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S T A F F

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Fig. 1

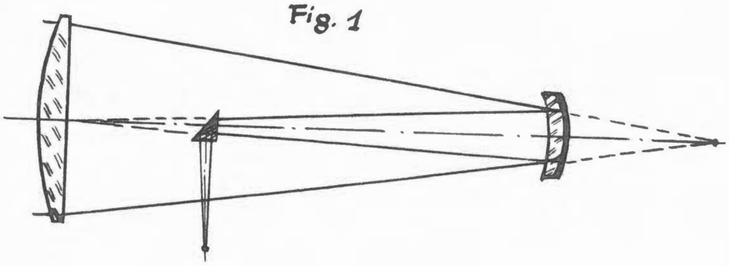


Fig. 2

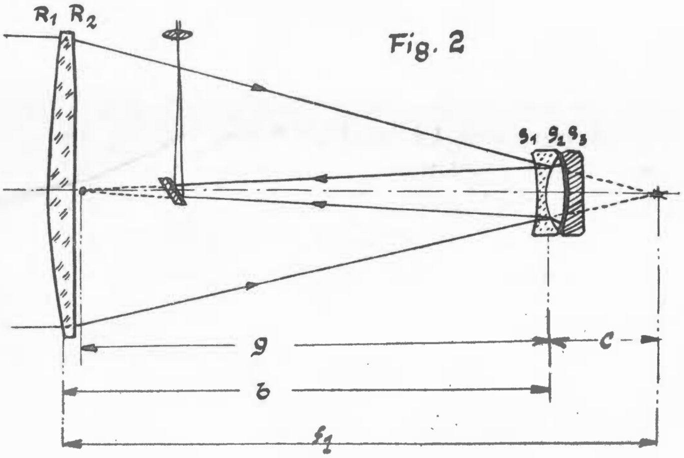
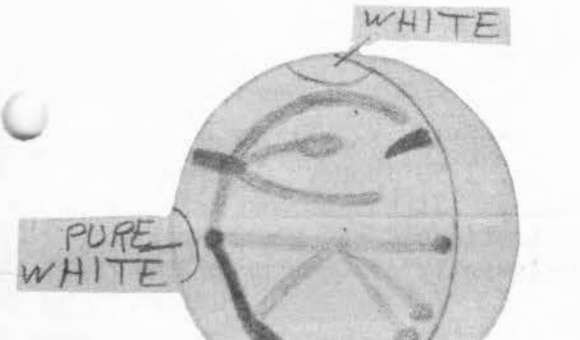
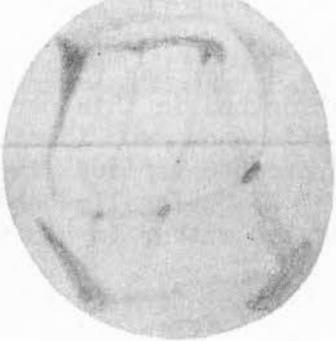


Fig. 2A. Photograph of Venus on January 31, 1950, with a 16-inch Telescope on Mule Peak, New Mexico.





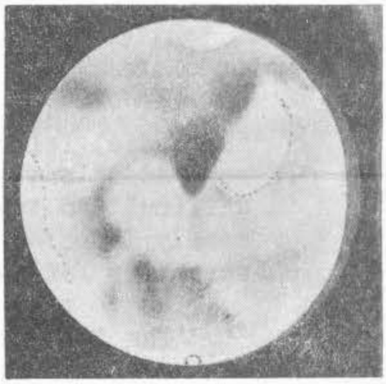


Fig. 3. Mars
W. H. Haas. 6-in. refl.
June 8, 1950.
2^h 44^m, U.T.
325X.
C.M. = 94°

Fig. 4. Mars
M. B. B. Heath
10-in. refl.
May 1, 1950.
20^h 30^m, U.T.
282X.
C.M. = 348°

Fig. 5. Mars
S. Murayama
8-in. refl.
May 30, 1950.
10^h 40^m, U.T.
275X.
C.M. = 295°

ANNOUNCEMENTS

The Wilkins lunar map is here at last! There is reproduced near the back of this issue of The Strolling Astronomer the Frontispiece Section of the H. P. Wilkins map of the moon. The Index Map on this Section shows the arrangement of the 25 sections. There is also shown on the Frontispiece Section a key; it gives the symbols which Mr. Wilkins uses for craterlets, clefts, ridges, etc. This key will naturally apply to all the Sections that will appear in our future issues. The Frontispiece Section also includes Sections XIII, XVII, XXI, and XXV. These four are small corner Sections of the map. In the November issue there will be reproduced Section I, which includes a number of interesting regions in the central portions of the moon. The scale of our reproduction of the Wilkins map in this periodical is about 38 inches to the moon's diameter. The Association of Lunar and Planetary Observers thanks Mr. Wilkins very much for permission to reproduce his excellent map of the moon.

We are sorry to announce that Mr. C. B. Stephenson is unable to continue as the Mercury Recorder of the A.L.P.O. We have been fortunate in securing as the new Mercury Recorder Mr. Donald O'Toole, 114 Clarement Ave., Vallejo,California. Mr. O'Toole is one of our keenest observers. In the future all observations of Mercury should be sent to Mr. O'Toole, who will also be glad to correspond with A.L.P.O. members about studies of that planet.

Foreword by Editor. Many readers have expressed much interest in the Medial Telescope described by our German colleague, F. L. Pfannenschmidt, in the July issue. In the following article Mr. Pfannenschmidt discusses on a more advanced level the optical design of the Medial. Our contributor's address is (20b) Einbeck-Hannover, Grimsehl Strasse 18, British Zone, Germany. Mr. Pfannenschmidt and the editor hope that at least a few A.L.P.O. members will construct and test thoroughly the Medial Telescope.

MORE MEDIAL DOPE

by E. L. Pfannenschmidt

In recent weeks the author has found time and opportunity to follow up on the Medial Telescope described in this periodical's July, 1950 issue. So here's some additional information on your ideal planetary O.G. It has proved rather difficult to trace and procure various important publications, and we are sincerely indebted to "Unk" A. G. Ingalls and to the University of Göttingen Observatory for assisting the author in his work.

The instrument's original form is now given in Figure No. 1. It was granted an English Patent (No. 3781) in 1814, issued to W. F. Hamilton. Reference to more than two dozen works seems to indicate that the inventor never actually constructed a telescope of this type and neglected to analyze its aberrations. He called his telescope a "Brachymedial", a name we propose to preserve.

The Brachymedial's intrinsic design is minutely described by Ludwig Schupmann, a former professor at the Aachen Technical College, in his book "Die Medialfernrohre" (1899, Teubner, Leipzig), which also provides four practical examples of actual design and gives valuable notes on shop ppodedure, collimation, etc. Schupmann's American Patent No. 620,978 (1899) may still be available in the United States. He succeeded in redesigning the Brachymedial for bigger F-ratios by initiating the small concave front-surface glass speculum behind the flint component of the compensator and deserves credit for going well into the Medial's optical and mathematical theory.

The Brachymedial is an improvement of the dialytic type of telescope, i.e., of telescopes whose achromatic object glass elements are widely separated (Greek lutos = loosed, dia = apart). We shall attempt to give a short survey of the more important details of its specifid design, taken from Schupmann's original publication mentioned above (refer to Figure No. 2).

Let f_1 and f_2 designate respectively the focal length of the crown and flint elements and c the distance of the flint lens from the crown-lens' focal plane. Let

(1) $$v = \frac{n - 1}{n_F - n_C}$$

designate the medium dispersion of the glasses employed. Then the formula giving achromatization in a Brachymedial will be very nearly

(2) $$v_2 f_2 = -2 v_1 f_1 \left(\frac{c}{f_1}\right)^2 .$$

From this, it becomes quite evident that to acquire "normal" achromatization it may suffice to employ curves of radii approximately 50% shorter than usual or to employ a flint lens of smaller dispersion. An image may be formed between the crown and flint elements by placing a suitably curved concave mirror behind the latter.

Early attempts at dialytic construction were probably made with the intention of not only reducing the flint lens diameter but also of eliminating or diminishing the secondary spectrum. In Dialyt-and Medial-O.G.'s the designer has a new and valuable correcting element at his disposal since the corresponding red and blue wavelengths of any axial pencil of light will penetrate the compensating unit at different axial heights. The relation of this height of incidence of any chromatic ray X to that of the central ray D is

(3) $$v = 1 + \frac{DX_1}{v_1} s,$$ where

(4) $$DX_1 = \frac{n_X - n_D}{n_F - n_C}$$ expresses the relative partial dispersion and s is the so-called dialytical constant. One has

(5) $$s = \frac{f_1}{c} - 1$$ for the Brachymedial telescope. This change in the deflection or diversion of a lens zone, due to the change of incidence for a specific color, may now be put in relation to the variation in chromatic diversion by employing instead of the dispersion of the compensating unit, e.g. flint lens - concave mirror, the product of its multiplication with v. These values must also be inserted in the achromatizing formulae because in the above the variation of the height of incidence has been neglected.

The secondary spectrum is defined similarly to that of a normal doublet objective whose components are separated by o; then the change of focal length relative to the focal length of the first lens is

(6) $$\frac{1}{v1} \; (DX_1 - DX_2).$$

This formula is also valid for Medial telescopes except that the new dispersions are to be inserted for the compensator.

Eliminating first order spherical aberrations on the axis shouldn't prove too difficult for advanced amateurs since the values for the objective andcompensator have opposite signs. Chromatic differences and spherical aberrations of higher orders are usually insignificant since the various optical surfaces of the system do not provoke serious spherical aberration.

Schupmann's examples include four instruments with various values of s, ranging from 1.13 to 2.00. Small s- values will permit the use of a flint meniscus silvered on the back surface as originally proposed by Hamilton. When s becomes bigger, however, it proves necessary to separate the concave mirror from the flint component if the Sinus- and Gauss-requirements are to be fulfilled. The Brachymedial's field of view is small, in an F/10 instrument approximately 32 minutes of arc. This is its major drawback since the two, or at most four, reflections of first order may be eliminated by coating the optical surfaces. A flat should be used instead of a prism as the deflecting unit between the crown and flint components; and it may be glued to the inside surface of the crown with canada balsam, thus eliminating diffraction effects otherwise caused by the spider.

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Literature: Schupmann: Die Medialfernrohre 1899, 146 pages, 28 figures
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Foreword by Editor. Mr. Clyde W. Tombaugh is doubtless best known to our readers for his discovery of the planet Pluto on a Lowell Observatory photograph in 1930. He has made many observations of the moon and the planets, but especially of Mars, with the excellent 24-inch refractor at the Lowell Observatory. Mr. Tombaugh's present address is 636 S. Alameda St., Las Cruces, New Mexico. Since our contributor has published very little, we are the more glad to present the two following abstracts relating to his planetary studies. The papers of which these are abstracts were read by him at the meeting of the American Astronomical Society at Bloomington, Indiana, in June, 1950.

Mr. Tombaugh's interpretation of the oases of Mars as impact-craters caused by collisions with asteroids and of the canals as cracks radiating from the oases and formed by the same impacts cannot fail to arouse the interest of our readers. It appears to the editor that such a natural explanation cannot be reconciled with the geometric representations of the Lowellian school-great circle paths for the canals, uniform widths over their whole length, continuity, and occasional very artificial-looking doublings. If the canals are vegetation growing in natural cracks, they should instead seldom follow great circles, they should vary in width (lunar clefts do), and they should show breaks and discontinuities. If we accept the Tombaugh interpretation, we must suppose that the Lowellian observers simply are not seeing the canals well enough to recognize their true nature. There might, in fact, be more support from the Antoniadian observers, who do insist that the canals are discontinuous and splotchy-looking when they are seen best.

It is our tentative plan to reproduce one of the photographs of Venus with a 16-inch telescope near the last inferior conjunction in either this issue or the next one. At this writing it is not known how successfully the photograph can be reproduced. On the original the extension of the horns beyond a semicircle is very evident. In connection with the photographic evidence cited below that the east cusp was prolonged more than the west one, it is interesting to refer to pg. 3 of our May issue. There we read that at 7^h on January 31, 1950, U.T., Mr. Murayama and Miss Koyama with an 8-inch refractor found that "the eastern cusp was far more prolonged than the western one". To be sure, Haas with a 6-inch reflector had the reverse impression and thought the west cusp the more prolonged from $22^h 40^m$ to $23^h 50^m$, U.T., on January 31 and from $23^h 10^m$ to $23^h 54^m$ on January 30. The angular perimeter supplied by the photographs is 210° ($180^\circ + 25^\circ + 5^\circ$). Larger values were obtained visually on January 30 and 31. Murayama and Koyama estimated 250° to 270° at 7^h on January 31, and Haas secured 230° to 240° near 23^h on both January 30 and 31. Of course, it is easy to suppose that the visual observers could follow the cusp-extensions beyond the portions which were bright enough to register on the photographs.

GEOLOGICAL INTERPRETATIONS OF THE MARKINGS ON MARS

A B S T R A C T

by Clyde W. Tombaugh

The increased knowledge of the physical conditions on Mars during the past two decades warrants an attempt to explain the nature of the surface markings as being of geologic origin. It appears likely that Mars has always had a thin atmosphere, very little water, and a very dry climate. The lower temperature prevailing there would greatly retard the process of oxidation so that the reddish-ochre desert areas may not have robbed the atmosphere of its oxygen to the degree that it has commonly been supposed. There is evidence that the deserts consist of rhyolitic igneous rock, little altered by chemical action. The color of the Martian deserts compares well with the natural color of rhyolite samples. The known physical and geological conditions on Mars are consistent with the planet's size and distance from the sun.

The distribution of the maria and the desert areas conforms well with tetrahedral deformation of a globe which suffered shrinkage in volume after a thick crust had formed. There is a striking similarity to the Farth in this respect. There is good evidence that the maria are the lowest regions on the planet, and they occupy the faces of the tetrahedral figure. The vertices fall in the middle of the great expanses of desert. The eccentric position of the south polar cap remnant suggests that the fourth vertex lies near the south geographical pole in the general longitude of zero degrees.

The juxtaposition of the high Hellas plateau with the very low altitude Syrtis Major represents a diastrophic situation frequently found on the Earth.

The lack of water erosion on Mars would permit the surface to retain a visible record of the major events that happened during the planet's entire separate existence, similar to that on the Moon. The round "oases" are depicted as the sites of impact craters caused by the collisions of small asteroids. Great dust clouds on Mars are observed occasionally. They indicate some wind erosion, which if extended over long geologic ages would mitigate the abrupt slopes of the craters. The dark color and seasonal behavior are undoubtedly due to the growth of vegetation (perhaps similar to our lichens), which finds a favorable environment in the pulverized igneous rock and shelter offered by the crater.

It is noted that the oases of Mars are much less numerous than lunar craters of corresponding size. This may indicate that the craters on the Moon were formed mainly by the infall of large planetesimals produced by the birth-of-the-Moon process, while those of Mars may have been produced entirely by collisions with asteroids.

The invocation of intelligence to explain the extra-terrestrial characteristics of the so-called canals was a reasonable hypothesis in its day, but stern geological considerations of the planet's natural resources is highly unfavorable to the economics required for such a civilization. The canals cannot be entirely relegated to the realm of illusions in spite of the unfortunate misrepresentation given by the drawings of some observers nor by the doubts of those who do not know how to see fine planetary detail.

The radial pattern of the canals with respect to the oases is attributed to fracturing of a thick crust under strain by the impact of asteroids which created the oases. The fractured zones could give haven to a hardy vegetation in regions of unfavorable environment. The seasonable behavior of the canals can be explained by the growth of vegetation capable of absorbing the slight moisture from the air after the polar caps melt and evaporate during each Martian year.

PHOTOGRAPHS OF VENUS AT INFERIOR CONJUNCTION, 1950, FROM MULE PEAK, NEW MEXICO

A B S T R A C T

by Clyde W. Tombaugh

Photographs of Venus at inferior conjunction on January 31, 1950, were taken with a movie camera attached to the 16-inch tracking telescope on Mule Peak (altitude = 8100 ft. above sea level). The equipment is owned and used by

the Ordnance Department of the United States Army in obtaining large scale pictures of rockets in flight at the White Sands Proving Ground. Nearly 5000 images (2.3 mm. diameter) were obtained on Shellburst Panchromatic film with an equivalent focal length of 300 inches at 16 frames per second. Two sets of photographs were taken at $15^h\ 00^m$ and $16^h\ 20^m$, MST, through clear, 2 A, K-2, 16, 23, and 25 Wratten color filters in succession (U.T. 22^h and $23^h\ 20^m$ on January 31).

The best images show considerable elongation of the cusps, equal to 25 degrees and 5 degrees of the circumference for the east and west cusps respectively. This is of particular interest in the study of the Venusian atmosphere since Venus was seven degrees north and twelve minutes of time west of the sun at this time. The great circle distance between their centers was $7^\circ\ 30'$ of arc.

This series of photographs presents an interesting study of the behavior of seeing.

SOME OBSERVATIONS AND SOME COMMENTS

C. M. Cyrus observed Linné with a 10-inch reflector on June 24, 1950, at colongitude 15°6. (Colongitude is the lunar longitude of the sunrise terminator, measured at the moon's equator toward the east all the way around). He saw a crescent-shaped shadow within the white area. The shadow presumably lay in a crater. The seeing being only fairly good, Cyrus tested the effect of a 6-inch diaphragm on his telescope. The view differed little with 6 inches and 10 inches but was slightly better with the full aperture.

Cyrus made the following observations with the same telescope on June 22 at colongitude 351°6 with a hazy sky but rather good seeing. "Down the southeast slope of the central peaks of Theophilus the ground is exceedingly rough and a dark line-either a cleft or a row of mounds, wound down this slope to the crater floor. A cleft could be seen winding down from the east side of Proclus, and other clefts were seen running in an east and west direction just north of Plinius. Mare Serenitatis was sprinkled with minute craterlets..."

In the supplement to Documentation des Observateurs for June-July, 1950, A. Hestin describes an estimate of the light of Aristarchus on the earthshine. On April 20, 1950, he observed with a 12-inch reflector at 65X and was struck by the visibility of detail on the earthshine. The double star Kappa Tauri was near the moon's east limb and was occulted at $19^h\ 47^m$, U.T. According to G. Raymond the components are of magnitudes 5.7 and 7.8 and are separated by 19"3. Using extra-focal images so that Aristarchus and the stars were about the same apparent size, Hestin found that Aristarchus was less luminous than the principal star of Kappa Tauri but was a little more luminous than the companion. Therefore, the stellar magnitude of Aristarchus was about seven. F. J. Reese has occasionally compared the brightness of the central peak of Aristarchus on the earthshine to that of stars near the moon, for which C. B. Stephenson has kindly determined stellar magnitudes. We thus have that the stellar magnitude of the central peak to Reese was 8.2 on March 15, 1948 at $0^h\ 33^m$ (U.T.) and 8.5 on May 31, 1949 at $1^h\ 38^m$. Reese sees the central peak as a bright nucleus within Aristarchus by earthshine. The stellar magnitude of the central peak is naturally less than that of the whole crater.

The editor wonders whether we ought not greatly to extend Reese's work and even to determine a sequence of stellar magnitudes of small lunar features on the earthshine. These magnitudes would naturally need to be corrected for changes in the phase of the earth as seen from the moon and in the distance of the moon from the earth. Such a project is evidently a rather ambitious one and might require a long time for its completion. Once established, however, the desired sequence would be of value in at least one connection. The visibility or invisibility of lunar marks of known stellar magnitude would now quickly tell us how faint a lunar meteor or meteoritic impact-flare we could see against the moon in a given observation. Our present system of determining this important limiting magnitude is little but intelligent guessing. Moreover, some persons have suspected that the brightness of Aristarchus and other objects on the earthlit hemisphere varies. J. C. Bartlett has expressed this opinion in correspondence with the editor. Unfortunately, the supposed light-variations are very uncertain because of the lack of a standard of comparison of known brightness. Hestin and Reese have now shown us the way to getting more reliable data on this subject. If Aristarchus and other lunar spots vary by earthshine, then long-continued comparisons with stars must reveal the variations. For lunar features not small enough to be point-like the comparisons should be made with out-of-focus images such as Hestin used.

On pg. 8 of the May issue we reported a temporary bright spot observed against the earthlit part of the moon by A. Hestin on March 26, 1950. The spot was diffuse and lasted for perhaps one to two seconds. Its stellar magnitude was about six; its angular diameter,about ten seconds. Mr. R. Rigollet has kindly sent us a copy of an article,to be published in <u>Documentation des Observateurs</u>, in which Mr. Hestin proposes an explanation of the transient bright spot. The following translation is by the editor: "In order to explain the appearance observed one could imagine, for example, an explosion of a bolide in the midst of an atmosphere charged with vapors, which, upon reflection, is not impossible. In fact, the light appeared on the earthshine, hence at a point of our satellite immersed in a relative night in spite of the 'light of the earth'. The dark part of the moon is then at an extremely low temperature. Certain gases (for example, carbon dioxide) could exist there in the state of fine droplets or fine crystals in suspension in the atmosphere, forming, very near the surface and particularly in the low regions, clouds or mists. The arrival and explosion of a meteor in such a medium could give, as seen from the earth, the diffuse light which I observed on March 26, 1950. This explanation evidently assumes an atmosphere; but some selenographers have proposed the hypothesis that certain brilliant formations observable immediately after sunrise could be ice - probably carbon dioxide - an hypothesis also the more plausible since the lunar surface is essentially volcanic". Mr. Rigollet adds: "Some colleagues have informed me that sulphurous anhydride SO_2, which is also produced by volcanoes, would give the same effects as CO_2".

On pg. 10 of the May issue and pg. 7 of the July issue we spoke of a curious illumination of the limb of the earthlit hemisphere of the moon. On several July and August dates J. C. Bartlett, Jr., observed this same illumination, both on the lunar east limb in the evening sky and on the lunar west limb in the morning sky. Using Wratten color filters, he found that the east limb contained both a blue and a yellow component in its light and that the west limb was yellowish. Both limbs reflected very little red light. However, Bartlett used a 3.5-inch reflector at 60X on the east limb in late July and a 3-inch refractor at 45X on the west limb in early August; the evidence for a difference in color between the east and west limbs would be better if the same telescope had been employed at all times. On July 22 at 2^h 10^m, U.T., Bartlett readily saw the radiance of the east limb when the moon's age was 6 days, 21 hours, though it could not be distinguished on the following night. If phosphorescence is the cause, we must suppose that the materials affected remain luminous for at least seven days - an interval which appears long. At times Bartlett found the radiance equally bright along the whole limb; at other times he distinguished one or two brighter arcs, as Japanese observers also have done. Two brighter arcs recorded at 7^h 57^m on August 8 were not to be found at 8^h 20^m on August 9, though the seeing was better on August 9 and the moon's crescent was narrower. W. H. Haas has made a few observations of this limb-brightening with his 6-inch reflector. On July 20 at 3^h 22^m, and thus when the age of the moon was 4 days, 22 hours, he saw the dark (east) limb to be brightened all the way around in a band perhaps 2" wide. "This rim becomes brighter near each cusp; in this sense each cusp is extended about 12 degrees, the south one the more distinctly." On July 20 Haas saw the rim-brightening about equally well with different color filters; but on June 20 at 3^h 47^m he found the appearance less distinct with a red filter than with other colors, confirming Bartlett. Some of our readers having the proper equipment might contribute much to the solution of this problem of the limb-illumination by taking photographs of the dark hemisphere, including ones with color filters.

The energetic Dr. Bartlett has also communicated observations of Mare Crisium and the crater Proclus with his 3.5-inch reflector. On July 29 at colongitude 85°.6 he found Crisium gray-green in color, becoming very dark with a red filter. Haas has often seen green in Crisium under low lighting. Bartlett on July 29 noted: "The surface [of Mare Crisium] appeared to be covered in all directions by a great multitude of small, dull white spots which greatly resembled a field of cirro-cumulus seen from above. I have noticed this appearance before, and it was mentioned by Webb; but for some reason it is not always visible." Bartlett also directs attention to inconsistencies in descriptions of the floor and walls of Proclus and wonders whether there must not have been changes in Proclus over the years. Goodacre on pg. 218 of his Moon (1931) said that the floor was so bright that detail was difficult to observe. Neison on pg. 151 of his Moon (1876) gives the brightness of the floor as five to six, of the south wall as eight, and of the north wall as nine. Neison is here using the Standard Lunar Intensity Scale of zero (shadows) to ten (most brilliant marks). Neison tells us that Maedler (1837) made the floor only four and all walls, except the west, "not much brighter". Observing on seven dates from July 22 to 31, inclusive, Bartlett found that the floor was darkest relative to Mare Crisium when the lighting was highest. An absolute darkening is naturally hard to establish. However, Bartlett was impressed by the darkness of the floor and found it at least as dark as Mare Crisium between colongitudes 10°.7 on July 23 and 60°.4 on July 27; he is hence puzzled by Goodacre's description of the floor, and even Neison's. Bartlett found the walls brilliant and is confident that the north wall, not the west one, is the brightest; he is hence much puzzled by Maedler's description of the walls. (Neison, like Bartlett, made the north wall brightest.) On July 31 at colongitude 109°.4 Bartlett perceived a dark gray band on the southwest wall of Proclus. It appears rather difficult to reconcile the differences between recent observations and past descriptions, though it should be borne in mind that the latter probably refer to the appearance near the terminator. In that position Bartlett has found the floor definitely lighter than Crisium.

Bartlett also observed Plato with a 3.5-inch reflector and 100X from colongitude 48°.3 on July 26 to colongitude 183°.3 on August 6. Using color filters, he found that the floor was a steel-blue-gray or a purplish-gray, the tone perhaps varying a little from night to night. He perceived on the floor bright spots and darker portions, both apparently varying from night to night. These details do not agree too well with what other observers have seen with larger apertures. However, the spots, streaks, and shadings on the floor are difficult for apertures of 6 or 8 inches; and Dr. Bartlett is to be commended on recognizing even the general pattern of detail with only 3.5 inches. It is curious that his drawing on July 31 at 111°.0 shows a dark spot apparently on the site of one of the bright spots near the west wall. Relative to Mare Imbrium and Mare Frigoris the floor of Plato is darker under high lighting than under low lighting, Bartlett reports.

G. A. Carroll of Tujunga, Calif. writes of a lunar observation which was for him unique in 20 years of astronomizing. At about 4^h on August 21 (U.T.) he saw a shading on the terminator at the north shore of Mare Vaporum. This shading was about 40 miles wide and about 200 miles long, the long dimension being perpendicular to the terminator. The shading was darkest at the terminator and faded out gradually on the illuminated part of the moon. It was so faint that it could easily be overlooked. Mr. Carroll had a very strong impression that the shading resembled the shadow of a terrestrial cloud near sundown. He telephoned T. R. Cave, Jr., to confirm the appearance; but Cave could not do so, employing an 8-inch reflector in poor seeing. Carroll had excellent seeing and transparency and employed chiefly 120X (telescope not stated). By $4^h\ 40^m$ the shading was no longer visible to Carroll. The colongitude was 6°.1 at 4^h.

Carroll suggests that a meteorite struck the moon and raised dust from the surface, the resulting cloud being dense enough to cast a faint but perceptible shadow. Now the moon's known gravitation (1/6 of earth's) enables us to say that near the moon's surface the distance s in feet which any body (including dust particles) will fall from rest in t seconds in a vacuum is:

$$s = 2.7\ t^2.$$

It follows that an object will fall 180 miles in 10 minutes. This result will be modified if the moon has an atmosphere but perhaps not appreciably for the admissible densities of a lunar atmosphere. It appears highly unlikely to the editor that a meteorite can raise dust from the lunar surface to heights so great that the fall back to the lunar surface would require 40 minutes. The editor wonders whether what Carroll saw was merely the effect of the very oblique solar lighting of a lunar region. This interpretation would account for the greatest darkness at the terminator, where the lighting was lowest, and the fading out by $4^h\ 40^m$ as the illumination grew less oblique. If this explanation is correct, the appearance should be seen again when almost the same solar illumination is reestablished at 5^h, U.T., on October 19, 1950. Take a look near that time.

T. Cragg has communicated observations of Saturn on May 21, June 3, June 8, and June 14. He employed a 12-inch reflector on June 3, a 6-inch reflector on the other dates. A few bulges, bends, and wider sections in the south component

DRAWINGS OF JUPITER

Fig. 6. L.T. Johnson, 10-in. refl.
August 7, 1950, 4^h 57^m U.T.
300X. C.M.$_1$ 244°, C.M.$_2$ 18°
S = 7, T = 3

Fig. 7. L. T. Johnson, 10-in. refl.
July 29, 1950, 5^h 25^m, 300X
C.M.$_1$ 279°, C.M.$_2$ 122°
S = 3-4, T = 2-3.

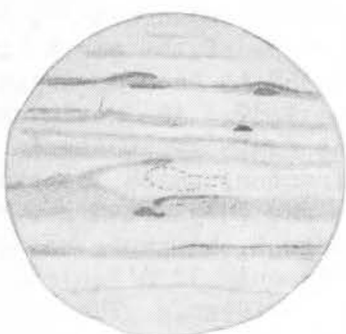

Fig. 8. T. Cragg, 12-in. refl.
August 11, 1950, 12^h 15^m. U.T.
336X, C.M.$_1$ 63°, C.M.$_2$ 165°.
S = 4-5, T = 4½

Fig. 9. T. Cragg, 6-in. refl. 208X
August 19, 1950, 6^h 40^m, U.T.
C.M.$_1$ 43°, C.M.$_2$ 85°.
S = 4-6, T = 3.

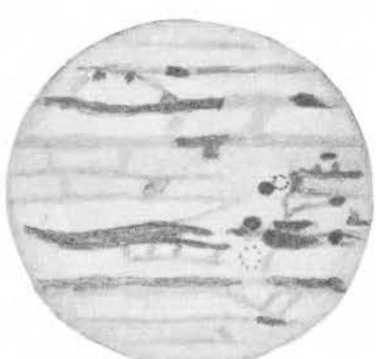

Fig. 10. L.T. Johnson, 10-in. refl.
August 25, 1950, 3^h 5^m, U.T.
C.M.$_1$ 140°, C.M.$_2$ 138°, 300X.
S = 7, T var

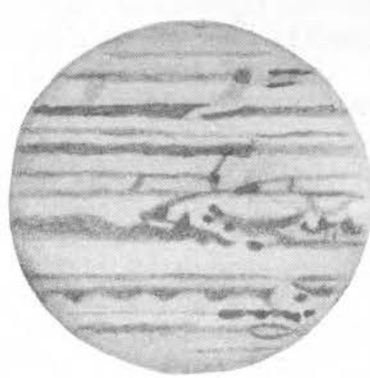

Fig. 11. L.T. Johnson, 10-in. refl.
August 26, 1950, 4^h 50^m, U.T.
C.M.$_1$ 2°, C.M.$_2$ 352° 300X
S = 8, T = 4

of the North Temperate Belt cannot be identified with the fast-moving darker section apparently observed by Roth and Haas in June (pg. 12 of September issue). Cragg found the Equatorial Zone much brighter in its north part than in its south part, as Haas also did; the line of demarcation between the brighter and dimmer parts was sometimes very irregular to Cragg. On June 8 he saw very clearly that Ring B was brightest in its outermost fourth. The North Temperate Belt was seen double on June 3, though the north component was thin. (Hare last saw it double on May 13.) On June 3, when the 12-inch was used, Cragg found the south component of the South Equatorial Belt to be very dark on the central meridian, with less dark wings on each side. Perhaps there was merely a short very dark section of the belt in transit across the C.M. Usually this component of the S.E.B. was darker than the north component to Cragg.

Observations of Mars have recently arrived from T. Cragg (6-inch refl., 12-inch refl.), W. H. Haas (6-inch refl.), D. O'Toole (6-inch refl.), and T. Saheki (8-inch refl.). Cragg's views were in June; those of the others, in late July and August. On October 15 the angular diameter of Mars will be only 5".2 so that large telescopes will be needed to show much on the disc. The north pole will be tipped toward the earth by 6 degrees. The season will be early spring in the southern hemisphere, the vernal equinox having occurred on September 12. Plain enough to Cragg in June, the north cap was "very vague" and poorly bounded to O'Toole on July 30. Saheki found it rather dim and diffuse on August 1 and 24. It was rather undistinguished to Haas on August 25, but he found it brilliant four days later. The angular diameter of the north cap as measured on drawings was 34° to O'Toole on July 30 and 36° to Haas on August 29. It is possible that about the middle of July, or near ☉148°, the north cap enlarged and became a cloud-cap. All observers found the north cap white in color. In necessarily casual views of Mars with a 6-inch refractor, which he exhibits at various Los Angeles playgrounds, Cragg during June and July often saw bluish white clouds of Type I in far southern latitudes. In August, however, he noticed a south polar cap more frequently than such clouds. On July 30 O'Toole found a yellowish white south cap to be the easiest feature on the disc. The south cap was brilliant to Saheki on August 1, but he thinks that it may have been dimmed by a bluish gray haze on August 24 at C.M. 185°. Haas saw the south cap well on August 25 and 29. The bordering south polar band was very dark to Saheki in August, though melting can scarcely have begun then. The diameter of the south cap was measured as 70° by O'Toole on July 30 and as 40° by Haas on August 29. Saheki could still see blue or green tones in southern maria in August. Acidalium appeared pentagonal, and a little less dark than before, to Saheki on August 1. Large clouds were still sometimes recorded on the limb and the terminator during June, July, and August. On June 3 Cragg saw much structure in the Propontis shading (using his 12-inch reflector). On June 14 what was apparently the Forks of Aryn was very dark near the limb to this observer at C.M. 59°. The canals usually look rather wide to him.

REPORT NO. 2 ON JUPITER IN 1950

by Edwin E. Hare

Having spiralled a little closer to Earth than for many years, and also a little northward, Jupiter in August was in a more favorable position to observers in the northern hemisphere. Reports from some of them have been received and are listed (with their telescopes): Ernst Botl (8-in. refr.), T. R. Cave, Jr. (8-in. refl.), Thomas Cragg (6-in. and 12-in. refls.), Eugene Epstein (6-in. refl.), Edwin E. Hare (12-in. refl.), Lyle T. Johnson (10-in. refl.), John E. Mellish

(5-in. refr.), Raymond Missert (8-in. refr.), D. B. Mumford (3-in. refr.), Paul J. Nemecek (12-in. refl.),O.C. Ranck (4-in. refr.),Tsuneo Saheki (8-in. refl.), J. W. Tisdale (6-in. refl.),and E. King White ($7\frac{1}{2}$-in. refl.). Forty-two drawings, most of them dated in August and many containing an immense amount of data, were submitted for study. White and Hare experimented with five different kinds of photographic film and obtained more than 300 exposures. While the most rapid films were disappointingly low in contrast, better results were had with Contrast Process Pan. On some of the enlargements it should be possible to measure the latitudes of fully 8 belts. In addition, we already have a set of micrometrical measures by Cragg with the Griffith 12-in. refractor.

The Red Spot Hollow enclosures spanning the S. Tropical Zone remained faint in August, perhaps even faded a little. Cragg on one date was unable to see the preceding arm, and it shows but faintly on a photograph by White. The following arm was but little stronger at the end of the month. An interesting situation may have unfolded the month of September. In the S.Tr.Z. Cave, Johnson, Missert, and Nemecek in August espied a delicate belt. A stronger section of that belt has been found to be moving rapidly down upon the R.S.H.; on July 1 transits taken by Hare made it to lie between (II) 0° and 40°, and on Aug. 23 the preceding end had reached 280° (this motion giving a period of $9^h\ 53^m\ 50^s$). At this rate the stronger section was due to arrive at the Hollow by September 4. The question arises: Will these heavier clouds sail on across the Hollow - where faint markings have already been seen - or will the cloud-mass pile up against a barrier? If it is the former, we should hope to see more certain detail in the R.S.H.; if it is the latter, there should be a darkening of the following arm. Therefore any change observed to take place should be recorded for whatever significanee it may have toward a better understanding of the Red Spot Hollow. The only report of detail visible in the Hollow in August was a continuation of a dim northern edge of the $S.F.B._s$ into the oval of the Hollow about 7° past the preceding arm, and from the end of it a column or second arm (much like the p. arm) arose to a dusky S.Tr.Z. belt in the south half. However, the north-preceding corner appeared to be unclosed, leaving an open gateway into the hollow S.E.B.

Continuing along this hollow belt one came to probably the most outstanding dark spot on the globe. Located at (II) 174° (Aug. 25) it has been referred to by Reese and has been drawn by Johnson, Cragg, Botl, and Hare. The last-named has seen a mixture of red and black in it. Johnson, on the above date, noticed two dark spots on the $S.E.B._s$ near it. A much smaller spot on the north edge of the $S.E.B._s$ at (II) 140° was drawn by Johnson and Cragg. In as much as the spot was unrecorded on several drawings, it was a pleasant surprise to find it faintly visible on photographic negatives. The large elongated spot at 174° had a high velocity (relative to System II) and will be getting into close proximity to the smaller spot by Oct. 1. It would seem they might rub together. Something may happen! The white cloud obscuration over the $S.E.B._n$ at (I) 260° illustrated in our First Report (August <u>S.A.</u>) was later seen by Saheki. By July 22, however, it had moved into the Equatorial Zone, where it subsequently faded and probably was last seen on July 29 as a hollow gray ring in the south part of the E.Z. Another June $S.E.B._n$ gap, 20° long, has turned out to be more interesting. Reported by Saheki, Johnson, and Cave, its motion is lagging slowly in System I. On Aug. 26 its following end was at (I) 164°, and at that point the $S.E.B._n$ was twice as wide and prominent as on the other side of the gap. Can it be that the obscuring cloud body obstructs the flow of a more rapidly moving stream? The observed appearance is that of a log-jam packed for a long distance upstream, yet not having too greatly overflowed the banks! Still another break in the S.F.B.$_n$ was seen by Johnson on Aug. 26 at (I) 15° and is visible on a photograph from White. On one occasion the S.F.B.$_s$ impressed White as being a triple belt.

As a result of our effort to trace some 1949 S.T.B. markings into 1950, Reese has supplied a chart on which the life history of that belt since early 1946 is given. Changes in rates of motion occur from time to time, but by mapping the entire belt it was possible to maintain identification. The three marks considered in our First Report are being followed into their fifth year.

Considerable activity is being displayed in a long section of the S.S.T.B. Cragg, Johnson, and Hare have noted a doubled region; and the latter two have seen dark clots along the north element. A photograph taken by Hare on Aug. 28 reveals a broken texture in the belt as well as a wide, dim column connecting across the S.Te.Z. to the S.T.B. (II 305°). The dusky column has also attracted the attention of Missert, Johnson, and Nemecek. A still fainter column at 0° is confirmed by Botl and Johnson.

On Aug. 26 Johnson had nearly perfect seeing; in the N.E.B. there was much internal white detail and dark spots. Many of the features drawn then by Johnson have been seen by others in our group. A white indentation in the north edge of the N.F.B. at (II) 148° has been observed by Botl, Cave, and Hare; dark dash-shaped marks in the N.F.B. just inside the north edge have also been noted by Cave, Cragg, and Missert. These are a deep red color to Hare, who sees a long, faint, broken red line to which they belong. His color observations are made, not with color filters, but directly with relatively low power or "rich" field (200X). Reese has detected a red color to the dark S.F.B.$_n$ belt with the very "lean" image at 40X/inch, but most observers will need a "rich" image for viewing colors. Botl, Cave, Johnson, Missert, and Saheki draw projections or plateaus jutting out from the N.T.B.$_n$ into the N.Te.Z. On Reese's drawing, Fig. 8 in the August issue, the belt I labelled N.N.T.B. should be called the N.N.N.T.B., whereas the N.N.T.B. lies in the N.Te.Z. and is discontinuous. Some of its black sections have been recorded by Cragg, Epstein, Johnson, and Missert.

J. E. Mellish, the well known comet discoverer and telescope maker, on August 26, the night of opposition, took a 5-inch refractor to a mountain-top above the clouds in Escondido, Calif., and was treated to a transit by satellite I when its shadow was so nearly hidden beneath it that only a black crescent of the shadow remained visible. On the preceding night both Mellish and Johnson had observed sat. II and its shadow to be just in contact. At 5^h on Aug. 14 (U.T.) sat. IV was so black to Mr. Tisdale that he reported it as the shadow, but actually the latter gone off the disc before he began observing.

Observational reports should reach the Recorder by the 10th of the month in order to make the bulletin "deadline", and drawings should be received about a week earlier.

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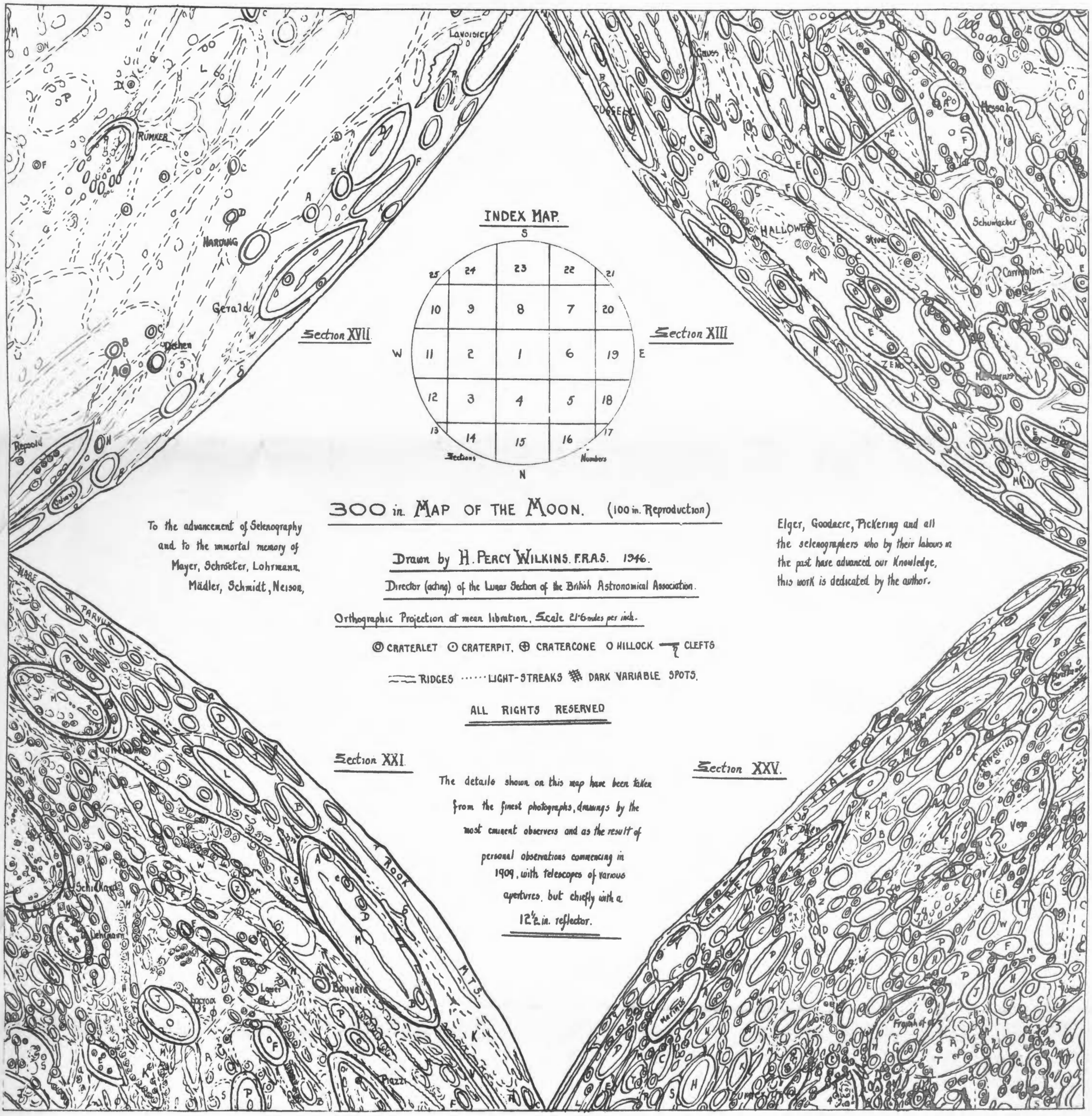
IMPORTANT NOTICE

The new temporary address of The Strolling Astronomer is 167 W. Lucero, Las Cruces, New Mexico. The Editor has left the University of New Mexico, and The Strolling Astronomer is now issued as a private service. It is hoped to be able to give a permanent address in the next issue.



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