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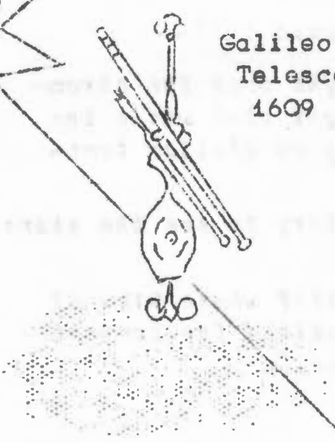
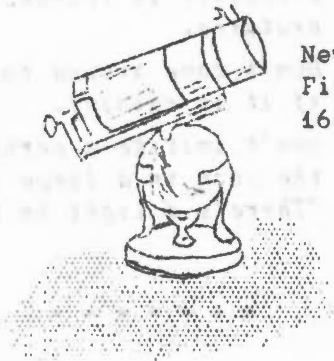
THE STROLLING ASTRONOMER

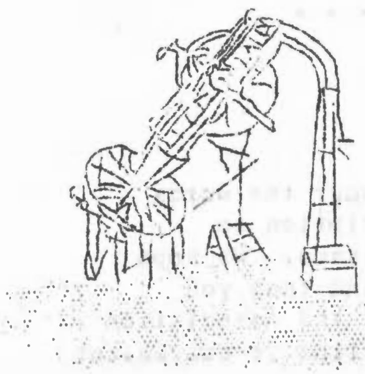
(Association of Lunar and Planetary Observers)



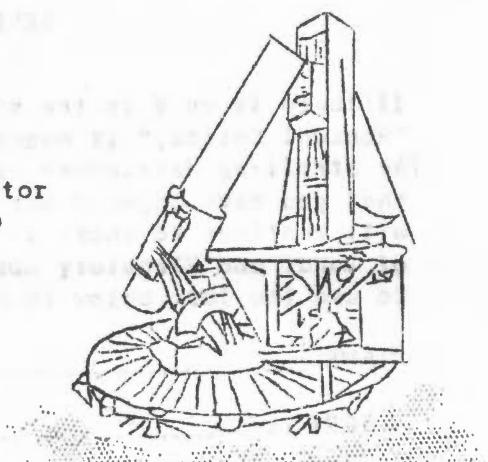
Galileo's Telescopes 1609



Newton's First Reflector 1668



Refractor, around 1790



Reflector 1860

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ETIQUETTE FOR VISITORS TO OBSERVATORIES

Professor Noman of the Noland Observatory has given us the benefit of his long experience with visitors to that institution on open-house nights.
Here is a list of things to be avoided:

1. *Don't call the Astronomer an Astrologer. (Corollary: Don't say: "Why, you're a Capricornus, a Taurus, etc."*
2. *Don't call the telescope a microscope.*
3. *Never ask: "How far can you see with it?"*
4. *Don't exclaim with too much delight over the chromatic aberration-effects on a bright star while the professor is learnedly expounding on stellar temperatures.*
5. *Don't come around to the Observatory to see the stars if it is raining.*
6. *Don't imitate a certain Navy Officer whose view of the Moon in a large reflector elicited the comment: "There's a light in that telescope."*

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RENEWAL NOTICE

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If there is an X in the square box just under the words "Renewal Notice," it means that your subscription to *The Strolling Astronomer* expires with this issue. We hope that you have enjoyed our little pamphlet and that you will continue to share in the activities of the Association of Lunar and Planetary Observers. You may find it convenient to use the form below in renewing.

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FOR ....ISSUES.

INTRODUCTION

Mr. M.B.B. Heath has been an assiduous observer of Mercury and other planets for many years. His name has long figured prominently in British Astronomical Association reports. We are pleased to present this contribution from him.

The reader further interested in Mercury might like to examine "A Ten-Year Study of Mercury and it's Atmosphere," Popular Astronomy, Volume 55, No. 3 (March), 1947. Those conversant with French will find it worthwhile to peruse E. M. Antomiadi's booklet La Planete Mercure.

As Mr. Heath says, the planet is brighter when gibbous than when crescentic. Mercury is disproportionately bright at the full phase; and the reason is the same as for the same effect on the Moon, namely, the roughness of the surface. Indeed, Mercury is not most easily visible to the eye at greatest elongation. Rather, it is most conspicuous about five to ten days before greatest elongation when in the evening sky and the same interval after elongation when in the morning sky.

The editor's opinion is that with ordinary-sized telescopes, say with apertures of five to twelve inches, the best views of Mercury are obtained near sunrise or sunset. There then comes, he has found, a period when contrasts are best for markings on the small disc; on a brighter sky the image is too pale to show much detail, and on a darker one, glare drowns the features. This period for obtaining best results is often brief, perhaps lasting only five or ten minutes. The exact time of its occurrence depends upon such things as the aperture, the transparency of the air, and the variable stellar magnitude of the planet. When Mercury is visible to the eye, it is too bright for good telescopic views.

OBSERVING THE PLANET MERCURY

By M. B. B. HEATH.

Mercury is probably the least observed as well as the least observable of all the planets inside the orbit of Saturn. In middle and high latitudes it is not often favorably placed for observation; and even when it is, the anticipated view may be prevented by the intervention of fogs, mist, or haze. Indeed, an old English writer, one Goad, in 1686 described the planet as "a squinting lacquey of the Sun, who seldom shows his head in these parts." In lower latitudes Mercury is more easily observed, generally under better conditions.

Owing to the considerable eccentricity of the planet's orbit the greatest elongations vary largely, and the brightness of the little orb at such elongations also varies over a wide range. From a mathematical investigation we can ascertain that if Mercury is at perhelion and is also at greatest elongation about September 28 in any year, it will then be only about 17 degrees 50 minutes from the Sun as a morning star north of the ecliptic and so favorably placed for observation in the northern hemisphere. It's stellar magnitude, computed from Müller's formula, will then be minus 0.20. If, however, the elongation occurs about February 17 and Mercury is then in perihelion, it will be about 18 degrees 8 minutes from the Sun, an evening star north of the ecliptic and again favorably placed for observation in the northern hemisphere. It's stellar magnitude is then minus 0.24, which is about the brightest the planet can appear at any greatest elongation.

On the other hand, if Mercury is at both aphelion and greatest elongation about April 4, it will be about 27 degrees 45 minutes from the Sun, a morning star south of the ecliptic and well placed for observation in the southern hemisphere. Its stellar magnitude, computed as before from Müller's formula, is then plus 0.54. Similarly, if an aphelic elongation occurs about August 12, the planet will be 27 degrees 26 minutes from the Sun, an evening star south of the ecliptic and again favorably placed for observation in the southern hemisphere. It's stellar magnitude will then be plus 0.57, which is about the faintest possible for Mercury at any greatest elongation. Thus the planet is about twice as bright at a perihelic elongation, and this fact compensates for its greater proximity to the Sun; perihelic elongations are best seen in the northern hemisphere, aphelic elongations, in the southern hemisphere.

Irrespective of whether Mercury is seen under favorable conditions or not, it is always much brighter in the gibbous than in the crescent phase. With an aperture of 9 or 10 inches it can generally be seen within about 10 or 12 degrees of the Sun and in full sunshine when gibbous; but in the crescent phase it is far too faint to be so seen, and observation must be put off until sunset or a little after.

Seen in bright sunshine at a moderate altitude, the planet loses the rosy tint which it assumes near the horizon and is seen to be of a dullish livid white tinge, sometimes with a pale yellowish tint. In the half and crescent phases the brilliancy falls off rather suddenly towards the terminator so that the phase is apt to be underestimated on a bright sky. Moreover, it will often be found that half-phase is not synchronous with greatest elongation. Occasionally one cusp may appear slightly more acute than the other; and when this occurs, the southern cusp is generally the blunter of the two. Also, the terminator may sometimes exhibit a slightly irregularly curved appearance.

In the gibbous phase the apparent diameter of the planet is small, and a magnification of at least 230 to 300 diameters should be employed whenever the state of the air permits. In the crescent phase a lower power may be used.

As most of the observations will have to be done in sunshine, a well-adjusted equatorial telescope of at least 9 or 10 inches aperture, or preferably larger, should be used. Seen thus in good air, the planet occasionally shows markings which with practise become progressively more easily seen. Thus, one not infrequently detects a brighter and whiter patch at or near the north cusp in both morning and evening elongations. The southern hemisphere is often more shaded than the northern; and in evening elongations the terminator is occasionally seen to be notched with one or more dark indentations, a particularly obvious one being situated a little north of mid-terminator and another just south of the bright area at the north cusp. These markings are not generally visible at the same time. One or the other may be fairly well seen; or the disc may be practically featureless for considerable periods, even in conditions of good seeing. More rarely, other and fainter streaks and condensations of shading may be observed, mostly in the southern half of the disc.

Even the easiest of the markings is of considerable difficulty and requires for visibility, an eye capable of distinguishing faint nuances of shade and great acuity of vision, the prerequisite in all cases being clear and steady air with good telescopic defination.

If these lines induce in someone living in more favored climes a desire to study this shy and elusive planet, they will not have been written in vain. Sooner or later the observer is sure to obtain a good view, seeing a little detail, which success will compensate him for all past failures, and, it is hoped, set him on the road to becoming a regular observer of the planet nearest the Sun.

WITH THE PLANETS

The Red Spot Hollow on Jupiter still preserves the aspect familiar since late March, 1947, that of a large oval white area in the South Tropical Zone somewhat brighter than that zone on either side of it. Central meridian transits by Haas between July 28 and August 7, inclusive gave these longitudes in System II : preceding end (left in simply inverted view) at 217° (2 transits), center at 227° (3transits) and following end at 237° (4 transits). E. K. White, from transits between July 9 and August 14, inclusive, has obtained these results: preceding end at 226° (3 transits) center at 234° (3 transits), and following end at 243° (5transits). The gross difference between White and Haas presumably indicates a large "personal equation" on the part of one or both of them in timing transits.

The Hollow will be close to the center of the disc near the following P.M.,E.S.T., times: 8:15 on September 9, 7:30 on September 14, 9:00 on September 16, 10:45 on September 18, 10:00 on September 23, and 7:30 on September 26. One should subtract one hour from these times to get C.S.T., two hours to get M.S.T., and three hours to get P.S.T. The use of the rotation-period of about 9 hours, 55 mins. will readily give other times when the Hollow is favorably placed.

The Disturbance so prominent during the early months of 1947 is now gone. Haas last saw it on July 7, when it was reduced to a tiny hump on the north edge of the South Temperate Belt; and Reese writes that he last observed it on July 10. The following end of a conspicuous section of the South Temperate Belt, noted on page 6 of the August issue, continued to move in decreasing longitude II and was near 254° , according to Haas, by August first. Reese reports that he continued to follow the South Tropical Zone white "cloud", which he had observed to drift past the Disturbance in early June, and that he placed the "cloud" at longitude II 263° on July 24. Haas obtained 260° on July 31 for a bright area that indented the north edge of the South Temperate Belt.

E. J. Reese has sent us the following note: "During the last two apparitions (1945-6 and 1946-7) Jupiter's South Temperate Zone has contained three brighter sections which have been very durable. Extrapolations of the 1945-6 drifts of the preceding and following ends of these sections coincide very nicely with 1946-7 drifts. (Jupiter was too near the Sun to be observed for several months in the autumn of 1946.) The longest drift extends from February 17, 1946 at longitude II 256° (Haas) to July 26, 1947, at longitude II 176°. These terminal positions give a drift of $-25\overset{\circ}{.}2$ in 30 days. The mean of all six drifts is about $-25\overset{\circ}{.}5$. In 1947 only the mean drift has been $-25\overset{\circ}{.}3$."

Mars is still remote; the angular diameter reached five seconds of arc on August 24 and will not attain six seconds until October 13. Haas found the south cap small and perhaps brilliant in late July and up to August 2. On August 7 it was invisible on which date White also could not see a south cap; then from August 9 to 14 it was larger than up to August 2 but variable in size and brightness. The north cap between mid-July and mid-August was usually unnotable and frequently was invisible.

It appears reasonable to suppose that after August 2 the remnant of the melted south cap was concealed by a changeable overlying cloud-cap and that the north cap mentioned above was atmospheric rather than on the surface. On August 2 the areocentric longitude of the Sun, quantity ☉♂ of the Nautical Almanac, was 324°. This quantity is so selected as to be 0° at the vernal equinox of the northern hemisphere. The season on Mars on August 2 thus corresponds to mid-February on the Earth--late winter in the northern hemisphere and late summer in the southern. Incidentally, the seasonal phenomena of the Martian polar caps are by no means the same in different apparitions.

In 1941 a tiny and brilliant surficial south cap was last seen at $\odot$ 327°, but in 1943 the last view came at $\odot$ 290°.

A. W. Mount has told us orally of his observations of the daylight occultation of Jupiter by the Moon on June 28. He used an 8-inch reflector in Fort Worth, Texas and had a much clearer sky than did Observer Schmidt in Chloride, New Mexico (pgs. 7-8 of August issue). Mr. Mount tells us that he failed to see any unusual appearance at either immersion or emersion. Soon after emersion, he did note that the brightness of the disc of Jupiter fell off greatly toward it's edge. Such is indeed the true state of affairs, but it usually passes unobserved.

It is often stated that Uranus reveals no detail except in the largest telescopes. This assertion is as false as many others perpetuated by writers with no firsthand knowledge of lunar and planetary observing. The editor examined Uranus on the mornings of August 2 and 7 with a 6-inch reflector in poor seeing. He repeatedly glimpsed a brilliant white cap on the southwest limb (west as in terrestrial sky and not with regard to sense of Uranian rotation) and a notably dark band bordering the cap. F. R. Vaughn in 1940 -2 several times recorded, with 7 anc 8-inch reflectors, a broad white zone across the middle of the disc with parallel dark belts at its edges. It is perfectly true, of course, that a large telescope is a great advantage on Uranus.

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ACKNOWLEDGEMENTS

We thank Popular Astronomy for their note about The Strolling Astronomer in their August issue.

E. J. Reese, H. M. Johnson and E. K. White have submitted very helpful observational reports on Jupiter. Most of their data are C.M. transits of the sort described in our May issue, but White has also included a full-disc drawing. Reese and White have further submitted some notes on Saturn and Mars respectively.

A. F. O'D Alexander has contributed long series of measures of the size of the north cap of Mars in 1945-6. He measured his original drawings. His values will help greatly in studying the seasonal spring melting of the cap during that apparition. We should be happy to receive similar measures from other 1945-6 observers.

We had the pleasure of a visit from A. W. Mount of Fort Worth, Texas, when he was passing through Albuquerque early in August. Mr. Mount and his son were seeing points of interest in New Mexico and Arizona. Our friend's telescope is an 8-inch reflector.

A few evenings later we had the good fortune of seeing Clyde W. Tombaugh, the discoverer of Pluto, while he was briefly in Albuquerque. Mr. Tombaugh is now engaged in ballistics research at the White Sands Proving Ground in New Mexico. He has erected his 12-inch reflector in Las Cruces, N. Mex., and tells us that he plans to make some drawings of Mars as it approaches its 1948 opposition.

Fred Garland, Leo Scanlan, Norb Schell and Walter Haas had a pleasant get-together in Pittsburgh, Penna., on August 15. It is really surprising how much more pleasant astronomical acquaintances make travelling.

Dr. E. M. Brooks, Assistant Professor of Geophysics at Saint Louis University, directs attention to the fact that near 4 P.M., M.S.T., on November 5, 1947, Mercury will be only about a minute of arc from the limb of the Sun. Several lines of evidence suggest that Mercury has a tenuous atmosphere, a matter discussed in the two references mentioned on page 1. Dr. Brooks ingeniously points out that such an atmosphere might give rise to visible refracted sunlight at the edge of Mercury on November 5. He suggests that a few special instruments, such as the Climax, Colorado, coronograph might be able to attempt this difficult observation on the brilliant sky very near the limb of the Sun.

SEARCHING FOR LUNAR METEORS

By *Walter H. Haas*

In the August number of *The Strolling Astronomer* I pointed out how the Perseid epoch was a good time to search for possible lunar meteoritic phenomena, either the impact-flares to be expected if the Moon quite lacks an atmosphere or the luminous meteor-trails that should be produced if it still retains a tenuous one. It appeared only proper to seize this opportunity, even though the skies of Albuquerque during the critical period were not as excellent as the Chamber of Commerce claims. In the table of my results below, the third column gives the estimated stellar magnitude of the faintest flash or moving luminous speck that could have been observed. The fourth column is the area in square miles of the lunar region watched. The region observed was in all cases near the north limb and on the non-sunlit part of the Moon.

Date	No. Minutes Observing	Limiting Magnitude	Area	Results
August 9	88	8	400,000	None
" 10	77	8	700,000	1 moving speck
" 11	140	9	700,000	None
" 14	30	10	2,000,000	None

The moving luminous speck of August 10 was remarked at 4:11 A.M., M.S.T., in fairly good seeing. It was distinctly visible and, with an estimated magnitude of 6, was by no means at the limit of vision. It lay near longitude 0° and latitude +75° on the lunar surface. The length of the path on the Moon's surface was 25 to 30 miles, and it traversed this path in $1^s.5$ to $2^s.0$. The lunar direction of motion was toward north of west. The angular diameter was at most one second of arc and perhaps much less. The speck appeared yellow in color.

If this speck was actually a meteor luminous in a residual lunar atmosphere, then a stellar magnitude of 6 at the distance of the Moon would correspond to one of -11 at a distance of 100 miles, a value not unlike those for the brighter terrestrial fireballs. The estimated path-length and duration lead to a velocity along the projected path upon the surface of the Moon of 12.5 to 20 miles per second. The heliocentric velocity just outside the lunar atmosphere is undeterminable from available data. The lunar position and direction of motion of the speck appear to preclude its being a lunar Perseid meteor.

I should again like to recommend as a worthwhile observational project, the systematic examination of the lunar surface for unusual bright spots of any kind. It is best to look on the earthlit portions when the Moon is a thin crescent. A large aperture, a very clear sky, and a power low enough to permit a wide field of view (excluding the sunlit region of course) are all desirable in this project.

MISCELLANEOUS

D. W. Rosebrugh and E. J. Reese have submitted correct solutions of the mathematical puzzle on page 5 of the August number. It is allright down to the line:

$$(4 - 9/2)^2 = (5 - 9/2)^2.$$

However, the next line should read:

$$4 - 9/2 = \pm (5 - 9/2).$$

The inadmissible neglect of the negative sign led to the absurd conclusion.

* * * * * * * * * * *

It is usually loosely stated that the superior planets beyond the orbit of Mars reveal no phase. Actually, however, it is not difficult near quadrature to distinguish that the limb of Jupiter is brighter than it's terminator. An 8-inch telescope is ample to show this aspect. With an 15-inch refractor at 400 X, the editor has seen the phase-cusps themselves, the outline of Jupiter being deformed from perfect ellipticity much as that of the Moon is from perfect circularity just short of the full phase. The phase of Saturn is also visible near qradrature in that the limb is brighter than the terminator. W. W. Leight has remarked this effect with only 6 inches of aperture. The editor knows of no detections of the phase of Uranus or Neptune.

The serious lunar and planetary observer can hardly get along without The American Ephemeris and Nautical Almanac. This volume is compiled each year by the Naval Observatory and can be purchased from the Superintendent of Documents, Washington, D. C. It contains, among many other things, the positions of the Moon and the planets, the longitudes of the central meridian of Mars and Jupiter, the phase-angles of Mercury and Venus, the times of the phenomena of the Galilean satellites of Jupiter, and the saturnicentric positions of the Earth and the Sun. It is not too early to order your 1948 volume. The price of the 1947 one was $2.00.

Remember, the primary purpose of The Strolling Astronomer is to further observation of the Moon and the planets. Use your telescope on these fascinating objects, and send us your observations. They are always welcome.

How small a telescope can do useful lunar and planetary work? The editor has usually accepted the conventional limits of a 4-inch refractor or a 6-inch reflector. However, E. J. Reese has made really beautiful drawings with a 6-inch reflector; and the editor with a 6-inch refledtor, and T. R. Hake with a 5-inch refractor, have observed as difficult a feature as Encke's Division in Saturn's rings. Of Course, much depends upon the optical quality of the individual telescope. It appears possible that a first-class 3-inch refractor or 5-inch reflector might be capable of useful lunar and planetary studies. However, the editor should perhaps try to avoid a possible misunderstanding on the part of the reader. He is not championing small telescopes as opposed to large ones but instead is strongly of the opinion that our favorite celestial bodies should be examined with as much aperture as obtainable. Miss A. J. Hoth, Port Sydney, Ontario, Canada wants to invest about $100 in as large and as good a telescope as can be obtained for that sum. She plans a program of regular observations with it and will welcome helpful information from anyone.

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