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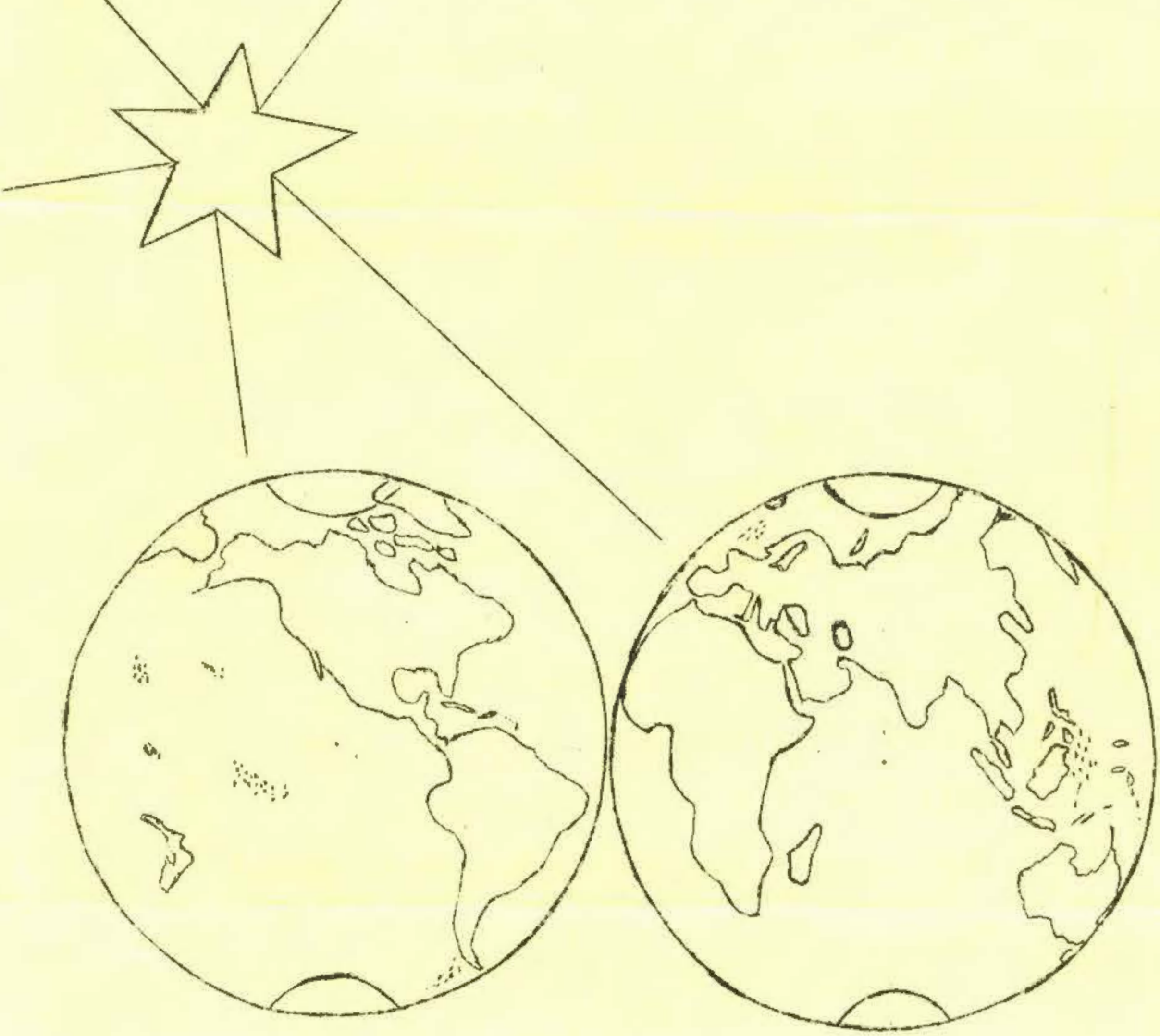
THE STROLLING ASTRONOMER

(Association of Lunar and Planetary Observers)



MAILING ADDRESS

THE STROLLING ASTRONOMER
Institute of Meteoritics
University of New Mexico
Albuquerque, N. M.

"THE 'ROLLING' ASTRONOMER"

An astronomer, drunken or not,
Is wont to look at the stars,
And in scanning the sky, this sot
May see Venus playing leapfrog with Mars.

In surprise he may focus the lens,
Again to spy the planets at play.
Egad! He's knocked clear off his pins,
Arcturus is bottling milk from "the Way".

Our hero is now thoroughly vexed,
Mercury's rising due west in the dawn.
This never was "writ" in a text,
Stay sober - so conclusions may be drawn!

BY
Johnny Telescope

INTRODUCTION

We are glad to present the following contribution to a problem of much observational importance (on instruments) by subscriber E. K. White.

Living in southeastern British Columbia away from astronomical societies and almost without contacts with other amateurs, King White is a striking example of what energy, enthusiasm, and perseverance can accomplish. He has ground two 9-inch mirrors in recent years, and these have been pronounced excellent by persons very competent to judge. He has observed Saturn intensively and has seen several little-known delicate features there (e. g., a bright annulus at the inner edge of Ring A and a dusky shading near the inner edge of Ring B), apparently about as well with a 9-inch telescope as the editor has done with an 18-inch telescope. In fact, Mr. White preceded the editor in the "discovery" of a black gap between Rings B and C. He recently built a dome for his telescope and surely now has one of the best private observatories in Canada.

We congratulate our member on the advent of Mr. Terry White on March 20. We are sure that Moon and Saturn will be among the first words in the young gentleman's vocabulary.

Address: E. K. White, Chapman Camp, B.C., Canada.

In connection with the subject of White's article it appears suitable to report some experiments carried out in 1942 by reader C. F. Gramm, then a foreman with Bausch and Lomb. With a 90X 4-inch aperture spectrometer he interposed circular obstructions of varying sizes in the parallel light rays between the collimator and the telescope. Even when the diameter of the obstruction was only 1/8 the aperture, the diffraction effects were still considerable. With the usually relatively larger secondaries in most existing reflectors, they must surely be serious.

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Small Secondaries for Newtonians

by E. K. White

Various formulas are offered for the computation of minimum size of the secondary mirror to be used with the Newtonian Reflector. All are based upon the field lens aperture or, more exactly, upon the diaphragm opening of the lowest powered ocular to be employed. In most cases with usual F:8 mirrors the size of the secondary works out to be about 1/4 to 1/6 the diameter of the primary. This size does not cut off much light but will produce pronounced diffraction effects on images of bright stars or planets.

For those interested in double star work, or planetary and lunar investigations, it is well worth while to use a smaller secondary, say 1/8 to 1/10 the diameter of the primary mirror.

The average power used in the above-mentioned studies is often near 200X. The diaphragm opening in an eyepiece that will give 200X is near 3/8 to 1/4 inch. The actual diameter of an image at the focal plane of the field of view is not over 1 mm. in ordinary amateur reflectors.

Let us trace the reflected rays from the primary on paper or use threads fastened to the floor by pins. When the actual position of the secondary is found, we shall see that it does not need to be very large to catch all the rays that converge to form a 1 mm. image. If we add a little for safety, and make our image say 1/8 inch, the secondary may still be quite small, yet all of this cone of reflected light will easily enter the diaphragm of our higher powered oculars.

To state my own experience, the primary is nine inches in aperture and 100 inches in focal length. I use an elliptic flat with its minor axis equal to one inch and located eight inches inside the focal plane of the primary. A drawing showed that this flat would intercept all the light in a cone forming an image 1/4 inch in diameter at the focal plane. This image represents an area on the Moon about seven minutes of arc in diameter.

The diffraction effects of this flat were much less than were formerly experienced with a flat of $1\frac{1}{2}$ inches minor axis. There appears to be no noticeable light loss even with a Kellner ocular having a diaphragm opening of $1\frac{1}{4}$". To check, a mask eight inches in aperture was placed over the open tube-end while observing the well known Chi Persei cluster. When the effective aperture of nine inches was reduced to eight inches by the mask, a definite light reduction of the star field was seen. I hence concluded that the one inch flat caught most of the useful reflected rays of even a large star field.

Image quality is definitely improved with the small flat, bright stars are sharper, and there is little more to be desired with planet and lunar images if seeing is good. I have seen the fifth and sixth stars in the Theta Orionis Trapezium using the 1" flat quite as well as with the $1\frac{1}{2}$" flat. The sixth star is about the lower limit of magnitude my nine-inch will reveal.

Both flats were polished by F. B. Ferson. They are flat to 1/10 wave, and they are aluminized.

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PLANETARY QUIZ

(See Page 4 for Answers)

1. Is it possible for a planet both to rise before the sun and to set after it?
2. Could a person weighing 150 pounds on the earth weigh less than 150 pounds on a planet larger than the earth?
3. Was Galileo the first person to see the moons of Jupiter in a telescope?

The Adaptation of the Reflecting Telescope to Lunar & Planetary Work

By FRANK R. VAUGHN

(Concluded from May Issue)

The Newtonian secondary, or diagonal, is a portion of the optical train of the reflector which has received little serious attention, due chiefly, I think, to the loose treatment given it in A.T.M., in which it is repeatedly stated that a piece of "good" commercial plate glass cut to shape is adequate. Although such pieces (especially if cut from a large sheet of polished plate) may be found of sufficient flatness (frequently, however, testing of such pieces is cursory), they have a poor surface quality and will inevitably scatter light. One cannot always be sure of obtaining an optically polished diagonal, even from professional firms (at least this was true some years ago) despite glowing claims. Unless the diagonal is polished by the telescope owner himself, probably the only way to secure a good diagonal is to specify to a reputable firm just what is wanted, viz. a pitch-polished diagonal of as small a size as is feasible (as indicated by geometric computation) and plane to within $\frac{1}{2}$ to $\frac{1}{4}$ wavelength.

The problem of diagonal size, while dealt with in a mathematically correct manner in A.T.M., is somewhat more of a problem than mere field coverage; in planetary and lunar work the size should be kept to an absolute minimum, even to the point of allowing very little extra size for off-axis rays. Mr. E. K. White has verified in a letter to me that on his 9-inch reflector of 100-inches f.l., a diagonal of 1-inch minor axis is superior to larger ones he formerly used, and the apparent light-loss away from the center of the field is negligible. (Note: See Mr. White's article on this problem on Page 1 of this issue - Editor.) In fine work we are, of course, primarily interested in axial rays (center of field). Scattered light, due to the use of too large a diagonal, is serious even with small apertures and serves to reduce delicate contrasts of tone on planets or the Moon.

Supports for the diagonal mirror are frequently of heroic dimensions. Diffraction rays from bright stars (but also, it must be remembered, from Martian canals, delicate Saturnian ring divisions, minute lunar cracks and craters, and indeed from all objects) are not pretty to see when one imagines the effect on things he is trying to view. I should like to recommend the use of thin strips of metal at right angles to each other, displaced along the tube axis by a few inches, and drawn tightly. With such an arrangement obnoxious diffraction effects are held to a minimum, while a strong support derives from the tautness of the strips and from their axial displacement.

Eyepieces, while not so important as the foregoing, nevertheless deserve a little thought. When it is considered that the ocular acts as a local magnifier of a perhaps nearly perfect image formed by the primary and secondary mirrors, it would seem a great shame here to introduce gross errors. Eyepieces of short focus do not, in general, possess serious faults for axial rays; that is, there is little choice between a Huyghenian and a Ramsden, say both of $\frac{1}{4}$-inch f.l. One should only be sure that his eyepieces are carefully made (well polished, perfectly centered, and of solid construction).

Probably most reflectors are provided with metal tubes--a singularly unfortunate practice. Moreover, many seem to have been purposely constructed of as small a diameter as possible (as though the maker were fighting against having an extra few inches of tube diameter). It has been well verified by good observers that the most serious tube currents tend to "hug" the sides of the enclosure and that a material improvement is effected by having the tube at least three inches larger in inside diameter than the primary mirror. If the telescope owner is already plagued with a metal tube and hesitates to make another one, lining the inside with some insulating material is one method which some have found effective (see A.T.M.). Although results have not been altogether harmonious, it seems to have been the experience of many observers that a small fan blowing air through a door near the mirror is effective in dispelling tube currents. I have had good luck with this method when "seeing" has been consistently poor otherwise, though I usually find it unnecessary.

Whether the tube should be entirely closed (as I have found best), wholly open (latticework), or a combination of the two, is possibly a matter dependent upon climate and personal taste, though it might be pointed out that a large temperature gradient between the observer and the night air may give rise to serious convection currents. In any case, the closed tube should be considerably longer than necessary, possibly a good foot or more beyond the eyepiece.

Limited space has prevented extension of the above points, as well as giving some of the reasons underlying a particular "stand"; and I should welcome correspondence on any of the material. Address: 1368 East 53rd Street, Chicago, Illinois.

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ANSWERS - PLANETARY QUIZ

(See Page 2 for Questions)

1. Very possible. The planet need merely be far enough north of the sun (in northern latitudes) when near enough to conjunction in right ascension.
2. Yes, if that planet's density were sufficiently less than the earth's density.
3. No. Simon Marius preceded him.

OBSERVATIONAL CHIT-CHAT

H. P. Wilkins writes that he quite independently observed the dark streak across the ball of Saturn just north of the rings, a feature mentioned in the March and April Issues of THE STROLLING ASTRONOMER. During recent weeks the editor has seen this feature poorly in mediocre early evening seeing. E. K. White has not seen this object, and E. J. Reese has only suspected it. We request our readers to watch for this curious and apparently controversial streak when Saturn is again favorably placed in the sky.

During the first 25 days of May the Red Spot Hollow on Jupiter has continued to exist as a slightly brighter oval area in the South Tropical Zone (see page 8 of May Issue for nomenclature). As usual, the south component of the South Equatorial Belt is deflected northward where adjacent to the Hollow; and, also as usual, this belt is here lighter than either preceding or following the Hollow. Transits by the editor during the first 25 days of May give these average longitudes (II): preceding end at 209° (5 transits), center at 222° (6 transits), and following end at 233° (7 transits). Near each terminal end of the Hollow is a hump on the north edge of the South Temperate Belt; these presumably mark the ends of a Red Spot otherwise invisible to the editor but sometimes drawn as a faint shading by E. J. Reese. The longitude of the Hollow is constant in System II or nearly so.

We list some more sample longitudes (II) of points in the South Tropical Disturbance on Jupiter:

Date (U.T.)	S prec. Corner	N prec. Corner	N fol. Corner	S fol. Corner
May 2	304°	309°	316°	316°
May 12	300	306	313	313
May 19	302	310	312	308
May 24	299	(N tip at 313)		306

It will be noted that the Disturbance has continued to shorten because of the continuing differing motion of its preceding and following ends. By the middle of May it was little more than a large hump on the north edge of the South Temperate Belt. However, the south component of the South Equatorial Belt is still very dark following the Disturbance.

With more hopefulness than sense, the editor examined Mars on the mornings of May 17 and 24. These first views of the 1947-8 apparition were naturally poor - low altitude, bright sky, and small diameter. Nevertheless, marks drawn could later be identified on a map of Mars. The south polar cap was seen on both dates, but it was less bright on the later one. The north polar cap was dull and indefinite. The season on Mars is a little after the summer solstice of the southern hemisphere.

A.F.O'D. Alexander has communicated a summary of his analysis of recent central meridian transits of dark marks at the north edge of the South Equatorial Belt (the main belt) on Saturn. The observers are Dr. Alexander, Mr. W. E. Fox in England, and the editor. Dr. Alexander finds that the observations appear to accord very well with a rotation-period of 10 hours,14 minutes.

Little study has been given to the latitudes of the Saturnian belts and possible variations therein. We are happy to report that the members of The Association of Lunar and Planetary Observers did something on this problem in 1946-7, and we hope that they will do still more in the future. The latitudes in the table below are <u>saturnigraphic</u> latitudes, computed by formulas which allow for the oblateness of the planet; the negative signs mean that they are south. Column (1) below is for the period 1943-6 and is based on measures of drawings by E. K. White, A. W. Mount, C. F. Gramm, E. J. Reese, and the editor. Column (2) summarizes the measures by A.F.O'D.Alexander of 12 of his drawings in 1946-7 between December 28 and March 6, inclusive. Column (3) does the same for 32 drawings by E. J. Reese in 1946-7 between October 25 and April 27, inclusive. Column (4) is for four drawings during that apparition by the editor, the first on October 26 and the last on March 25.

	(1)	(2)	(3)	(4)
Center Equatorial Band	-8°			0°
North Edge South Equatorial Belt	-14	-9°5	-10°	-15
South Edge South Equatorial Belt	-32	-30	-31	-30
Center South Temperate Belt	-37			
Center a Narrow Zone			-46	
North Edge South Polar Belt	-72	-66	-62	-67
South Edge South Polar Belt	-80	-77	-72	-73
North Edge South Polar Cap			-82	-79

The agreement between the three different observers in 1946-7 is fairly good, in the editor's opinion. There is evidence in the work of all three that the north edge of the S.E.B. shifted farther north by some degrees in January.

Walter H. Haas

WALTER H. HAAS, Editor.

COSMIC WALL-PAPER?

Among the members of The Association of Lunar and Planetary Observers is Mr. John J. O'Neill, the Science Editor of The New York Herald-Tribune. We quote part of a letter from him dated May 5:

"Mount Wilson Observatory about 20 years ago got out a beautiful enlargement of one of their shots of the full moon. The disk was about five feet in diameter. Very few copies were issued. Do you think it would be possible to interest enough observers to get a batch of orders together that would encourage the Mount Wilson folks to repeat the stunt with a reasonable charge?"

The editor requests all interested readers to write to him on this subject and to be sure to state the maximum amount that they are willing to pay for one such enlargement. A charge below ten dollars for each reproduction appears rather unlikely.

The price will naturally depend upon the demand.

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ACKNOWLEDGMENTS

Observations of Mars in 1943-4 and/or 1945-6 have been submitted by L. J. Wilson, A. W. Mount, T. R. Hake, and D. W. Rosebrugh. Mr. Rosebrugh has submitted some drawings by H. Harris as well as his own.

An excellent and comprehensive set of observations of Saturn during its 1946-7 apparition has been received from E. J. Reese.

H. P. Wilkins, 127 Eversley Avenue, Barnehurst, Kent, England has submitted a number of lunar drawings and also some tracings from rare old lunar maps. We urge all serious lunar students among our readers to contact Mr. Wilkins, the Lunar Director of the British Astronomical Association, and to obtain a copy of his map of the Moon in 25 sections, easily the best lunar map ever constructed.

We thank The Observer, published by the Yakima Amateur Astronomers, for their mention of The Strolling Astronomer in their June issue. The Observer is a four-page printed pamphlet issued monthly at a cost of one dollar per year for associate members (two dollars for active members). The editor is Edward J. Newman, 324 West Yakima Avenue, Yakima, Washington. A regular feature is an article by James Stokeley on current sky-events.

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REGARDING SUBSCRIPTIONS

All future subscriptions to THE STROLLING ASTRONOMER must, of necessity and until further notice, begin with the May Issue, since our reserve supply of March and April issues is exhausted.

If the demand for these back issues is sufficient, the staff of THE STROLLING ASTRONOMER will be able to get out a second printing for 25 cents a copy. If you wish to complete your file so that it starts with the first issue, send in your request to the mailing address on the cover. When the demand is sufficient to justify a reprinting, you will receive your request and will be billed for it.

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