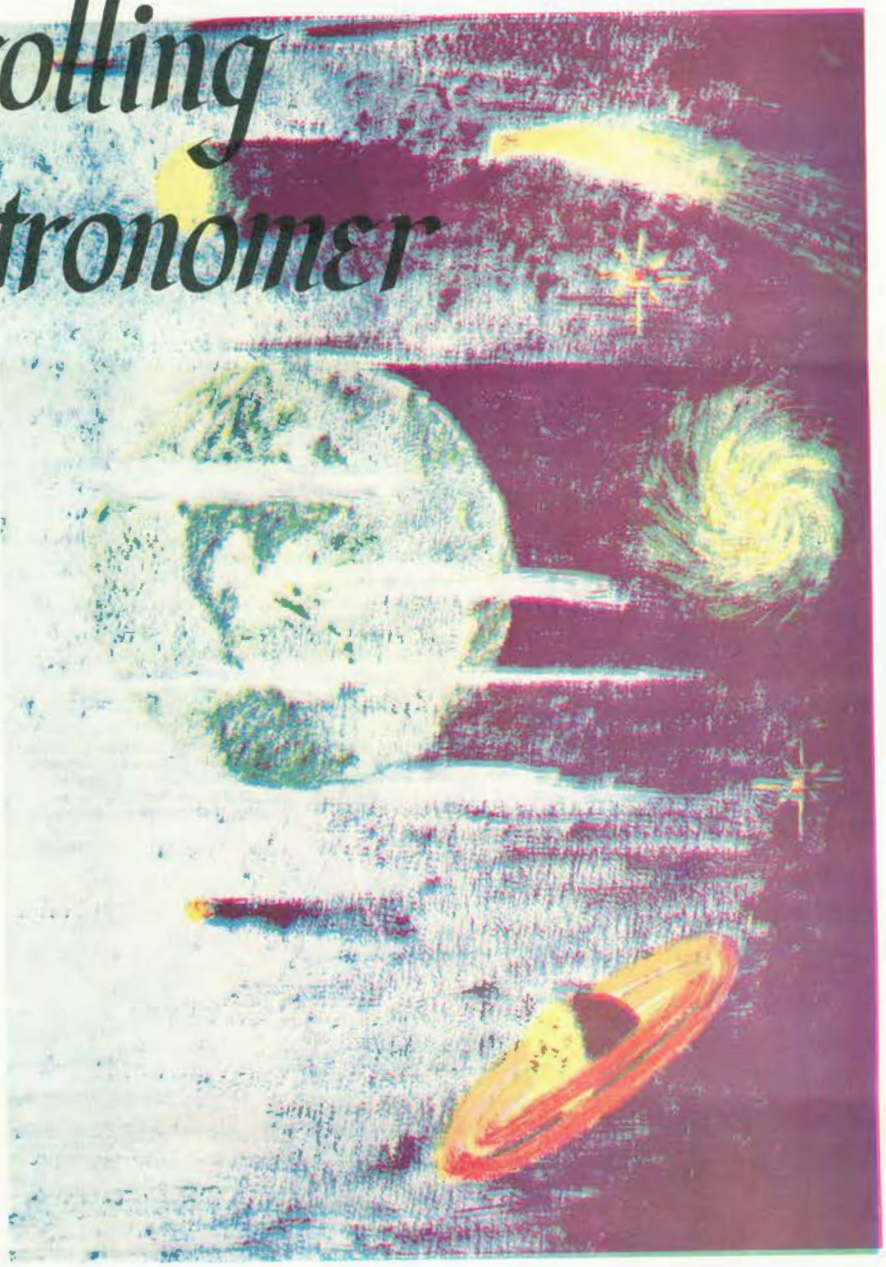
Volume 5, Number 9 September 1, 1951

ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

The Strolling Astronomer



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

NEAR-SIMULTANEOUS PHOTOGRAPH AND . INGS OF JUPITER IN 1950 BY A.L.P.O. MEMBERS.
(Dates and Times by Universal Time)

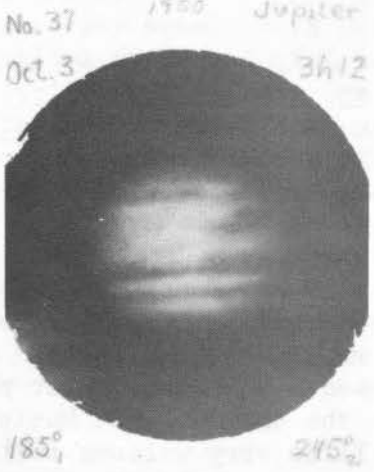


Fig. 1. Photograph by E. E. Hare. 12-inch reflector. Oct. 3, 1950. $3^h\ 12^m$. Exposure 10 seconds. Process Pan.
$C.M._1 = 185°$. $C.M._2 = 245°$.

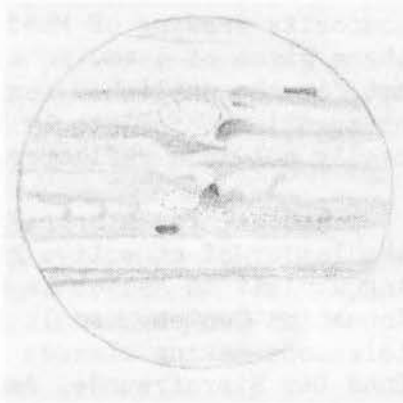


Fig. 2. Drawing by T. A. Cragg. 12-inch reflector. Oct. 3, 1950. $3^h\ 15^m$. 168X. Conditions poor.
$C.M._1 = 187°$. $C.M._2 = 247°$.

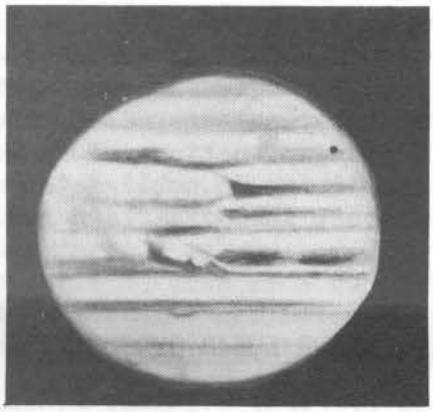


Fig. 3. Drawing by L. T. Johnson. 10-inch reflector. Oct. 1, 1950. $2^h\ 5^m$. 300X.
Conditions fair. $C.M._1 = 189°$. $C.M._2 = 264°$.
(Black speck near right limb is a defect.)

Mr. Hare's photograph is very creditable; of course, some detail has been lost in the process of reproduction. His results show what can be achieved with diligence in planetary photography with good amateur equipment. Large telescopes have a great advantage in photographing the planets, and an aperture of about 8 inches is a minimum requirement.

Mr. Cragg's drawing is almost exactly simultaneous with Mr. Hare's photograph. Mr. Johnson's drawing shows almost the same portion of Jupiter two days earlier. Comparison of these drawings with the photograph and with each other will be interesting and instructive. Drawing the disc of Jupiter is an easy and worthwhile study with 6- to 12-inch telescopes.

Errata in July and August, 1951, Issues. E. J. Reese has pointed out that the correct scale of Figure 3 on pg. 5 of our July issue, this figure being his composite drawing of Maedler's Square, is 1 mm. equals 1.62 miles. The scale there given of 1 mm. equals 0.95 miles is true for Reese's original drawing but not for the published reproduction. On pg. 15 of the August issue we spoke of observations of Plato by T. E. Howe with a 4-inch refractor. This telescope is really a 4-inch reflector.

Request for Mirror-Making Kits. On July 12 Mr. Ernest L. Pfannenschmidt, the leader of an active group of planetary observers in Germany, wrote that during a visit to Munich he had conversed with Mr. Munsing, Director of U. S. Information Center, Adult Education. He learned that the Center plans to hold telescope-making classes in cooperation with the amateurs at Munich and in the Bund Der Sternfreunde. American servicemen will be very welcome to these classes. Mr. Pfannenschmidt wonders whether A.L.P.O. members would care to contribute a limited number of 6-inch and 8-inch mirror kits for these classes. Such kits should be mailed to him at (20b) Einbeck-Hannover, Grimsehl Strasse 18, British Zone, Germany.

Reminder. Readers having astronomical goods and services to sell should not forget that our back outside cover is available for advertising. Rates and other details will be supplied upon request.

Foreword by Editor. We are very glad to present an article by Mr. H. Percy Wilkins, the Lunar Director of the British Astronomical Association. Few persons in the world can speak with as much authority as Mr. Wilkins upon "lunar curiosities"; certainly very few persons possess his detailed knowledge of the surface of our satellite. We very heartily endorse Mr. Wilkins' general point of view that almost all astronomers who have specialized in observing the moon have thought that things do happen on its surface, even things not explicable by the science of their own time. Those whose lunar investigations are carried on in their armchairs will naturally not see these phenomena. Perhaps some of our readers would like to attempt explanations of some of the observations listed below by Mr. Wilkins; we shall try to publish the more interesting of these explanations. Mr. Wilkins' address is 35 Fairlawn Ave.,Bexleyheath, Kent, England.

SOME LUNAR CURIOSITIES

by H. Percy Wilkins, F.R.A.S.

It is remarkable how many people still believe the moon to be a world on which nothing ever happens, a belief undoubtedly due to the persistence of this statement in the "standard textbooks." Such books are usually compiled by individuals who, however eminent in their own sphere, are devoid of both interest and experience in lunar observations. Indeed many of them never look at, let alone observe, our satellite, their activities being devoted to the formulation of theories of solar and stellar constitution.

Their opinions carry little or no weight in selenography and are, moveover, opposed to the experience of the majority of students of our satellite, who alone have the right to speak with authority. During the past 40 years that the writer has observed the moon many curious anomalies have been noted, some of the more interesting of which are given herewith:

1914, Dec. 29. 19^h, U.T. The moon being gibbous, the limb south of Blancanus, which should have been brightly illuminated, was noted to be very dark so that a 3-inch refractor gave the impression of a semicircular "bite" out of the limb, which was about 150 miles across and within which one bright speck was prominent. It should be noted that the terminator lay to the east of this area.

1922, Nov. 28. 20^h, U.T. The mountain Lahire near the terminator cast a finely pointed shadow which was, apparently, cut across by a bright streak considerably longer than the width of the shadow at that point. This streak itself cast no shadow; hence, there was the curious appearance of a long, pointed shadow complete at both ends but missing for at least 3 miles in the middle.

1923, March 29. 21^h, U.T. The interior of Babbage was in shadow but was partly crossed by a narrow bright line from northeast to southwest. This line might have been a ridge, but no such feature is visible when the floor is fully illuminated.

1927, May 12. 22^h, U.T. With a 12.5-inch reflector and 200X no trace could be found of the crater Peirce A (now Graham) in the Mare Crisium, although it was quite distinct on May 11. On May 13 it could be faintly traced.

1932, April 12. 20^h, U.T. While observing the neighborhood of Aristotle, the writer noted a black streak lying from west to east on the central portion of the low-rimmed Egede. If this appearance had been from north to south, it might have been caused by a low ridge or a cleft; but such a streak from east to west is difficult to explain.

1934, Nov. 11. The moon being a crescent 4 days old seen with a 6.25-inch reflector at 150X, the earthshine was very vivid with a very evident light area on the limb around Vasco de Gama.

1934, Dec. 23. 22^h, U.T. With 12.5 inches of aperture the eastern portion of Mare Crisium, to the west of the gap in the mountain border, an area normally lighter than the rest of the surface of the plain, was very appreciably lighter in tint than usual, almost equal to the continuous mountain rampart.

1935, Aug. 26. 5^h, U.T. Three days before new moon. 12.5-inch telescope. The earthshine was bright, and the limb between Crisium and Humboldtianum was fringed with light so that this portion was much more distinct than the rest. [This observation appears comparable to ones made by Bartlett, Murayama, Saheki, and Haas of a bright limb of the earthlit hemisphere. Refer to The Strolling Astronomer, Volume 4, No. 4, pg. 7, No. 5, pg. 10, No. 7, pg. 7, and No. 10, pp. 8-9, 1950. - Editor.]

1935, Dec. 13. As sunset approached Messier appeared elongated from north to south and presented a striking contrast to Pickering. Messier was not only larger than its companion; but its walls were as brilliant as though snow covered and equalled, in this respect, Aristarchus or Proclus.

1939, March 29. With 6 inches of aperture Copernicus was in fine relief, the interior being filled with shadow. At 19^h, U.T., the group of central mountains was faintly but distinctly seen as a somewhat diffused light spot, together with indications of the inner terraces on the west. This aspect lasted about 15 minutes and then disappeared, leaving the interior enveloped in shadow; and not until 22^h did the first ray of direct and true sunshine strike the summit of the highest of the central peaks. What was the cause of the earlier but transient appearance? [Lunar twilight? - Editor.]

1942, March 2. Total lunar eclipse. The floor of Stoefler is irregularly shaded and contains some dark areas, especially on the east. When close to the edge of the umbra and therefore in the dense penumbra, the western portion of the floor became very light while the dark areas on the east darkened rapidly to become absolutely black when covered by the umbra. The appearance suggested that the spots on the western side withered away as the solar light was withdrawn and are of a different nature than those on the eastern side. [Refer also to an article by H. P. Wilkins in J.B.A.A., Vol. 52, pg. 108, 1942.]

1944, August 12. With an 8.5-inch "With" mirror and 200X the central craterlet within Plato was very clearly seen to have its northern rim apparently obliterated to the level of the floor so that the craterlet appeared imperfect.

1949, May 1. $20^h\ 44^m.5$, U.T. Aristarchus, visible as a diffused light spot on the earthshine, suddenly glowed for about two seconds to such a degree that the central peak and inner terraces became distinctly visible. [See also The Strolling Astronomer, Vol. 3, No. 9, pp. 10-11, 1941.]

1951, May 17. $20^h\ 45^m$, U.T. While the writer was observing Gassendi with a 15-inch reflector at 300X and was making a careful and detailed drawing, a bright flash or point of light appeared close to the craterlet (P on the writer's map) to the east of the central mountains and between them and the formation H on the east wall. This bright speck, equal to a fourth magnitude star to the naked eye, lasted for only a second; but a certain amount of glow persisted for two seconds more. This object may have been a meteorite striking the surface.

1948, April 14. The south cusp was prolonged by the arc of the Leibnitz Mountains; and the detached peaks, star-like points of light on the darkened portion of the disc, were connected by exceedingly fine filaments brighter than the earthshine. The sky was very clear; a 12-inch reflector at 150X was used. With reference to the star-like points, often a feature of these lofty mountains, a very peculiar and interesting sight was witnessed on the evening of January 7, 1919. The air was very clear; and the crescent moon (terminator at east wall of Catherina) was observed, using a 3.5-inch refractor and 100X. Several detached peaks were noticed on the earthlit southern limb when it became apparent that one of them was slowly moving westward along the limb! It was, of course, a star that just escaped occultation and was passing behind, and being hidden by, the true mountain peaks.

The above recordings are but a selection of the many peculiar, even remarkable, appearances which have come within the writer's experience, as observed with telescopes of apertures from 3 to 15 inches. These events clearly show that things do happen, and are continually happening, on the moon, whatever their cause or explanation.

BOOK REVIEW

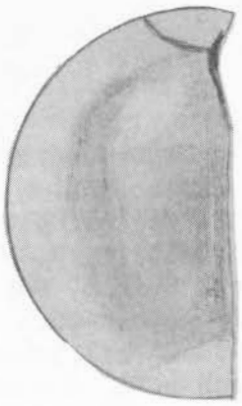
by Walter H. Haas

Contributions to Selenography. No. 1. "The Diameters of Lunar Craters." Part I of a catalogue of the diameters of lunar craters. Based on observations on all existing lunar photographs. Observed and reduced by D. W. G. Arthur, F. R. A. S. Published by the author. March, 1951.

VENUS - 1951

H. Koyama
June 17-7h10m, U.T.
8" Refr. 180X

O. Ranck
July 7-0h35m, U.T.
4" Refr. 240X



Dr. J.C.Bartlett Jr.
June 20-0h16m, U.T.
3.5" Refl. 100X

Mr. Arthur is the Librarian of the Lunar Section of the British Astronomical Association. He is one of the most active and most skillful lunar observers in England. He is also the editor of The Moon, a new and excellent periodical published by the B.A.A. Lunar Section.

There has long been a need for an accurate standard work upon the diameters of lunar craters. Mr. Arthur has admirably filled this need by measuring "almost every lunar photograph ever taken." His main sources, however, were the excellent photographs taken at the Mount Wilson, Lick, and Yerkes Observatories. The unit for the diameters published is 0.001 of the moon's radius. One can multiply by 1.08 to convert to miles. The probable error of the diameters is difficult to estimate because the material used is heterogeneous. It is thought to be about 0.1 to 0.3 units for small craters not too near the limb of the moon and about 0.4 to 1.5 units for ring-plains.

Part I of the projected three-part work consists of a one-page introduction and 20 pages of tables, listing 1,000 lunar craters. In these tables the first column is an identifying number, for reference. The second column is the I.A.U. designation of the crater. The third and fourth columns are its orthographic map coordinates, according to Blagg and Mueller. The fifth column is the diameter, and the sixth column contains occasional remarks.

The reviewer recommends this work to all those who have any interest in lunar crater diameters and statistics relating to them.

Mr. Arthur's address is 35 Vastern Road, Reading, Berkshire, England.

RECENT OBSERVATIONS OF VENUS

by T. R. Cave, Jr.

The planet Venus has been under careful observation by a number of A.L.P.O. members in recent months. A very considerable number of observations have been submitted by the following: J. A. Anderer (3.5-inch refl.), J. C. Bartlett, Jr. (3.5-inch refl.), R. M. Baum (3-inch refr. and 6-inch refl.), David Lee Bellot (6-inch, 8-inch, and 12.5-inch refls., the largest belonging to Cave), David Louis Bellot (6-inch and 8-inch refls.), E. E. Both (8-inch refr.), J. Campbell (7.2-inch refl.belonging to Courtright), T.R. Cave, Jr., (8-inch refl.) P. Cluff (6-inch refl. and Bellot's 8-inch refl.), I. Courtright, Jr. (7.2-inch refl.), E. Epstein (6-inch refl.), H. Le Vaux (6-inch refl.), (Miss) H. Koyama (8-inch refr.), J. Merritt (Courtright's 7.2-inch refl.), S. Murayama (8-inch refr.), O. C. Ranck (4-inch refr.), R. Royer (Courtright's 7.2-inch refl.), and S.C. Venter (2.7-inch refr. and 12-inch refl.)-a pleasing total of 18 observers. We wish to welcome to the Venus Section Mr. R. M. Baum, the well-known English observer, who has recently submitted a very fine series of sketches and notes to the Recorder. Mr. Ernst Both, the A.L.P.O. Jupiter Recorder, has also forwarded some excellent drawings and notes. Messrs. Roger, Campbell, and Merritt are members of a recently organized group of observers in Venice, Calif. We also welcome observations from David Lee Bellot, the son of David Louis Bellot, who has been actively observing Venus during the last two years. Mr. Philip Cluff of Long Beach, Calif., has also submitted some excellent sketches of Venus.

The Cusp-Caps. Most of the observers agree that the north and south cusp-caps have been considerably fainter and smaller during the present apparition than during the preceding evening apparition of 1949-50. During May, June, and July, 1951, the south cap was considerably more easily seen by most observers, the north cap being either very small and faint or completely invisible on most dates of observations. Le Vaux found the south cap to vary greatly in brightness in May and early June, while he seldom observed the north cusp-cap. On June 18-25 Courtright thought the south cap to be very prominent and to have a persistent projection just to its north. Observing with an 8-inch Zeiss refractor at Tokyo, Japan, on June 23, Miss Koyama noted the north cusp-cap to be slightly more prominent than the south one. Using the Kellogg Observatory 8-inch refractor E.Both on July 6 recorded a rather large white oval area near the north cusp; by July 9 it had altered its position to be considerably nearer the north limb. Anderer observed a rounding of both cusps on several dates in June. During June and July Baum found the cusps nearly equal in brightness, the south cusp-cap being perhaps slightly the more prominent.

The Terminator. A number of observers noted large irregularities along the terminator,particularly after dichotomy; among those finding irregularities were Le Vaux, Epstein, Courtright, Bellot, Cluff,Bartlett, and Cave. These irregularities upon the terminator were probably more widely observed at this apparition than in 1949-50. The frequently seen shading of the terminator was certainly recorded by more observers during the present apparition than during former apparitions of the planet.

The Light and Dusky Areas. These vague details, often visible to some observers in the past and seldom if ever visible to others, have been at least somewhat more difficult objects during the present apparition than in 1949-50. Ranck observed large oval faint patches of dusky detail on a number of occasions, particularly near dichotomy. During this same period Both, Royer, Campbell, and

Merritt noted rather linear detail having a general tendency to run north and south. Bellot, Murayama, Koyama, and others observed two very faint belt-like formations, lying north and south of the "equatorial zone" and running parallel to the "equator". (We here assume that the cusps mark the poles of rotation.) Baum often noted spoke-like details, which radiated outward from near the center of the illuminated hemisphere and thus from near the subsolar point. Baum's observations are strongly reminiscent of Lowell's work near the turn of the century. Baum made many attempts to show that these markings were due to optical illusions but without success, and he feels that they are definitely objective. Mr. Baum also writes that M.B.B. Heath and P. A. Moore in England have observed something of the same effect. On a number of occasions in June and July Ranck noted a bright "equatorial streak"; he usually observed in a daylight sky with his 4-inch refractor.

Dichotomy. The time of observed dichotomy, or half-phase, always differs by some days from the time predicted in The American Ephemeris and Nautical Almanac. This difference is caused by the atmosphere of Venus. The phase-angle i is the angle at Venus between lines drawn to the sun and to the earth. If Venus lacked an atmosphere, dichotomy should be observed when i equals 90°0, hence on this occasion on June 24.5, 1951.

Observer	Telescope	Observed Dichotomy	i
J. A. Anderer	3.5-inch refl.	1951, June 19.0	86°5
J. C. Bartlett, Jr.	3.5-inch refl.	June 18.0	85.9
R. M. Baum	3-inch refr. and 6-inch refl.	June 18.0	85.9
D. Louis Bellot	6-inch, 8-inch, and 12.5-inch refls.	June 18.0	85.9
J. Campbell	7.2-inch refl.	June 22.0	88.4
T. R. Cave, Jr.	8-inch refl.	June 19.2	86.6
I. Courtright, Jr.	7.2-inch refl.	June 20.3	87.3
H. Koyama	8-inch refr.	June 17.5	85.6
J. Merritt	7.2-inch refl.	June 22.0	88.4
S. Murayama	8-inch refr.	June 17.5	85.6
O. C. Ranck	4-inch refr.	June 20.0	87.1
R. Royer	7.2-inch refl.	June 22.0	88.4
S. C. Venter	2.7-inch refr. and 12-inch refl.	June 19.7	86.9

The average date for observed dichotomy among the 13 observers was June 19.5, 1951; and the corresponding value of i was 86°8. This result may be compared with the following ones recently secured by A.L.P.O. members and published

The Strolling Astronomer: 86°3 in November, 1949 (Vol. 4, No. 1, pg. 14, 1950) and 86°4 in April, 1950 (Vol. 5, No. 1, pg. 7, 1951).

Comments by the Recorder. This Venus Report is the last one which I shall write, and it is with regret that my personal circumstances make it necessary for me to resign as Recorder of the Venus Section. Our new Recorder, Dr. James C. Bartlett, Jr., 300 No. Eutaw St., Baltimore, Maryland, is now handling all current Venus observations. All observers are urged to send him their work in the future. During the past two years a very great amount of observational data has been contributed by the many observers of Venus, and it is hoped that eventually a full paper may be prepared upon these two evening apparitions and one morning apparition. I wish to thank Mr. David Louis Bellot for his help in preparing this Report.

VISIT TO FRENCH OBSERVATORIES

Mr. H. Percy Wilkins, the Director of the Lunar Section of the British Astronomical Association, spent his holidays in France last July. This article is compiled from two letters from Mr. Wilkins.

He visited the Flammarion Observatory at Juvisy, 12.5 miles south of Paris. It was given to the illustrious Flammarion by an admirer. A dome on the roof shelters a 9-inch refractor with twin photographic telescopes. The library contains thousands of books, charts, etc.

Mr. Wilkins then travelled on to the Meudon Observatory and its 33-inch refractor, which is perhaps best known to us planetarians as the telescope used by E. M. Antoniadi in his studies of Mars. The Observatory is in a suburb of Paris and commands a superb view of the city from a hilltop. The rectangular iron tube, 52 feet long, carries both a 33-inch visual lens and a 25-inch photographic lens. Other instruments include the great solar apparatus and a radio telescope. Mr. Wilkins observed the sun for two hours with Lyot's monochromatic polarizer, employed with an objective 12 inches in diamter and fed by a coelostat and fixed mirror. Magnificient views were obtained of the prominences and chromosphere.

Our English colleague was very pleasantly surprised to find that Dr. Lyot and others exhibited considerable interest in the moon and the planets. They showed him many photographs and drawings. For example, they have found that the cleft near the foot of the west wall of the lunar crater Alphonsus is continued by turning eastward near the south wall and then bends sharply northward past the west side of the central mountain. They have recorded clefts and pits over the entire floor of Gassendi far in excess of the best maps and charts. They have constructed maps of Mercury and Venus. The Meudon observers think that the canals of Mars exist but are really caused by a series of spots arrayed in a linear manner. They have drawn much detail on the satellites of Jupiter, especially Ganymede and Callisto. On Saturn they have detected a gap between Rings B and C, delicate divisions on Rings B and C, and at least two divisions on A besides Encke's. E. K. White, W. H. Haas, and a few other A.L.P.O. members have seen the Fifth Division, as we call it, between Rings B and C. We have also seen two divisions on B and one near the middle of C. The French observers have detected a broad belt across Uranus.

Mr. Wilkins is anxious to establish closer liaison among French astronomers, the British Astronomical Association, and the Association of Lunar and Planetary

Observers. We share this desire. These lunar and planetary researches at Meudon are being continued, the former with the aid of the 300-inch Wilkins map of the moon.

OBSERVATIONS AND COMMENTS

We direct the attention of readers to pg. 1. The photograph and drawings which appear there were kindly supplied by Mr. E. E. Hare, the Jupiter Recorder of the A.L.P.O. in 1950. Mr. Hare's photograph of Jupiter on October 3, 1950, is by no means one of his best; the image was too dim on the negative because he underestimated the effect of a smoky atmosphere (from Canadian forest fires). Cragg's drawing of October 3 is essentially simultaneous with Hare's photograph on that date, and L. T. Johnson's drawing of October 1 shows almost the same portion of Jupiter. Cragg was especially interested in a white cloud in the Equatorial Zone and in a connecting white streamer lying over, or within, the North Equatorial Belt. On October 3 the Red Spot Hollow was in conjunction with a similar-looking large white oval in the South Equatorial Belt North (The Strolling Astronomer, Vol. 5, No. 1, pg. 3, 1951), but Cragg has drawn only one of the two features (because more concerned with detail near the equator?).

On July 10, 1951, M. Robins searched for possible lunar meteors for 29 minutes without success. He used 35x on a 3.5-inch reflector.

On June 12, 1951 C. M. Cyrus observed Linné and vicinity with a 10-inch reflector at 280X in fair seeing. The colongitude was 358°7 so that the region was almost a day inside the sunrise terminator. Cyrus perceived a tiny craterlet somewhat less than half full of shadow with the Linné white area. This craterlet has been seen by a number of A.L.P.O. members and has been mentioned from time to time in this periodical. It is thought to be only one to two miles in diameter, and its visibility is a rather severe test of six- to ten-inch telescopes. It is quite certain, in the editor's opinion, that this difficult object is not the controversial crater observed by several eminent selenographers prior to 1866 and apparently invisible from that year down to the present.

On July 15 Mr. Cyrus observed the lunar walled plain Plato with his 10-inch reflector at 280X in fairly good seeing and a very clear sky. He considers the view his best yet of Plato. The colongitude was 42°2; hence, Plato had been in sunlight for about two and one-half days. His drawing agrees well with one made by W. H. Haas with an 18-inch refractor on November 1, 1944 and reproduced as Figure 5 on pg. 1 of our March, 1951, issue. Indeed, the six most conspicuous craterlets are identical on the two drawings; and the observers agree perfectly on the order of decreasing conspicuousness, except that Cyrus interchanged numbers 3 and 4 from the order on Haas' drawing. These are the twin craterlets in the north central part of the floor. Cyrus notes that these "were seen as distinctly as they appear on the Mount Wilson photograph of 1919. The space between the twin pits was nearly as wide as the diameters of the twins. The two pits were about the same size. The western one seemed to be a little brighter, which may have been due to a high east wall". Cyrus discerned shadows in all of these six most conspicuous craterlets - a very creditable accomplishment. He observed two additional white spots at the foot of the west inner wall of Plato to make a total of eight spots.

On pp. 13-14 of the July issue we described how J. C. Bartlett observed a remarkable faintness and diffuseness of all detail on the ball of Saturn on

April 6, 1951, at 4^h 39^m, U.T. C. Tarwater comments that he observed Saturn at 4^h 40^m on April 6 with his 8-inch reflector (an instrument of great optical excellence) and 240X. His drawing does show, he reports, little contrast in the belts and hazy outlines of detail. He made no other observations of Saturn within two weeks of April 6. Mr. Tarwater thinks that Saturn passed through such a phase (faint and diffuse markings) lasting for at least several weeks but concedes that Dr. Bartlett's very frequent observations give him a better basis for judging. E. J. Reese made a drawing on April 6 at 4^h 35^m, using his 6-inch reflector under rather poor conditions. "The entire northern half of the South Equatorial Belt appeared unusually light and diffuse; however, the south edge of that belt and both components of the North Temperate Belt appeared as dark and well-defined as they did on March 12. The shadow of the rings on the globe was easy and black on April 6". We thus may have here some partial confirmation of Dr. Bartlett's findings from these two simultaneous views with larger telescopes. We should be glad to hear from any others who observed Saturn on April 6.

At 4^h 39^m on April 6 (U.T. here and later) Bartlett was surprised to find Rhea almost as bright as Titan. At 4^h 45^m on April 6 Reese independently made this step-estimate; Titan 6 Rhea 5 Tethys 1 Dione. If we assume that a step is 0.1 stellar magnitudes and that the stellar magnitude of Dione was 10.7, then Tethys was 10.6, Rhea was 10.1, and Titan was 9.5. Comparison to accepted stellar magnitudes of the satellites suggests strongly that Titan was unusually dim rather than that Rhea was unusually bright. Reese and Bartlett do agree that Rhea and Titan differed much less in brightness on April 6 than is normal. Many more A.L.P.O. members might profitably initiate programs of observing the relative brightnesses of the Saturnian satellites. Even visual step-estimates are worthwhile. A six-inch telescope is capable of useful results; an eight-to twelve-inch is still better. Excellent optical quality is not here required.

During the last two months we have received observations of Saturn from the following colleagues: J. C. Bartlett, Jr. (3.5-inch refl.), E. E. Both (8-inch refr.), T. R. Cave, Jr. (12.5-inch refl.), T. A. Cragg (6-inch refl., 12-inch refl.), C. M. Cyrus (10-inch refl.), W. H. Haas (6-inch refl.), T. E. Howe (4-inch refl.), O. C. Ranck (4-inch refr.), and E. J. Reese (6-inch refl.). Most of these observations were made in June and July, though some date back to April and May. Once again Dr. Bartlett was the most active of the observers; he examined the planet 26 times on 24 dates from June 1 to July 11.

During June and July Bartlett often observed a small and very dark south cap on the limb of Saturn, and Ranck sometimes drew such a feature. Bartlett found this cap to vary in size. Cragg on May 29 and 30 and Haas on July 31 found a small bright cap on the south limb, surrounded by a rather broad and fairly dark South Polar Region. A South Temperate Belt about midway between the south edge of the South Equatorial Belt and the north edge of the South Polar Region was recorded by Both, Cragg, and Cave, and rarely by Bartlett also. Cragg drew a narrow bright zone just south of this belt on April 1. During June and July Bartlett found the South Temperate Zone, between the S.T.B. and the S.P.R., to be dusky and the South Tropical Zone, between the S.T.B. and the S.E.B., to be bright; and it is confirmatory that Both drew such an appearance on July 6 and 7 with an 8-inch refractor at 360X in very good seeing. However, Ranck in June and July often drew a uniform gray shading extending from the shadow of the rings all the way to the south limb in his 4-inch refractor at 120X or 240X. Bartlett on different dates saw a wide variety of colors in the dusky S. Te. Z.;

he described it variously as bluish gray, olive gray, yellow-gray, slaty gray, and even greenish or brownish. Bartlett found the S. Te. Z. sometimes darker than the North Tropical Zone and sometimes lighter than it; it is his opinion that both zones varied absolutely. On July 6 and 7 the S. Te. Z. was briefly almost as bright as the S. Tr. Z., though Both drew a distinct difference in tone on these two dates in views simultaneous with Bartlett's; on July 8 the S. Te. Z. was already darkening again, according to Bartlett. Bartlett found the S. Tr. Z. to be usually yellow, though sometimes whitish yellow or white. On June 26 and july 6 it was apparently filled with white ovals. Cave and Cragg have seen one or two belts besides the S.T.B. in high southern latitudes. On July 21 Howe thought the ball pink south of the S.E.B.; perhaps because of atmospheric dispersion when Saturn was at a low altitude and seeing was very poor.

The South Equatorial Belt was one of the two most conspicuous belts on Saturn, being so very plain as to be drawn by Howe with only a 4-inch reflector at 56X. It was usually resolved into two components, regularly by Ranck with a 4-inch refractor and sometimes by Bartlett with a 3.5-inch reflector. However, Bartlett also sometimes found the S.E.B. single under unusually favorable conditions. Early in June Bartlett found the south component broader than the north component. The color of the S.E.B. was usually chocolate brown to Bartlett, and Howe noted brown or black on July 21. Bartlett considered the S.E.B. to be the darkest and plainest belt on Saturn from early April to mid-July, with occasional exceptions. Ranck, however, made the North Temperate Belt definitely more conspicuous than the South Equatorial Belt throughout June and July, and Haas saw the N.T.B. to be much the plainer on July 31. Bartlett observed at least one broader and darker section in the S.E.B. on June 1 and subsequent dates, and in late June and early July he recorded a number of small dark spots on the south edge of the S.E.B. These were, he writes, similar to those drawn at this latitude by T. Osawa on March 30, 1951 (Figure 4 on pg. 1 of July issue), except that they were much darker and more sharply defined.

The Equatorial Zone - North Tropical Zone was ordinarily the brightest part of the ball. Cragg, Ranck, and Haas agree that the E. Z., to the south of the projected rings, was definitely less bright than the N. Tr. Z., to their north. On June 1 Bartlett noted a gray Equatorial Band just to the south of the shadow of the rings. This shadow was, of course, prominent to all the observers during May, June, and July. Bartlett from May 31 to July 6 frequently found the E. Z.- N. Tr. Z. to be yellowish, though it also often exhibited its customary white. Howe called it white on July 21. From mid-May to early July Bartlett called the E. Z. - N. Tr. Z. only about as bright as the S. Tr. Z., and indeed the S. Tr. Z. was often the brightest zone on the planet. However, Bartlett's work suggests that the E. Z. - N. Tr. Z. may have been regaining its usual dominance by early July; and Ranck and Haas made the N. Tr. Z. definitely the brightest zone on Saturn during the latter half of that month.

The North Temperate Belt was one of the two most conspicuous belts on Saturn and was sometimes the most conspicuous belt. However, the N. T. B. was undistinguished to Bartlett from June 1 to July 11, especially after June 24; often it blended invisibly with the dusky North Temperate Zone to its north. Moreover, Cyrus drew the N.T.B. less plain than the S.E.B. on April 24 and June 12. It is surprising, then, that the N.T.B. looked very dark to Ranck throughout June and July, to Both on July 6 and 7, and to Haas on July 31. How are we to explain such discrepancies? Is it possible that differences in the color sensitivities of the eyes of the different observers play a role? For example, would a red

belt on Saturn look darker and more prominent to an observer whose color vision is more blue-sensitive than is normal than to one whose vision is more red sensitive than is normal? Unfortunately for this conjecture - and it is no more than that - Dr. Bartlett's color vision has been tested and found to be extremely accurate (pg. 14 of June issue). The N.T.B. was usually divided into two components by Cragg and Ranck and was sometimes so resolved by several other observers. Ranck often drew the space between the components to be dusky.

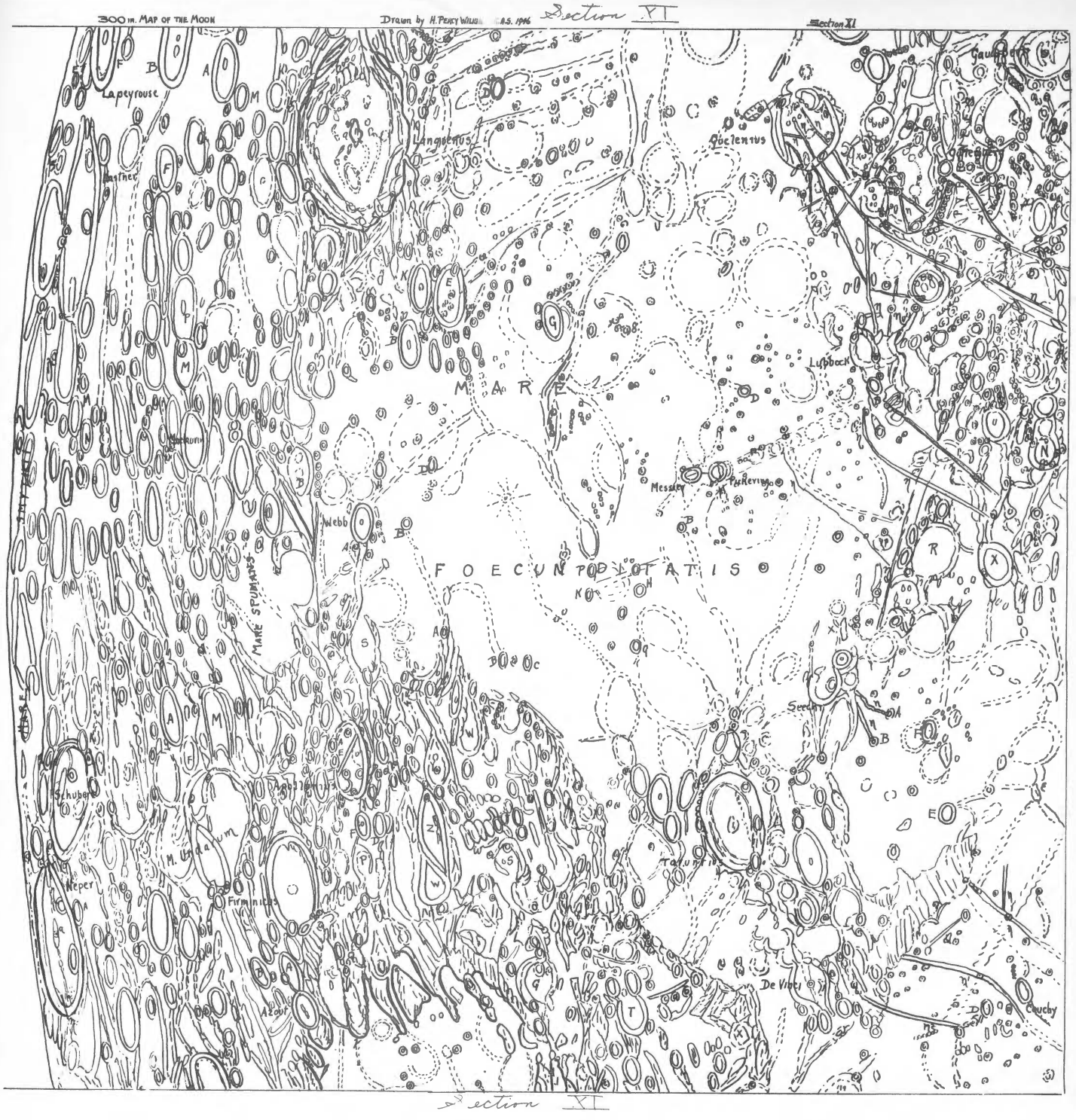
A North North Temperate Belt was sometimes seen not far north of the N.T.B. by Bartlett, Cave, Cragg, and Both. To Bartlett this N.N.T.B. was inconspicuous and often blended invisibly with the dusky North Temperate Zone between it and the N.T.B. On July 21 Howe found Saturn green north of the N.T.B. but perhaps only because of atmospheric dispersion. On May 29 at $3^h\ 45^m$, U.T., Cragg found Saturn surprisingly blank of all detail north of the N.T.B. On May 30 at $3^h\ 55^m$ Cragg was surprised to note a very curious-looking distortion of a belt in high northern latitudes. His drawing shows an aspect somewhat similar to the familiar deflection in latitude of the South Equatorial Belt South on Jupiter by the Red Spot Hollow. However, Cragg's drawing does not show any feature at all that might be responsible for an anologous deflection here - merely the shaded North Polar Region to the north of the distrubed belt. Bartlett writes that he has caught glimpses of the bright arcs along the limb of Saturn in northern latitudes drawn by Osawa (Figure 4 on pg. 1 of July issue). Haas on July 31 found the ball distinctly more dusky in middle northern latitudes than in middle southern latitudes. Bartlett gave close attention to the dusky N. Te. Z. He variously described its color as grayish, yellowish gray, slaty blue, brownish, and reddish brown. On June 20 and 25 he glimpsed a lacework of gray ovals and wispy festoons in this zone. Cragg on June 2 drew two large bright ovals in this zone. During the first half of June Bartlett found the N. Te. Z. about as dusky as the S. Te. Z., being sometimes more dusky and sometimes less so; after about June 15 the N. Te. Z. became (absolutely) lighter. Drawings by Both, Cragg, and Ranck indicate that the shaded North Polar Region sometimes reached to the N.N.T.B. It was sometimes much smaller, however; and Bartlett on June 17 remarked a clear yellow N. N. Te. Z. just north of the N.N.T.B.

The shaded North Polar Region was visible to almost all the observers. Its color was gray to Bartlett. It was not outstandingly dark. Bartlett several times found the north limb to be a clear yellow, not shaded at all. Bartlett in June and July frequently noted a small white north cap within the polar shading, as Haas also did on July 31. Perhaps this cap existed in some Saturnian longitudes only, for on June 26 Bartlett observed it at $1^h\ 14^m$ but not at $2^h\ 28^m$. Cragg on June 2 at $4^h\ 55^m$ was surprised to note "a very dark cap on the north cap on the north pole." He remarks: "This small region was so dark that it gave one the occasional impression that Saturn had a flat spot on it!" There does appear to be a resemblance, however, to very dark marks on the south limb drawn by Ranck and Bartlett.

Detail in the rings was naturally hard to observe when they were so nearly edgewise;but most of the observers saw Cassini's Division well enough, and Cragg on April 1 with a 12-inch reflector found Ring B to be brightest near its middle. Ranck observed the projection of the rings against the ball to be brighter than the ball during June and July. Ranck recorded the shadow of the ball on the rings in July. This shadow was inconspicuous during the 1950-51 apparition, perhaps because of the extreme narrowness of the ring-arms. On pg. 13 of the June issue and pg. 13 of the July issue we mentioned observations by Bartlett of a difference in color between the east and west ring-arms and of a curious effect

that the west arm was dimmer than the east arm when transparency was poor but not in a clear sky. Bartlett last observed such a difference in color on May 31; on subsequent dates both arms were the same yellowish white hue. In addition Bartlett never found the west arm dimmer than the east arm after April 29, except upon July 11, although nights of low transparency were common enough. We must thus wonder not only what caused the effect but why it vanished! On June 2 at $2^h\ 3^m$ Bartlett reported the rings to be "certainly much brighter than they have been for the same or comparable transparencies". He is confident that they were then much brighter than under similar conditions on June 1 and 6. Such a brief, pronounced brightening appears difficult to explain in terms of the physical constitution of the rings.

From June 20 to July 6 Dr. Bartlett observed 7 central meridian transits of features in the South Equatorial Belt. The preceding end of a broader section of the belt that was on the C.M. at $1^h\ 16^m$ on June 20 was apparently again on the C.M. at $2^h\ 37^m$ on June 28. If we assume such an identity and further assume 19 intervening rotations, there results a period of $10^h\ 10^m.6$. The remaining transits are of pairs of dark spots on the south edge of the S.E.B. (Is it physically significant that they occur in pairs?) From studying the data Dr. Bartlett concludes that several pairs of spots in widely different Saturnian longitudes are involved and that their motion is compatible with a period of rotation near $10^h\ 14^m$. The editor agrees and sees no possibility here of determining definitive periods.



SECTION XI

OF

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

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