Handbook. In fact, a second printing is being planned, with some changes and improvements from the first printing. Mr. Glaser expects some delay in filling orders for the Handbook received after September 1, 1961, and asks for patience about such delays.

Since the A.L.P.O. Jupiter Handbook clearly filled a real need, it appears evident that further Handbooks by other A.L.P.O. Sections would also be a real service to our members. The work involved can be considerable, but the idea is strongly recommended to the Section Recorders.

Simultaneous Observation Program. This very worthy project was described on pp. 90-94 of our May-June, 1961, issue. It is supervised by Mr. Clark R. Chapman, 2343 Kensington Ave., Buffalo 26, New York. Mr. Chapman urges that all observers turn in promptly to him all drawings and data which they have for the 15 selected target-dates. He will also welcome more discussion about the general project. Mr. Chapman's present plans are for two articles as final reports on the program, probably in early 1962 issues of *The Strolling Astronomer*.

Concerning Divisions in Ring A of Saturn. Mr. Leif J. Robinson has communicated the following note bearing on his discussion on pages 129-130 of our July-August, 1961, issue. The observation cited was made in June, 1961. "I talked with Tom Cave yesterday. He described an observation of Saturn confirming everything I said in my previous note. He saw A8 and Encke's as double at A4 and A6. He was using a 12.5-inch reflector in seeing at least 9 on the common scale of 0 to 10 with 10 best."

**Request about Invoices for Renewals.** We appreciate that some subscribers, such as libraries and persons in foreign countries who employ the services of subscription agencies, require from us invoices in order to renew their subscriptions. At the same time we need to keep the extra labor involved in preparing invoices to a minimum. We hence ask those who do need invoices so to inform us as soon as possible after reading this notice. We shall then adjust our records accordingly and shall be able to mail needed invoices at the proper time in the future.

**Objects of Interest.** The following sentence appeared in one of the amateur bulletins kindly sent to us by our members: "Come, bring your 'scope, your pictures, your wife, and any other object of interest."

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