The ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

The Strolling Astronomer

VOLUME 9, NUMBERS 7 AND 8 JULY-AUGUST, 1955

In This Issue

THE STROLLING ASTRONOMER
1203 North Alameda Street
Las Cruces, New Mexico

The Strolling Astronomer

SUBSCRIPTION RATES

1 issue (in stock) - - -	$0.35
Double Issue (in stock) - - -	0.70
6 Months - - - - - -	1.75
1 Year - - - - - - -	3.00
2 Years - - - - - -	5.00

ADVERTISING RATES

Full Page Display Ad	$40.00
Half Page Display Ad	22.50
Quarter Page Display Ad	15.00
Classified or Listing (per column inch)	4.00

Inside Front Cover, Outside Back Cover, Inside Back Cover, First Page,—other.

(PRICES ON REQUEST)

Discount of 10% on 3-time insertion.

"All ads must be in our hands by 15th of month to insure insertion in next publication."

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.

ANNOUNCEMENTS

The Best of the Season. It is extremely probable that this belated issue of The Strolling Astronomer is the last one which will reach our readers before Christmas. Therefore, we should like at this time to send each and every one of our members and friends our best wishes for a very merry Christmas and a most happy and prosperous New Year. May the holidays be full of joy for you, and may 1956 bring you many good things! We shall on our part make at least one New Year's Resolution, to try to get the mailing of The Strolling Astronomer back on schedule.

Uranus Project. Mr. Leonard B. Abbey, Jr., 822 S. McDonough, Decatur, Georgia, invites all persons interested in observing Uranus to correspond with him. The study of markings on the small disc is best pursued with large telescopes and good seeing; and yet Mr. Abbey and Mr. O. C. Ranck of Milton, Penna. have made several independent, surprisingly concordant, simultaneous observations. Perhaps, then, a really systematic study of Uranus by a group of energetic amateurs willing and able to observe this remote planet regularly might tell us more than have many years of casual and irregular observations. Abbey and Ranck have worked up for distribution tables of Western Meridian Transit values for Uranus during its 1955-56 apparition. These correspond somewhat to the central meridian longitude tables for Mars and Jupiter and assume that Uranus rotates in 10 hrs., 45 mins. Instead of estimating when a Uranian feature is on the central meridian of longitude, however, the observer estimates when it is due west of the center of the disc, west here being a direction in the terrestrial sky. The reason for this choice is that it is relatively easy to determine the east-west direction from the drift of the planet across the field of view of an undriven telescope. Several imperfections of Western Meridian Transit longitudes may occur to the advanced amateur, but we think that they may still be helpful in the present very elementary stage of visual studies of the rotation of Uranus.

A Lunar Globe Model. Mr. Frank W. Manning, 4321 Perrier St., New Orleans 15, Louisiana is offering a "moonball" about six inches in diameter. The chief formations on the visible hemisphere are charted, and it should be instructive to be reminded that the apparently oval Plato and Tycho are really circular formations. On the unknown hemisphere there is given miscellaneous information about the size of the moon, its orbit, the maximum heights and depths of lunar features, the velocity of escape on the moon, etc. There is no attempt at great accuracy in the charting, Tycho having about twice the diameter of Copernicus for example; but probably the accuracy attained is sufficient for its purpose. Suggested improvements in possible future versions of Manning's "moonball" might include a systematic method of showing all maria as shaded and meridians of lunar longitude and parallels of lunar latitude (the former largely determining what formations are on the terminator at a given colongitude).

Flying Saucer Review. Such is the title of a British periodical on "unidentified flying objects". Persons living in the United States may subscribe by sending $3.50 to Mr. Bruce Lansbury, Box 3B, 55 W. 92nd St., New York 25, New York. The magazine evidently considers "saucers" to be much more than illusions or natural phenomena; the Editor is Mr. Derek Dempster, a former R.A.F. pilot.

MARS, 1954 - REPORT NUMBER 2, PART 1

by D. P. Avigliano

This report is based on A.L.P.O. observations covering the opposition and near-opposition period of the 1954 apparition of Mars. The period covered by this report is from June 18, 1954 to July 27, 1954. In addition to the observers listed in the previous Report No. 1 (Strolling Astronomer, Vol. 8, Numbers 7 and 8; Vol. 8, Numbers 9 and 10) the following observers have now sent in drawings and/or reports:

Observer	Instruments	Stations
Mr. Leonard B. Abbey, Jr.	6-inch refl.	Decatur, Georgia
Mr. Howard G. Allen	6-inch refl.	Coatesville, Penn.
Mr. Romulo Argentiere	10-inch refl.	Sao Paulo, Brazil
Mr. W. F. Barber, Jr.	6 & 12½-inch refls.	Atlanta, Georgia
Mr. D. P. Barcroft	10-inch refl.	Madera, California
Dr. James C. Bartlett, Jr.	3½ & 5-inch refls.	Baltimore, Maryland
Mr. Richard M. Baum	4½-inch refr.	Chester, England
Mr. Rex Bohannon	6-inch refr.	La Crescenta, Calif.
Mr. Phillip W. Budine	3½-inch refl.	Binghamton, N.Y.
Mr. Tomas P. Bun	10-inch refl.	Sao Paulo, Brazil
Mr. Ricardo G. Casal	5½-inch refl.	Barcelona, Spain
Mr. Rorry Coker	3½-inch refl.	Athens, Georgia
Mr. Javier S. Conde	3-inch refr.	Barcelona, Spain
Mr. Charles M. Cyrus	10-inch refl.	Baltimore, Maryland
Mr. Rubens De Azevedo	10-inch refl.	Sao Paulo, Brazil
Mr. Herb Doughty	3½-inch refl.	Lima, Ohio
Mr. Jack Eastman	6-inch refl.	Manhattan Beach, Calif.
Mr. S. Ebisawa	8-inch refr.	Tokyo, Japan
Mr. Eugene Epstein	10-inch refl.	Pasadena, Calif.
Mr. Brownie Flowers	5-inch refr. & 6 & 12-inch refls.	Atlanta, Georgia
Mr. J. A. Frew	6-inch refl.	Dunedin, New Zealand
Mr. Edwin J. Gilmore, Jr.	6-inch refl.	Allentown, Penn.
Mr. Robert Gomien	12½-inch refl.	St. Louis, Mo.
Mr. Jose C. Gual	4½-inch refr.	Barcelona, Spain
Mr. Walter H. Haas	12½-inch refl.	Las Cruces, N.M.
Mr. W. D. Heintz	9-inch refr.	Canberra, Australia
Mr. C. H. Holton	5-inch refr. & 16-inch refl.	Atlanta, Georgia
Mr. A. P. Lenham	3¼-inch refr. & 6-inch refl.	Swindon, Wilts, England
Mr. Philip R. Lichtman	4⅞-inch refr. (photographs)	Washington, D.C.
Mr. Eugene A. Lizotte	6-inch refl.	L.I. City, N. Y.
Dr. W. L. Minear	12½-inch refl. & 24-inch refr.	Hot Springs, N. M.
Mr. A. C. Montague	4½-inch refl.	Oak Park, Ill.
Mr. Francisco X. Montanya	6-inch refl.	Madrid, Spain
Mr. A. W. Mount	8-inch refl.	Fort Worth, Texas
Mr. A. Neckar	13-inch refr.	Czechoslovakia
Mr. Jean Nicolini	10-inch refl.	Sao Paulo, Brazil
Mr. Toshihiko Osawa	6-inch refl.	Osaka, Japan
Mr. Edgar M. Paulton	6-inch refl.	Brooklyn, N.Y.
Mr. Ramon C. Porta	3-inch refr.	Palma De Mallorca, Spain
Mr. David W. Rosebrugh	6-inch refl. & 6-inch refr.	Meriden, Conn.
Mr. Milton Rosenkotter	10-inch refl. and 36-inch refr.*	Pierce, Nebr. and Mt. Hamilton, Calif.
Mr. Manuel Serinanel	8½-inch refl.	Barcelona, Spain
Mr. H. T. Sherman	6-inch refl.	St. Paul, Minn.
Mr. J. Russell Smith	8-inch refl.	Eagle Pass, Texas
Mr. Pavel Sommer	13-inch refr.	Czechoslovakia
Mr. Henry P. Squyres	6, 8 & 24-inch** refls.	El Monte and Mt. Wilson, Calif.
Mr. Barry Stern	3½-inch refl.	St. Petersburg, Fla.
Mr. A. J. Symonds	12-inch refl.	Dunedin, N.Z.
Mr. Juan P. Tort	9-inch refl.	San Celoni, Spain
Mr. S. C. Venter	12-inch refl.	Pretoria, South Africa
Mr. Orlando Zambardino	10-inch refl.	Sao Paulo, Brazil

The following observers, who were listed in Report No. 1, used the following instruments in addition to those listed in Report 1:

Mr. D. P. Avigliano	10-inch refl & 6 *** & 12-inch refrs.***	Sierra Madre, Mt. Wilson & Los Angeles, Calif.

Mr. Charles F. Capen, Jr.	6, 7 & 12-inch refrs. & 5 & 7-inch refls.	Flagstaff, Ariz. and Springfield, Ill.
Mr. Thomas R. Cave, Jr.	15½ ***** & 40-inch refrs.******	Washburn and Yerkes Observatories
Mr. Thomas A. Cragg	12½-inch refl. and 12-inch refr.*****	Inglewood and Los Angeles, Calif.
Mr. Owen C. Ranck	4-inch refr.	Milton, Penn.
Mr. C. W. Tombaugh	8-inch off axis refl.	Las Cruces, N.M.

* 36-inch refr. of the Lick Observatory
** 24-inch Snow Telescope of the Mt. Wilson Observatory
*** 6-inch refr. of the Mt. Wilson Observatory
**** 12-inch refr. of the Griffith Observatory
***** 15½-inch refr. of the Washburn Observatory
****** 40-inch refr. of the Yerkes Observatory.

During this period the diameter of Mars varied from 21".09 on June 18 to 21".88 on July 2, after this time decreasing to approximately 20" on July 27. The areocentric longitude of the sun or L.S. increased from about 180°.5 to 203°.5 so that during the period of this report the S. hemisphere of Mars went through its early spring while the N. hemisphere went through its early autumn. We will discuss in this first part of Report 2 the general appearances of the various main features of the planet as seen by several of our observers. The A. L.P.O. 1954 map of Mars will help in following the discussion.

GENERAL C.M. 345°. Figure 1, a drawing by D. P. Avigliano, shows Mars with its C.M. at 345°. In this drawing, which was made under rather good seeing, we should note the dark arm of the Sabaeus Sinus, now starting to break up into detail. This feature was still one of the three darkest large areas on Mars, the other two being the N. portion of the Syrtis Major and the Trivium Charontis-Cerberus I combination. The increasing prominence of the canal detail in the N. desert regions should also be noted. Here is shown one of the rare appearances, noted by a very few of our observers this year, of the two canals, the Djihoun and the Oxus, in the same view. The Pandorae Fretum could not be detected at this observation running its full length although its full appearance had been detected on other occasions as a faint feature. Most of our observers showed the Pandorae Fretum as faint. The so-called Hellespontus flow can be seen on the drawing starting from the melt-band around the S. polar cap. Many of the observers showed the desert regions of Nymphaeum, the S. portion of Aeria (just to the N. of the Sabaeus Sinus), Edom and the S. part of Aram as lighter and brighter (as in Fig. 1). These were consistent appearances and were due, most probably, to actual lighter desert zones on the planet. With the larger disc size the doubling of the forks of Aryn was now easy for most of our observers. Note in Fig. 1 the clouds in the N. polar area and the canal, Cantabras, extending from the following (W) side of the Meridiani Sinus to the Oxia Palus. The Aurum can also be seen extending from the oasis, Olympia, in the Meridiani Sinus.

GENERAL C.M. 40°. In Fig. 2, by Clyde W. Tombaugh, we see the planet with its C.M. at 50°. Note, in this very fine view, the doubled Niliacus Lacus, the well developed Lunae Lacus and the smaller Oleaster Lacus to its E, the two canals connecting to the dark and tiny Juventae Fons, the extremely long dark region canal, the Dargamanes, the crossing of the Jamuna and Hydraotes canals, the tiny oasis at the tip of the following (W) fork of the Meridiani Sinus, and the Oxia Palus. Most observers were able to detect the division between the Niliacus Lacus and the Mare Acidalium, the Achillis Fons, during the dates of this report. In Fig. 2 we see the dwindling S. polar cap and clouds over the N. polar area. Note the spread appearance of the Ganges canal to the Juventae Fons; this appearance was noted by other observers also in mid-July. The Ganges appeared normal during its mid-June presentation, after which it extended to the Juventae Fons by mid and late July.

GENERAL C.M. 90°. Fig. 3 is a drawing by Shirō Ebisawa showing Mars with its C.M. at 98°. It shows the interesting areas of Thaumasia

and the Solis Lacus. Note the characteristic shape of the Solis Lacus in 1954 with some of its internal structure shown. Of interest in Fig. 3 is the relative brightness and lack of detail shown in the areas of Ophir, Candor and Tharsis; these areas were shown cloud covered by most of our observers almost consistently during the 1954 apparition of Mars. It was difficult to get confirmation of the canals and other details in these areas due to the continued obscurations: drawings made earlier and later in the apparition were the most useful in showing details in these zones. At times red filters were especially useful when viewing these areas when the obscurations were lighter. Note on Fig. 3 the Juventae Fons, the Ganges canal, the Ascraeus Lacus, the Mareotis Lacus, and the wealth of oasis and canal detail, especially in the region of Thaumasia.

GENERAL C.M. 160°. Fig. 4 is another drawing by Tombaugh, showing Mars with its C.M. at 177°. Most of our observers show the canal and oasis detail between the meridians of about 110° to 190° as faint and diffuse when compared with similar features on other areas of the planet. However, in Fig. 4, made under good conditions by one of our most experienced Martian observers, the canal detail noted was seen as narrow and linear while the oases were quite small. Note especially the chain of four oases along the Orcus canal and the triangular shape of the Trivium Charontis. Confirmatory of the linearity of the canal detail in this general region when seen with larger telescopes this year was a drawing received from Thomas R. Cave, Jr. Cave in a fairly good view with the Yerkes 40-inch refractor used at full aperture shows a number of canals in this region as narrow and linear. More about these observations will appear in a special report. In Fig. 4 we should note the cloud action over the N. polar region and on the limbs of the planet. The definiteness of the canal and oasis detail shown and the lack of other canal and oasis detail should also be considered.

GENERAL C.M. 220°. Mars with its C.M. at 258° as seen by Tsuneo Saheki is shown in Fig. 5. One should note, from among the wealth of details shown on this drawing, the dark Trivium Charontis-Cerberus I-Pambotis Lacus combination, the small oases on the canals surrounding the lighter area of Elysium, the appearance of the two canals, Cyclops and Cerberus II, diverging from the Pambotis Lacus to the S. Maria, the newly developed Nodus Laocoontis area with its connecting canals, the lighter area S.E. of the Cerberus I, the lighter zones in the S. Maria (among them Hesperia) and the mottled triangular zone shown among the canals Laestrygon, Avernus, and what is probably the Tartarus.

GENERAL C.M. 280°. Our last view of Mars is a drawing of Mars by Thomas R. Cave, Jr. showing the planet with its C.M. at 298°. Here we should note the darker N. portion of the Syrtis Major, the canal, Phison, running from the Sigeus Portus on the arm of the Sabaeus Sinus to the dark knot-like Coloe Palus, and the Nilosyrtis running from the tip of the Syrtis Major to the Coloe Palus. The Thoth-Nepenthes can be seen in this view terminating in the spread Nodus Laocoontis development. Some of our observers show traces of modifying detail in the Moeris Lacus region (located in the Thoth-Nepenthes just as it leaves the Syrtis Major), but the appearance of the Moeris Lacus as a confirmed and well-developed feature was not noted by our observers in 1954.

Note by Editor. On pages 78, 79, 80, and 81 we present four full pages of Mars drawings by two of our most experienced observers, Mr. Thomas R. Cave, Jr. and Mr. Tsuneo Saheki. These may be profitably studied in the light of the discussion above, and it will be interesting to compare drawings of the same face of Mars by the two observers.

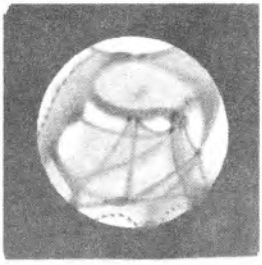


Figure 1. Mars.
D. P. Avigliano.
July 26,1954. 5^h 40^m,U.T.
8-inch refl. 325X, 480X.
Wratten 25 (red) filter used.
C.M. = 345°. D = 20".1.

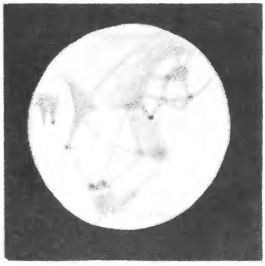


Figure 2. Mars.
Clyde W. Tombaugh.
July 18, 1954. 5^h 10^m,U.T.
8-inch off axis refl.
C.M. = 50°. D = 21".0.

Figure 3. Mars.
S. Ebisawa.
July 25, 1954. 12^h 45^m, U.T.
8-inch refr. 288X, 400X.
C.M. = 98°. D = 20".2.

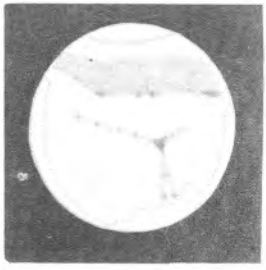


Figure 4. Mars.
Clyde W. Tombaugh.
July 6, 1954. 6^h 30^m, U.T.
Lowell 24-inch refr.
C.M. = 177°. D = 21".8.

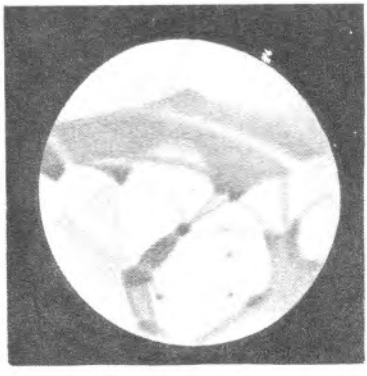


Figure 5. Mars.
Tsuneo Saheki.
July 8, 1954. 13^h 15^m, U.T.
8-inch refl. 285X, 330X, 400X.
C.M. = 258°. D = 21". 7.

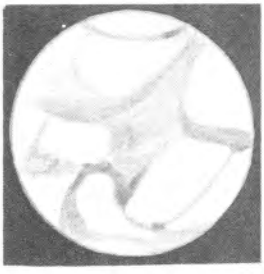
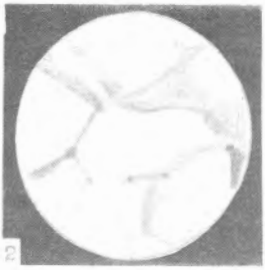


Figure 6. Mars.
Thomas R. Cave, Jr.
June 23, 1954. 6^h 55^m, U.T.
12.5-inch refl. 280X.
C.M. = 298°. D = 21".5.

MARS - 1954

OBSERVER: T.R. CAVE JR.

MAY 3. 10h 0m U.T.
12½" REFL. 270X
C.M. 81° ⊙155°.2
D⊕ -3°.5 DIA. 13".7

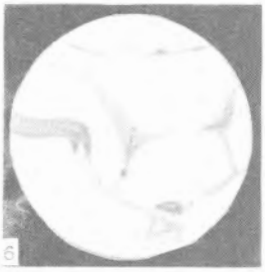


MAY 20. 9h 0m U.T.
12½" REFL. 360X
C.M. 274° ⊙164°.4
D⊕ -3°.6 DIA. 16".5

JUNE 1. 8h 10m U.T.
12½" REFL. 225X,360X
C.M. 143° ⊙171°.0
D⊕ -2°.8 DIA. 18".8

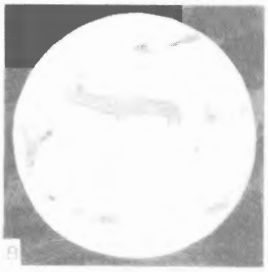
JUNE 8. 7h 40m U.T.
12½" REFL. 225X,450X
C.M. 82° ⊙174°.9
D⊕ -1°.9 DIA. 19".7

JUNE 11. 11h 30mU.T.
8" REFL. 210X,350X
C.M. 55° ⊙176°.5
D⊕ -1°.4 DIA. 20".3

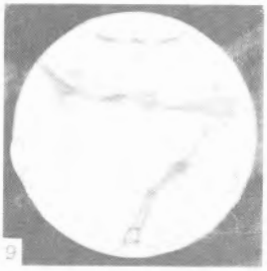


JUNE 13. 6h 40m U.T.
8" REFL. 210X, 350X
C.M. 21° ⊙177°.7
D⊕ -1°.1 DIA. 20".6

JUNE 15. 6h 35m U.T.
12½" REFL. 280X
C.M. 4° ⊙178°.8
D⊕ -0°.8 DIA. 20".7



JUNE 17. 6h 10m U.T.
8" REFL. 210X, 285X
C.M. 338° ⊙180°.0
D⊕ -0°.4 DIA. 20".9



JULY 2. 5h 20m U.T.
15½" REFR. 240X
C.M. 198° ⊙188°.6
D⊕ +2°.2 DIA. 21".8

MARS - 1954

OBSERVER: T.R. CAVE JR.

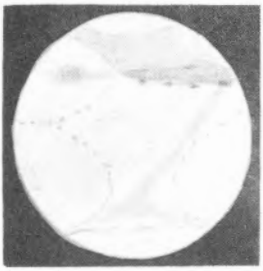
JULY 5. 6h 35m U.T.
15½" REFR. 240X
C.M. 205° ⊙190°.4
D♂ +2°.6 DIA. 21".7

JULY 6. 4h 0m U.T.
40" REFR. 320X
C.M. 141° ⊙191°.0
D♂ +2°.8 DIA. 21".7

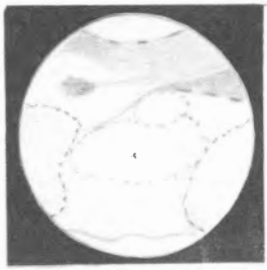
JULY 12. 5h 30m U.T.
12½" REFL. 280X
C.M. 109° ⊙194°.5
D♂ +3°.6 DIA. 21".5

JULY 16. 4h 50m U.T.
12½" REFL. 350X
C.M. 64° ⊙196°.9
D♂ +4°.0 DIA. 21".2

JULY 18. 3h 40m U.T.
6" REFR. 304X
C.M. 41° ⊙198°.1
D♂ +4°.2 DIA. 21".0



AUG. 17. 4h 10m U.T.
12½" REFL. 270X
C.M. 121° ⊙216°.4
D♂ +3°.2 DIA. 16".8

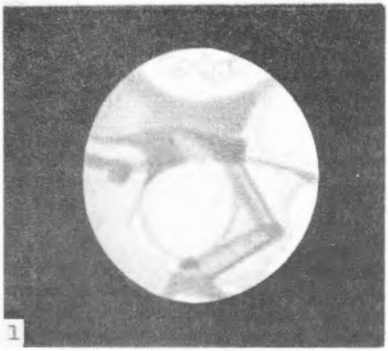


AUG. 19. 4h 35m U.T.
12½" REFL. 350X
C.M. 108° ⊙217°.6
D♂ +2°.9 DIA. 16".6

SEPT. 3. 4h 55m U.T.
8" REFL. 285X, 400X
C.M. 332° ⊙227°.0
D♂ +0°.4 DIA. 14".8

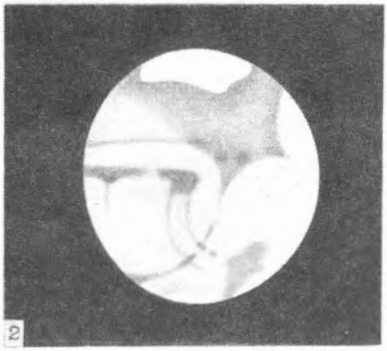
SEPT. 18. 5h 15m U.T.
8" REFL. 320X
C.M. 194° ⊙236°.5
D♂ -3°.0 DIA. 13".2

MARS - 1954
OBSERVER: T. SAHEKI



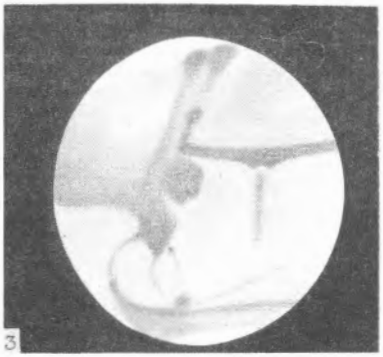
1

MAY 17. 15h 15m U.T.
8" REFL. 285X, 330X, 400X
C.M. 33° ⊙163°.1
D⊕ -3°.7 DIA. 15".7



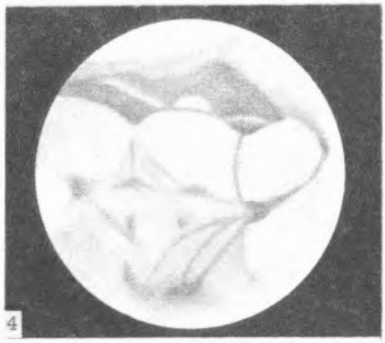
2

MAY 22. 16h 10m U.T.
8" REFL. 285X, 330X, 400X
C.M. 0° ⊙165°.8
D⊕ -3°.5 DIA. 16".9



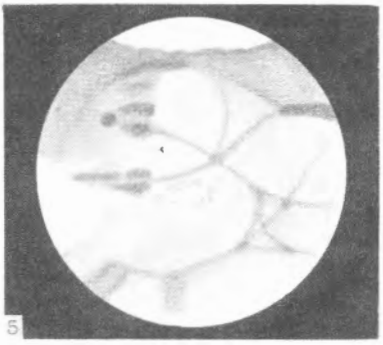
3

MAY 28. 15h 30m U.T.
8" REFL. 285X, 330X, 400X
C.M. 296° ⊙169°.1
D⊕ -3°.1 DIA. 18".0



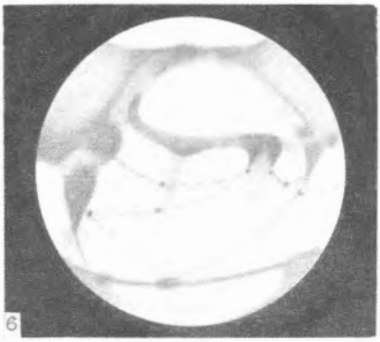
4

JUNE 12. 16h 45m U.T.
8" REFL. 285X
C.M. 180° ⊙177°.5
D⊕ -1°.2 DIA. 20".4



5

JUNE 16. 13h 30m U.T.
8" REFL. 285X, 330X, 400X, 500X
C.M. 96° ⊙179°.7
D⊕ -0°.5 DIA. 20".9



6

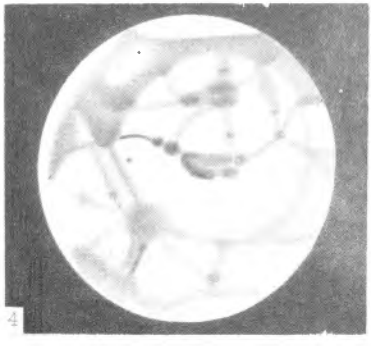
JULY 1. 14h 12m U.T.
8" REFL. 285X, 330X, 400X
C.M. 334° ⊙188°.4
D⊕ +2°.1 DIA. 21°.88

MARS - 1954
OBSERVER: T. SAHEKI

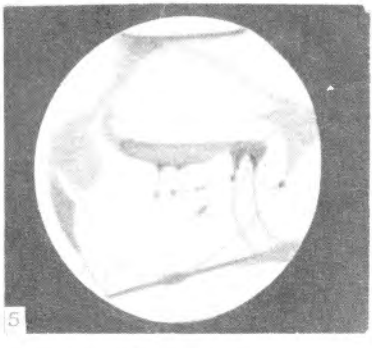
JULY 3. 12h 15m U.T.
8" REFL. 285X, 330X, 400X
C.M. 288° ⊙189°.5
D⊕ +2°.4 DIA. 21".8

JULY 16. 11h 35m U.T.
8" REFL. 330X
C.M. 162° ⊙197°.2
D⊕ +4°.0 DIA. 21".2

JULY 22. 13h 10m U.T.
8" REFL. 285X, 330X, 400X
C.M. 131° ⊙200°.8
D⊕ +4°.4 DIA. 20".5



JULY 24. 10h 30m U.T.
8" REFL. 285X, 330X, 400X, 500X
C.M. 74° ⊙202°.0
D⊕ +4°.5 DIA. 20".3



AUG. 5. 12h 0m U.T.
8" REFL. 330X
C.M. 347° ⊙209°.3
D⊕ +4°.3 DIA. 18".6

AUG. 23. 10h 30m U.T.
8" REFL. 330X, 400X
C.M. 158° ⊙220°.4
D⊕ +2°.3 DIA. 16".1

THE RADIAL MARKINGS OF VENUS: A REJOINDER

by Richard M. Baum

1. - Preamble. Dr. Bartlett's Published Paper.

Mars is often referred to by writers of popular astronomy as "the planet of mystery", in the circumstances an appropriate calling; but strictly speaking it is a misnomer, for the real planet of mystery is surely Venus, as a comparison of our respective knowledge of the two bodies shows. I need hardly remind the reader that Venus presents the investigator of planetary phenomena with one of the most outstanding riddles in the solar system; not only is it complex and full of subtle contradictions but also paradoxical, for (a) after the Moon and a handful of asteroids it is our nearest neighbor, (b) as a consequence it periodically subtends an apparent angular diameter much greater than is exhibited by any other planet, at its epoch of inferior conjunction showing a disk 61" in breadth, and lastly (c) through its occupation of an orbit interior to the Earth it is not impossible to keep it under almost constant observation throughout the whole span of its period of revolution. Yet despite the favorability of observing conditions created by these facts we know far less of this sunwards sister world of ours than we pretend to know of the massive globes of Jupiter and Saturn, and even distance-dimmed Uranus and Neptune. The cause of this cytherean ignorance is well known and needs no mention here. It is not surprising, therefore, in view of this that the cytherean problem, as it may well be called, has ever been surrounded by an aura of doubt and uncertainty, and has been the center of a sometimes bitter unrelenting conflict of observations and concepts, - in certain instances being more severe than the famous Martian controversy of long ago.

In recent years, due mainly to the perplexing and unproductive nature of the subject, there has been a decided falling off of interest in the planet; and to many new observers the source of the Venus conflict is not at all clear. In actual fact every department of this subject is dogged by the same characteristic phrase "non-proven", but the major dispute is that centered on the observed markings and the period of axial rotation. Most persons realize that Venus does not display any features comparable with those of the lunar or Martian surface, and there is every reason to suggest that we never see the actual surface of the planet. From time to time certain observers have reported seeing vague greyish shadow-like markings, but on the whole these have not been confirmed. In 1896 Percival Lowell announced in several astronomical journals the discovery of a system of radial streaks spreading out from a point on the planet directly opposite the Sun, on the illuminated hemisphere of course. Ever since then, this peculiar arrangement of marks so utterly unlike the "conventional" cytherean features, has been a constant source of dispute, the majority of observers through being able to detect little or no trace of it tending to discredit its very existence, and being more inclined to regard it as illusory. This is then the present point of dissension, whether or not this particular system has an objective reality or is the result of some illusion not yet comprehended, and that which a colleague of mine has seen fit to resuscitate in order to express his doubts by argumentative skill and rhetoric.

Let us recapitulate the late happenings. It will be remembered by readers of this excellent journal how in its January-February issue of 1955, that unparalleled of observers, Dr. James C. Bartlett, Jr. of Baltimore, Director of our valued Venus Section, published a long and important discussion on the controversial Lowellian system of cytherean markings, or 'spoke-system' as some prefer to call it, wherein he advanced certain interesting views and revealed his leaning towards the reality of the spokes. Dr. Bartlett supported his contention with the work of some past and contemporary observers; but by and large he employed only those records which can only be classed as extremist, i.e., completely

confirming those of Lowell, and which therefore are the least likely to be found acceptable. In a sense this is most unfortunate; for it marks a weakness in Dr. Bartlett's discussion through which the sceptics can infiltrate to explode with traditional decorum and the use of hackneyed arguments, thus giving rise to no small amount of confusion and misunderstanding, the chance of reaching out to uncover the truth of the cytherean problem. As already mentioned this weakness has been immediately seized upon by one amongst us who has no use for the radial markings, and who has made full use of the unsatisfactory situation so created by turning it with no small amount of genius to the momentary advantage of the sceptics. However, for the time being I do not intend to answer this incautious champion of an opposite camp, but rather to amend certain remarks made by Dr. Bartlett in his original paper, to which work I urge the interested reader to refer in order that he may be better equipped to follow the trend of the discussion.

2. - Some Important Errors in the Bartlett Paper.

Paragraph four of this work is given over to a most lucidly composed account of a supposed repudiation by Lowell himself of the spoke-system. Thus to quote Dr. Bartlett, "Among the stranger statements circulated was one by Young who though obviously skeptical was by no means malicious. According to Young, 'In 1902 Mr. Lowell announced that he was now satisfied that the radial markings which he saw on Venus were probably due to optical illusion'. In the winter of 1953, when I was assembling material for this little paper, I sought confirmation of this statement from the Lowell Observatory. Apparently it was as much a surprise to the Flagstaff observers as it was to me; for after a careful search of 'all publications for the years 1899-1903' Mr. Charles Osterberg of the Observatory staff was unable to find anything to support Young's definite statement".

There is nothing extroardinary about Young's remark; Lowell did indeed refute his own work in 1902; I have before me as I write a photocopy of Lowell's memorandum in which he announced this to the scientific populace at large. This notice is dated as at Boston, 1902 July 3, and is entitled "THE MARKINGS OF VENUS" by Percival Lowell. It was published in the "Astronomische Nachritchten" for October 22nd., 1902 (1). In this Lowell says, "Continued observations have convinced me that the spoke-like markings on Venus are probably not upon the surface of the planet but are optical effects of a curious and - astronomically speaking - of a hitherto unobserved character. I was first led to doubt their objective reality by measurement of the longitude of their centre of convergence in a series of drawings made by me subsequent to those published. From the measurements it appeared that the shift of the centre was not such as rotation of the planet would cause but was such as to keep the centre in the centre of the disk as the phase increased . . . . . Now it seems possible that the spoke-like markings might be caused by the eye wandering quickly from one of the dark indentations to the centre and thus dulling unconsciously a path along the retinal rods".

So conceded Lowell. This particularly honest statement attracted the attention of many leading observers, and drew praise from one to whom canaliform planetary detail was ever assumed illusory - E. W. Maunder. And at the monthly meeting of the British Astronomical Association held 1902 October 29th., Professor Maunder especially directed the attention of those present to Lowell's note and said this of him, "They must all applaud the honourable and candid way in which Mr. Lowell had been so prompt to express a doubt as to the reality of his own supposed discoveries". (2).

It would seem, however, that Lowell himself found this view untenable; and by the next year, 1903, he had reverted to his former belief, which prevailed, or so I believe, right up to the year 1914. (3).

The other error which I have noted in Dr. Bartlett's paper is not so much an error as a misinterpretation. This relates to the motion of the spoke-system as based on my observations in 1951. It is not correct to say that the central spot or center of convergence was bisected by the

terminator at any time . . . . . it always lay exactly 90° from the terminator, and moved in accordance with a rotation of the planet in a direct direction.

When first recovered the center of the system occupied the sub-solar point i.e., the point directly opposite the sun, on the illuminated hemisphere. Except for a slight wobbling on either side of this position the center spot remained so placed, except of course for an apparent motion brought into existence by the planet's movement around the sun. From observations extending over 1951 to 1954 I have always found the system to move in a predictable manner in accordance with the concept of its reality, and not indicative of illusion. Thus, at eastern elongation the central spots move towards the limb keeping the same distance from the terminator so that at dichotomy they lie exactly on the limb and are usually invisible, being only traceable by the convergent nature of the spokes. At western elongation the reverse applies. The center is not seen until after dichotomy, when it is observed to gradually move away from the sun-turned limb - over which it disappears at an eastern elongation - and appears to drift towards the terminator, always keeping 90° distant from it though. This displacement away from the limb continues until superior conjunction is reached, at which time the point of convergence is synchronous with the center of the disk; the aspect at this epoch is of a dusky smudge like a hub with several ill-defined smoke-like streaks running outwards from it towards the periphery of the disk.

It is important to note that no shift of the markings was detected which suggested to me a rotation period shorter than 224.7 days, even though on many occasions Venus was watched for several consecutive hours.

The significance of these observations is plainly evident: the displacement of the system away from the observer at an eastern elongation, and its approach back over the limb at a western elongation implies a long rotation period in a direct manner, and furthermore demonstrates the reality of the whole. These are what the observations reveal. I fully realize that my result contravenes radiometric measures, and in view of this I know full well that the seeming long rotation period cannot be applicable to the actual surface but only to the apparent. Therefore, it is my belief that the streak markings represent a vigorous circulation system in the cytherean atmosphere, as indeed we should expect to be the case through the planet's proximity to the sun.

In Section 5 I will give some further reasons to support the thesis of the spoke-system's objective existence, deduced from empiric studies.

3. - Patrick Moore's Critique.

In the May-June 1955 issue of this journal appeared a short memorandum from the pen of this well known selenographer, severely criticizing the reality of the spokes and claiming their illusory character. Moore's doubts are well set down in a way calculated to put his contention in a favorable light by the use of arguments notable for their strength of apparent repudiation. Unfortunately for Moore, these terms are not original, nor are they as conclusive as he considers; they are hackneyed, ambiguous and in one case subjected to mistreatment out of context.

I have known Moore for many years now; and as he justly observes in his paper, his remarks are not really maliciously meant even though he accredits me with having been misled by an illusion. His doubts, or so I believe, spring from a genuine desire to comprehend why it is so few observers are able to completely see Lowell's markings, and others only in part, whilst others like himself have never been able to trace anything on Venus apart from the usual amorphous grey shades, so beloved of Barnard.

Unfortunately, Moore, though an experienced observer, reveals a deplorable lack of knowledge respecting this question both historically and

theoretically: if he had taken the trouble to examine more closely what Dr. Bartlett means to imply, he would have instantly perceived how superficial his argument is, and how circumstantial the material he employs to bolster his discussion.

Though Dr. Bartlett was responsible for the initiating paper of this controversy, Moore's critique is not for all that it appears so solely directed against this . . . . . but rather and to a greater extent against the Chester observations. In his many visits to me Moore has expressed his doubts in no uncertain terms, and I know better than anybody else just what our colleague is driving at in starting up another conflict over Venus - he hopes by this to generate a waxing interest in the planet and all its mysteries, and this is not a bad thing at all; I for one hope this will be the end result especially as Venus will be well displayed for observation during the spring and summer months of 1956 as an evening star.

Before proceeding further I must add that Moore invited this reply sometime ago when he very kindly supplied me with a copy of his MSS., before it was despatched to our excellent editor Professor Walter H. Haas, himself a skilled authority on the planet now in focus. Work on other projects has delayed this rejoinder, but I trust it will not be too late to be of topical interest even though it may not appear, if acceptable, till 1956.

In bringing this section to a close I will say that Moore and I have had a lively exchange of letters on this same subject in other journals, and at astronomical meetings, one at Chester in the late summer of 1953 being of memorable import as we shall later see.

4. - Lowellian Canaliform Detail - Some Views.

The principal structure of Moore's critique is the presumed inaccuracy of Lowell's work on Venus, and he goes to some length to prove such: his thesis springs from the slender premises of lack of general confirmation and untenability of the Lowellian concept of surface conditions. However, Moore evades the main issue by concentrating on physical theory where such is not the point of dissension; what is, is the validity of the observations - whether or not the spoke-system has an objective existence or not. The question may be resolved into two parts, (a) how is it that Lowell canalified Venus to the extent he did where vagueness and formlessness are the chief characteristic properties of its surface markings? and (b) having established the reason how, why should so few observers comment on linear detail? For the present only (a) is to be discussed, (b) being reserved for section 5.

Many have refuted Lowell's Venus work simply because of his trend towards the canaliform in planetary features, and have stood by their rejection without bothering to investigate the matter any further than the use of hackneyed argument allows. Therefore whilst recognizing the ingenuity of many explanations, I personally regard them as being too literal and too superficial to be employed as statements of authorative negation.

Essential facts to bear in mind whilst considering this question include (1), that detail at or near the limits of vision is being dealt with and as a consequence full provision must be made for a wide variety of factors likely to exert a greater or less influence over the observer's reception, interpretation and reproduction of what is visible on the disk, and (2), that detail of a nearly or wholly linear character is hinted by all the principal observations of the planet. In view of these points, therefore, it is obvious material used in or evolved from the great Martian controversy will be found invaluable towards clearing up the riddle; indeed with Venus it is not so much a narrow field that is again in question but the whole problem of canaliform planetary details. Apart from using such material as I consider relevant then, I advance certain proposals which I believe to be new, but upon which pretence I stand to be corrected.

At the close of his paper Moore writes, "I do not dispute that some 'streaky' features may exist, and some photographs support this ..... But streaks are different from radial spokes". Now why Moore chooses to make a distinction where in reality none exists I cannot say; it is quite inexplicable, almost ridiculous in fact. To my way of thinking canaliform is the most suitable term of reference, as in its broadest sense it has an extensive coverage implying the presence of anything rectilinear, thus belts, bands, streaks, threads, wisps, all besides the true canali. If any one entertains doubts as to this, then I refer him to study the classical Mars drawings. Thus Professors W. H. Pickering and A. E. Douglass (4), both of the original Lowell school, drew canali as relatively broad bands of shade as opposed to the hard narrow lines of Lowell's own drawings. In this method or rather style Lowell was followed by many, but in particular by Perrotin, Thollon. (5), Jarry-Desloges (6), and Maggini (7), who all drew narrow spider-like canali, even more so than Lowell in some instances. When Schiaparelli first perceived canali in 1877 he recorded them as broad swaths of tone similar in many ways to the later delineations of Pickering and Douglass. It was only as his acquaintance with them grew that Schiaparelli set down fine linear canals. Antoniadi saw them as diffuse wide tracts of greyish hue, though it is interesting and important to note that his early drawings were veritable models of the Lowellian school. Only later did his characteristic photographic style come into being.(8). On the other hand we have those who claimed never to have seen a canal, and there are many today who report the same. But these latter cannot now hope to disprove the existence of canaliform markings on Mars; for though it is certain the aspect is not quite as Lowell figured it, observational evidence reveals the presence there of something linear, but not harshly defined nor so diffusely displayed as Antoniadi imagined.

What is implied by this is the extreme difficulty of making a precise observation of very fine detail at or near the limits of vision. Startling differences are bound to occur; but these do not signify the existence of different features, only that different observers through a wide variety of reasons see variously the same feature, which is a faint elusive something whose true aspect cannot certainly be revealed. Personally speaking, I have always realized this like so many others, but it seems some do not. To my way of thinking the Flagstaff Venus drawings will be found more acceptable if they are regarded more as charts indicating where the observers saw detail, rather than as semi-photographic portrayals of its exact appearance. Furthermore I fully believe that Lowell, when he discovered the "spokes", uncovered the true or basic pattern of apparent surface markings, but through his trend to canaliform detail unfortunately drew them in such a revolutionary manner that it is little wonder he heaped reprobation on himself, and his work. This stigma still pervades contemporary planetary astronomy.

The truth of this contention is amply borne out by comparing the work of other observers who have seen the spokes. Thus in 1932 Robert Barker, a well known British amateur, using his 12.5-inch reflector recovered them and drew them exactly like Lowell . . . . . hard relatively narrow bands. Over the same period, and up to 1933, J. Camus, of the Société Astronomique de France, using this body's Observatory, also but independently recovered ths system but recorded a more diffuse version of radial spokes and 'hub-spot'. Leonid Andrenko in 1934 published an interesting paper containing the results of observations on Venus from 1927 to 1934. (9). From his work Andrenko was able to compile a chart of the markings, and these though very diffuse indeed compared so favorably with Lowell's chart issued in several journals in 1896 that he was able to employ the latter's nomenclature without hesitation. Allowing for factors of personal equation, a magnificently executed map of Venus by Lucien Rudaux and Gerard de Vaucouleurs issued in a work entitled "L'Astronomie, les astres, l'univers", Paris 1948, page 194 includes many features shown by Lowell and Andrenko . . . . . a most interesting fact about these three maps is that all are so constructed as to imply a 224.7-day period of rotation. M. B.B. Heath, the eminent British authority on planetary work, reports that in 1951 he saw the dual spot placed at the

sub-solar point with two streaks extending away from it. Heath uses a 10.25-inch reflector; his experience of this work goes back to the end of the first decade of the present century.

When I first saw the spokes early in 1951 they seemed to be narrow smoke-like features definitely linear and symmetrically placed around the sub-solar spot like the spokes of a wheel. As my experience broadened so too did my delineations of the spokes; instead of the narrow features of first sight, comparatively broad diffuse bands were being recorded, an aspect which has subsequently evolved no further: only the character underwent this metamorphis; basically the system is still of the same arrangement. In some ways there is in this a decided parallel with what Dr. R. L. Waterfield found some years ago now. When he first observed Mars he drew much rectilinear detail, but latterly noted how this style waned as experience with faint marks grew. All this of course is quite the reverse to Schiaparelli, who initially drew the canali as broad relatively coarse features, and later very narrow; here however I am prone to believe realization of geometric design in the lay-out of the canals exerted a major influence over his reproductions of them.

In 1906 Percival Lowell wrote, "As some misrepresentation has been made on this subject through misapprehension of the writer's observations on Venus and Mercury, it may be well to state that the tenuous markings on both these other planets entirely lack the unnatural regularity distinguishing the canals of Mars. The Venusian lines are hazy, ill-defined, and non-uniform; the Mercurian broken and irregular, suggesting cracks. Neither resemble the Martian in marvelous precision, and have never been called canals by the writer nor by Schiaparelli, but solely by those who have not seen them and have misapprehended their character and look". (10).

Now this statement is of the utmost importance; for it demonstrates Lowell's recognition of the dissimilarity of the hermiographic, aphroditographic and areographic features, even though comparison of his drawings may lead one to deduce otherwise. And bearing this in mind, I tentatively suggest that the observer's characteristic style of reproduction by pencil techniques is affected by and varies solely as the intrinsic nature of the visible objective markings, it being more pronounced the fainter, more delicate detail gets.

Each observer has his own way of recording planetary details and it is my belief that it is this very fact which precludes any major advance towards a solution of the aphroditographic problem. To summarize:

All Lowell's drawings are characterised by rectilinearity and hard outlines; soft forms in all but a few isolated cases had no place in his style - study and compare Lowell's drawings with those of Antoniadi, or any photographs of Mars, he drew exactly as he imagined he saw under conditions of favorable seeing. Under such conditions features would come out very clear, and distinctly be seen. Consequently these qualities would be psychologically enhanced by what we may term a canaliform complex - could this have arisen as a result of his early association with Schiaparelli? - which would obviously dominate his receptive and interpretative faculties; and, we would expect, would be given visible existence in graphic impressions obtained by pencil at the telescope. As is common, certain detail would be given more attention than other detail and so would further be exaggerated - this being the precept that no one person sees the same object exactly as another does. Now if we assume the presence of linear detail or detail strongly bordering on such a form, then the consequences are obvious.

Mars, we know, exhibits canals; hence Lowell's work is accurate. Mercury is not quite so simple, but the position is not hopeless. We know the planet shows markings and these appear as cloudy mare- like tracts mottled over with darker and lighter patches. Schiaparelli mapped the planet, so did Lowell - with an incomprehensive maze of canals; so did Antoniadi with his usual cloudy shadings. Why should Lowell be so different?

I would question this by saying,"Is Lowell so different?" Some time ago I made a comparison with the hermiographic charts of Schiaparelli and Antoniadi of Lowell's chart, which was published in 1902.(11). The results were interesting and promising. Schiaparelli's chart (12) is not very detailed, but what is shown is obviously canaliform or streaky. The next to chart the planet was Lowell, who saw large numbers of streaks, and produced a perplexing pattern of surface markings. Many of Schiaparelli's features, if not all, are included; therefore the American observer not only confirmed but substantiated the Italian's work. In the years between the appearance of Lowell's map and Antoniadi's, several others were published, of particular note being that of Jarry-Desloges,which is decidedly similar to the former's - a significant point here is that Jarry-Desloges also saw streak features on Venus; his stations were chiefly situated in desert country or on a high plateau so that like Lowell he made the most of getting telescopes erected where seeing was invariably better than average. The year 1934 saw the publication of the accepted map of Mercury, Antoniadi's (13). This is notable for the fact of embodying Schiaparelli's marks in a very diffuse form, typical of the extremist antilinear group, and for casting shadows of doubt on Lowell's work.

By employing Schiaparelli's map, however, one is able to draw a certain parallel with the Lowellian and Antoniadian aspects ..... a light and shade impression of the second-named bears more than a superficial resemblance to the latter.

I consider Schiaparelli's work as being essentially the means by which we can translate Lowell's narrow, finely drawn features, whether they be on Mercury, Venus, Mars or the satellites of Jupiter, and identify them without difficulty with other work,especially that of the eminent French-Greek astronomer of Meudon. My way of looking at this springs from what I said a little while back on the question of reproduction styles and observers' seeing differently the same feature, though having it modified by such factors as seeing conditions, size of aperture, experience in the subject and other psychological effects. I regard Lowell as an extreme canalist, Schiaparelli as a moderate whose drawings are more nearly like the true appearance, and Antoniadi as producing semi-photographic pictures more detailed than a photograph but seemingly suffering from the same limitations in that only the broader features are shown, the finer detail being inserted in such a manner that its true nature cannot be certainly made out nor its general arrangement.

With respect to Mercury I have just a little evidence. In 1951 I had correspondence with Mr. Donald O'Toole, who was then Director of the Mercury Section, during the course of which I communicated to him for interest's sake what had been uncovered with respect to what I have just been discussing. He wrote back imparting some exciting intelligence: "It was at once interesting and favorable to note, in your column of marking comparisons, that Lowell recorded the area you identify with Antoniadi's S. Lycaonis as 'a mass of dusky streaks'. In a drawing of October 9, 1950, I drew the very same area as composed of at least three streaks. This sketch is on page 3 of the April 1951 issue of 'The Strolling Astronomer'". In the same letter Mr. O'Toole goes on to say, "As a matter of fact, much of my Mercurian detail takes the form of streaks of various sorts, though often enough I draw wider, duskier markings". (14).

There is just one more point I should like to make before closing this section. It will be recalled following the announcement of Schiaparelli's discovery of canali on Mars, how examination of some earlier drawings of the planet, especially by Dawes, Secchi and Burton, revealed many of the more prominent canals, but these had not been recognized as new features. Schiaparelli realized, though, and in doing so gave substance to a new style of planetary depiction - canaliform. It took some years for this to be established;but despite the sceptics' attacks; within a dozen or so years of its advent subtle-canaliform was all pervading in planetary astronomy. In other words a veritable school of such rose up. Adherents

to this would, or so we expect, tend to canalize all the planets and satellites they observed; this then would be an acquired property and would be stronger in the more imaginative, these more often than not being not quite so cautious as others and also tending to be extremist in their attitudes. Thus Lowell was, long before Flagstaff was founded, intimately associated with Schiaparelli, whom he admired and imitated. Assume then the Italian as the master planetarian and Lowell the impressionable, imaginative, eminently skilful student; the result from a psychological angle would be the creation of a canaliform complex which would tend to assert itself throughout Lowell's work, more especially when faint details were being studied and drawn.

With Antoniadi the reverse applies. From the age of 18 or so he worked with some of the most ardent anticanalists, and therefore it is possible he acquired a most pronounced anticanalist impression, equally as strong as Lowell's, but opposite. Another interesting point might have had some bearing on the subject. It is a fact that to most artists, and Antoniadi was originally trained as such, linearity of any form is not looked on with favor nor employed: seemingly it violates all natural beauty. Hence here again we have another factor that may, needs must, be taken into account in any considerations on canaliform detail.

In this section I have purposely strived to refrain from working out any particular argument to refute Moore's claim of illusion, but have been content to merely demonstrate just some of the less well known factors which in some small way essentially played and still play an important part in this question. And in view of these, it is interesting to note how the specious argument put by Moore has its foundations slowly but surely removed until the whole crumbles up to nothing. One final remark: it must certainly have been noticed following the death of the leaders of the opposite schools of planetary representation that their respective styles are not now extremely used, but more a subtle blending of the two - a significant point which reveals the basic objectivity of the disputed details.

5. - General Outline of Some Evidence Proving the Reality of the Spoke-System.

1). Experiments with artificial disks and illuminated transparencies by C. D. Reid and Paul Taylor at Chester during 1952 and 1953, and later but independently by A. P. Lenham of Swindon failed to produce any spurious system of markings like those observed by Lowell.

2). In the summer of 1927 Dr. F. E. Ross using the 60-in. Mt. Wilson reflector obtained a remarkable series of ultra-violet light photographs of Venus which showed a wealth of detail though characteristically wide and diffuse, essentially arranged in bands ever so slightly convergent towards the sub-solar point. Comparison of these photographs with the drawings of Schiaparelli, Perrotin, Fontsère, Lowell and many others who drew streaks reveals the latter to have much in common with them.

In August 1953 C. D. Reid conducted an experiment in order to test the hypothesis of varying eye color sensitivity, in which Moore, J. B. Hutchings, and I took part. It was found that whereas Moore hardly penetrated the blue end of the spectrum, I appeared to have a penetration almost down to the wavelengths used by Ross in his 1927 work. Reid and Hutchings held an intermediate place between these extremes but having, or so it was indicated, comparable sensitivity factors with each other. Applying these results to the way in which these "guinea-pigs" saw and depicted the cytherean features, a most striking fact was at once uncovered. Moore ever only drew vague indefinite marks, more often than not seeing nothing at all. Hutchings and Reid frequently saw much more than this, their work being slightly compatible with the marks discovered by Ross and earlier by Lowell. For my part it was found after allowing for personal equation that I was and had been drawing Ross's detail right from the beginning, experience in the work gradually enabling me to see more and more of it.

6. - Some Concluding Rejoinders.

1). Moore writes, " .....nor did Barnard, and Barnard, who worked with the Lick 36-inch (and, moreover, found no necessity to reduce the aperture, as Lowell was usually forced to do with his 24-inch!)". Moore here suffers from a delusion from what cause I know not, probably through not having gone too deeply into Barnard's writings, for the latter also realized, as has practically every other observer of Venus, that small apertures seem to yield better results. I quote Barnard from one of his papers referring to his Lick work, "Venus was looked at this time with the 36-inch, but the seeing with the great instrument was not perfect enough to show the markings satisfactorily. Indeed, in all subsequent observations of Venus the 12-inch was preferable". (15).

2). Seeing does play an important part over the visibility of the markings, and this is overlooked by Moore. It is not policy to observe Venus even on a darkening twilight sky let alone against a dark field; besides the glare proving too much even for the best objective or mirror, the planet is far too low for effective observation. It is well known that to see the markings of Venus, one must observe during the daytime, and this again is not the most advantageous time to look, for one rarely gets the steadiness of seeing experienced at night. Therefore the use of large apertures is strictly limited to those climes where seeing is usually above average, mountain summits, plateau or desert country. In other regions the poor seeing is so magnified by the large aperture that any markings, especially faint ones as the cytherean are, will be effaced or so masked as to look entirely different from what they really look like. Thus though a small aperture has not the resolving power, it does nevertheless reveal a general light and shade impression which is better than any other for correct evaluation purposes.

3). Moore employs a novel variant of the old argument that the larger the aperture, the less one sees on Venus. In (3) this has been examined so I will here just add how Moore's experience differs from that of the late W. F. Denning who had this to say in this respect: "Some years ago I made a number of observations of Venus with 2-, 3-, and 4.5-inch refractors and 4- and 10-inch reflectors, and could readily detect with the small instruments what certainly appeared to be spots of a pronounced nature, but on appealing to the 10-inch reflector ..... the spots quite disappeared".(16)Personally speaking, I have always found the markings equally visible in refractors of from 3- to 4.5-inches, and reflectors of from 6.5- to 9-inches. Strange to note too that H. McEwen, one of the most experienced observers of the planet ever, only used a 5-inch refractor in his work, which covers a span of nearly six decades. McEwen considered this aperture most ideal for the work.

4). On May 29, 1889 Barnard, using the 12-inch Lick Equatorial, drew three large dusky markings along the terminator which could have been foreshortened views of Ross's detail. (17).

And in view of the foregoing Moore has not the slightest justification to say, ".....what the great Barnard and Antoniadi missed with the giant telescopes of Lick and Meudon."

Patrick Moore's critique has upon close examination little or no positive evidence to support it. Furthermore, there is much more to warrant the contention of Venus as a belted planet than Moore cares to admit.

- - - - - - - -

References

1. - Lowell, P., A.N., Bd. 160, No. 3823, columns 129-132, Oct. 1902.

2. - Maunder, E.W., J.B.A.A., Vol. 13, No. 1, pp. 13-14, Nov. 1902.

3. - Lowell Observatory Bulletin No. 59 (Vol. 2, No. 9).

4. - Annals of the Lowell Observatory, Vol. 1, 1898, Plate X.

5. - Flammarion, C, La Planète Mars, Vol. 1, pp. 404 - 410, Paris,1892.

6. - Jarry-Desloges, Observations des Surfaces Planétaires, Fas. I, 1907.

7. - Pickering, W.H.,Pop. Astr.,Vol. 31, No. 4, Plates XI and XII, 1923.

8. - Antoniadi, E.M.,La Planète Mars, 1659 - 1929, Paris 1930, Plates.

9. - Andrenko, L.,Urania, Ano. 25, No. 180, Nov. 1935, pp. 110-113.

10.- Lowell, P., Mars and Its Canals, MacMillan, 1906, footnote p. 178.

11.- Lowell, P., Mem. Amer. Acad. Arts and Sci., 12 (1902), No. 4-1.

12.- Schiaparelli, G.V., A.N., Bd. 123, No. 2944, pp. 241- 250, 1890.

13. - Antoniadi, E.M., La Planète Mercure et la Rotation des Satellites, Paris, 1934.

14. - O'Toole, D., Private Correspondence Sept. 2, 1951.

15. - Barnard, E.E., Ap. J., 5,p. 301, May 1897.

16. - Denning, W.F., Telescopic Work for Starlight Evenings, p. 151, 1891.

17. - Ross, F.E., Ap.J., 68, p. 75, 1928.

- - - - - - - - -

INDEX OF VOLUME 8 (1954) OF THE STROLLING ASTRONOMER

by Howard G. Allen

Postscript by Editor. We are much indebted to Mr. Allen for his kindness in preparing this index of our Volume 8, and we are sure that all our readers who keep files of old issues will find it most helpful. The references are given, as is perhaps obvious enough, both by months and by page, The Strolling Astronomer being a bimonthly throughout 1954. An asterisk is used to indicate that at least one illustration on the subject appears on that page.

- - - - - -

OBSERVATIONS AND COMMENTS

Moving Bright Objects Seen Against the Moon. Mr. Eugene C. Larr of Pasadena, Calif. has written us of an unusual observation he made on September 27, 1955 at $5^h\ 18^m\ 3^s$, U.T. with an 8-inch, F:40 reflector at a power of 256X. The telescope employed is a solar coelostat adapted to planetary work; it was designed and built by Roy K. Ensign, one of our A.L.P.O. members. A moving bright object was seen against the moon, the location being shown in Figure 7; Mr. Larr thinks that the position marked is correct to within four miles at most. He writes in part:

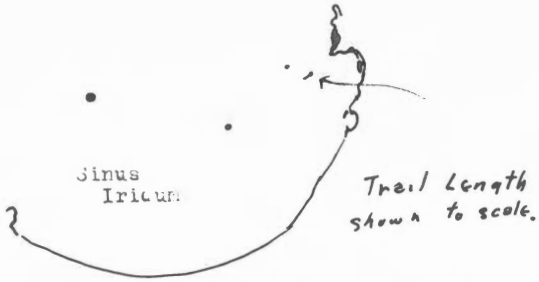


Figure 7 (above). Location of Possible Lunar Meteor Observed by Eugene C. Larr. 8-inch refl., 256X. Sept. 27, 1955. $5^h\ 18^m\ 3^s$, U.T. Colongitude = $38^\circ.6$.

Figure 8 (to right). Lunar Crater Schiller. Elmer J. Reese. 6-inch refl. 220X. October 19, 1953. $1^h\ 0^m$, U.T. Colongitude = $47^\circ.9$.

"The object was very bright and was seen for only about one to one and a half seconds. It first appeared as a trail moving rather fast across the area as shown in sketch. It then flashed into a very bright point of the contrast of a first magnitude star. It was slightly yellow and left no afterglow. .....If it hit the surface, it did not throw up any dust or other material as I think there would have been a shadow of some length. At the time of the observation two others were present, Dr. M.L. Stehsel and Mr. Roy K. Ensign ..... Stehsel and Ensign recorded the time, and it must be good to at least one second. I have been working from photographs taken by Dr. R. S. Richardson using the 100-inch here on Mount Wilson. I also have been using the small copy (Strolling Astronomer reproduction) of the Wilkins map of the moon".

We commend Mr. Larr for the care with which he has reported this observation, in particular for the exactness with which he obtained the time and the nicety with which he located the trail on the moon. It is an exciting possibility that we are here dealing with a meteor luminous in a very rare lunar atmosphere, and the observation is similar to several dozen others of moving bright specks seen against the moon during the last 15 years. Unfortunately, we have no other observations at this time of Larr's object; therefore, it is likely to remain a suspected lunar meteor only. At the time of the observation Sinus Iridum, in which the object appeared, was just inside the sunrise terminator. The Editor would suggest that it is a matter of extreme difficulty to estimate the stellar magnitude of a bright object seen against the moon. One thinks of Jupiter III and IV, which may look brighter than any part of their primary when they are seen against the sky but which may appear as black as shadows when they transit the face of Jupiter. The Editor would also suggest that the chief observable effect of a meteoritic impact upon the lunar surface would be a flash of light.

Mr. Herb Doughty, III of Lima, Ohio writes of seeing a moving bright object near Piccolomini "travelling about '50 miles' southwest" on October 28, 1955 at $3^h\ 30^m$, U.T. The moon was then only three days before full, and Mr. Doughty suspects that he saw a terrestrial meteor very near its radiant.

Schiller. This strange-shaped object near the southeast limb of the moon (Section XXII of the Wilkins map) has been observed by E.J. Reese and P.W. Budine. Mr. Reese's excellent drawing is given as Figure 8. Indeed, many of the features shown here are absent from the Third Edition of the Wilkins map of the moon. The comparatively large crater shown on Figure 8 near the east-west center of the floor and approximately one-third of the way from the south rim to the north rim is described by Goodacre on pg. 306 of his Moon as "quite a test object for definition".