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The Strolling Astronomer

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STAFF

EDITOR

Walter H. Haas
1203 N. Alameda Street
Las Cruces, New Mexico

SECRETARY

Atty. David P. Barcroft
Secretary, A.L.P.O.
1203 N. Alameda Street
Las Cruces, New Mexico

COUNSELLOR

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Head, Mathematics Department
University of New Mexico
Albuquerque, New Mexico

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300 N. Eutaw Street
Baltimore 1, Maryland

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Newark, Arkansas

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ANNOUNCEMENTS

Carl P. Richards Honored. At its 1955 National Convention at Seattle, Washington the Astronomical League presented its annual Award to Mr. Carl P. Richards of Salem, Oregon. We congratulate Mr. Richards on this honor richly earned by his long devotion to amateur astronomy and by his many services to it. We are proud to claim him as a charter member of our A.L.P.O. since its founding in 1947. Mr. Richards photographed the total solar eclipse of 1945 from Wolseley, Saskatchewan and the one of 1954 from Minneapolis, Minnesota. He is a Council Member and a former officer of the Astronomical League. He has contributed several articles to The Strolling Astronomer, including "The Story of A Shadow" in our July-August, 1954 issue.

"Frontier to Space." Perhaps readers will indulge the Editor if he calls attention to a series of television programs produced at his place of employment and in the making of which he had a very small part. The programs relate to the missile programs in progress at the White Sands Proving Ground and to the present prospects of space travel. "Frontier to Space" is a series of 26 educational films produced by the Physical Science Laboratory of the New Mexico College of Agriculture and Mechanic Arts near Las Cruces, N. Mex. and will appear weekly on the following television stations:

K U H T	Houston, Texas	Starting week of Sept. 18, 1955
W K A R	East Lansing, Mich.	" " " " " "
W Q E D	Pittsburgh, Penna.	" " " " " "
K Q E D	San Francisco, Calif.	" " " " " "
W T I Q	Murford, Ala.	" " " " " "
W B I Q	Birmingham, Ala.	" " " " " "
W A I Q	Alabama	" " " " " "
K R O D-TV	El Paso, Texas	" " " " " "
W G B H	Boston, Mass.	" " " " " "
W T T W	Chicago, Ill.	" " " Oct. 16, 1955

Other stations not listed above will also start the series the week of October 16, 1955.

Omission of Figure from Previous Issue. We regret very much that Figure 13 was omitted from pg. 33 of our March-April, 1955 issue because of an oversight on the part of our publishers. Figure 13 is hence reproduced below. It may be studied in connection with Mr. Brookes' article "Jupiter in 1954-55: First Interim Report" in the March-April issue.



Figure 13. Sectional Drawing of SEB, STB, STZ, and SSTB of Jupiter by Elmer J. Reese on January 8, 1955. 6-inch reflector, 320X.

Lunar Meteor Shower Predictions. Mr. Richard Baum in Vol. 2, No. 26 of his excellent review Yega directs attention to predictions by a Japanese astronomer, Kenzo Kono, of lunar meteor showers in 1955, their dates of occurrence and the lunar areas where meteor-flashes should be looked for. These predictions depend upon the assumption that known terrestrial meteor showers are so large in cross section that the swarms intersect both the earth and the moon. We give here Mr. Kono's predictions:

<u>Shower</u>	<u>Date</u>	<u>Moon's Age</u>	<u>i</u>	<u>t</u>	<u>a</u>
Lyrids	1955, Apr. 20	27 days	95°	327°	0.09
Delta Aquarids	July 26	7	49	283	0.66
Giacobinids	Oct. 10	24	81	190	0.15
Orionids	Oct. 22	6	9	342	0.99
Leonids	Nov. 18	4	52	102	0.62
Geminids	Dec. 10	25	78	101	0.20

Here *i* is the angular distance between the radiant point and the earth as observed from the moon, *t* is the position angle on the lunar limb where the lunar meteors should be looked for (measured from 0° at the north point through 90° at east all the way around and up to 360°), and *a* is the magnitude of the affected area. Past studies would indicate that terrestrial (and presumably lunar) Giacobinids will be scarce in 1955 but that a rich shower may occur in 1959 in at least some longitudes of the earth. Observations of these predicted lunar meteor showers should be attempted over a period of some days centered around the dates in the table.

Mr. Robert M. Adams, 324 South Valley, Neesho, Missouri is organizing our A.L.P.O. lunar meteor searches upon a systematic basis. Members willing and able to participate regularly in such work should write to him.

1954 Mars Drawings. On pages 52 and 53 we publish two more pages of drawings of Mars in 1954 by different A.L.P.O. members. The drawings were selected and arranged by Mr. D. P. Avigliano, our Mars Recorder. More pages of drawings of Mars during its 1954 apparition and more articles about the planet in that year will appear in future issues.

THE RADIAL MARKINGS OF VENUS: ANOTHER POINT OF VIEW.

by Patrick Moore, F.R.A.S.

Dr. J. C. Bartlett's paper in the January-February "Strolling Astronomer" raises a number of most interesting points, and with the full knowledge that I am treading on dangerous ground I propose to challenge him. Dr. Bartlett and I have corresponded for years upon a variety of topics, and it is scarcely necessary to add that I have the most profound respect for him personally and as an observer, so that I hope he will show me where I am wrong!

The first point seems to hinge upon Lowell's observations. Nobody in their senses would suppose that Lowell himself was anything but utterly honest and sincere, and any alternative suggestions can be treated with the contempt that they deserve. Few men sacrificed more in the cause of astronomy than Lowell did. But I cannot agree that his observations of Venus are accurate. He once described streaks as being "like steel engravings", and in his own words:

"The markings themselves are long and narrow; but unlike the finer markings on Mars, they have the appearance of being natural, not artificial.

They are not only permanent, but permanently visible whenever our own atmospheric conditions are not so poor as to obliterate all details on the disk. They are thus evidently not cloud-hidden at any time The markings, which are of a straw-coloured grey, bear the look of being ground or rock, and it is presumable from this that we see simply barren rock or sand weathered by aeons of exposure to the Sun. The markings are perfectly distinct and unmistakable, and conclusive as to the planet's period of rotation."

It will be remembered that Lowell supported the 225-day rotation period. His observations were "conclusive" in this direction; yet the 225-day period has now been shown to be wrong without any shadow of a doubt. Here is an immediate and significant inaccuracy. But Lowell did more; he rejected the whole idea of an all-concealing Cytherean* atmosphere, and went back to the ancient theory of Bianchini that the markings were permanent features of a solid surface.

In fact, his drawings and descriptions of Venus are so utterly at variance with those of others using comparable apertures that we have little choice but to reject them. His map of Venus is indeed curious. From a dark patch, Eros, a sort of focal centre, he drew well-defined strips which he named Adonis Regio, Enneas Regio and so on, while there were other less conspicuous streak centres - the whole forming a network. So far as I know, this network has been seen since only by observers using apertures of 12 inches or less. Antoniadi never saw it; 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!), wrote: "The planet was beautifully defined. Nothing was seen of the singular system of narrow dark lines shown in recent years ... Every effort was made to show them, by reduction in aperture and by the use of solar screens and magnifying powers. Previous attempts with the 12-inch here also failed."

So much for Lowell's map. We now come to the recent work by some observers, in particular by Richard M. Baum at Chester. I know Baum to be a splendid observer and a magnificent draftsman, and as he is also a very old friend of mine I feel I can say what I like! We have collaborated in lunar work, and aperture for aperture he invariably sees more than I do, quite apart from his infinitely greater skill at recording detail. The one object upon which we disagree is Venus. He sees a radial spoke system; I cannot.

The strange thing is that Baum has recorded the spokes with a 3-inch refractor, which is considerably smaller than the finder on the Lick telescope used by Barnard. Mr. Ranck's refractor is precisely the same size as this finder. I have used various telescopes up to and including a 15 $\frac{1}{4}$ -inch reflector, but most of my work has been done with my own 12 $\frac{1}{2}$ -inch reflector. My greater telescopic aperture must inevitably compensate for Baum's superior skill as an observer, but my only reason for mentioning my work is to point to a simple but significant experiment.

It is often said that a small telescope will show more on Venus than a large one, because of the reduced glare. This seems to me to be a complete fallacy (provided that Venus is observed against a light sky, of course). I have a 3-inch refractor of my own, and on a number of occasions I have drawn Venus with it before turning to my 12 $\frac{1}{2}$ -inch. Invariably I see more with the larger telescope, but the markings appear more diffuse. The small aperture naturally sharpens them up, simply because of the lack of resolving power.

Venus is the most difficult problem observationally of all the planets, and we must be doubly wary. It is my contention that the "spoke system" of Lowell is merely an optical effect, seen by modern observers simply because of the inadequacy of their equipment. I do not believe that any observer, however skilful, can see with a 3-inch refractor details which the great Barnard and Antoniadi missed with the giant telescopes of Lick and Meudon respectively.

* I absolutely refuse to use the hideous word "Venusian".

MARS - 1954

OBSERVER: T.A. CRAGG



MAY 25, 08:40 U.T.
6" RFT. 280X
CM 223° @ 168°
D@ -3°5 D 17°4



MAY 24, 07:20 U.T.
6" RFT. 250X
CM 213° @ 166°
D@ -3°5 D 17°0



JUNE 12, 08:30 U.T.
12" RFL. 168X
CM 59° @ 177°
D@ -1°5 D 20°3



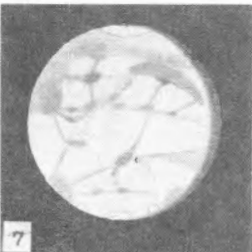
JULY 19, 06:00 U.T.
6" RFT. 280X
CM 53° @ 198°5
D@ +4°2 D 20°9



JULY 21, 04:40 U.T.
6" RFT. 280X
CM 7° @ 200°
D@ +4°3 D 20°7



AUG. 5, 04:45 U.T.
12" RFL. 168X
CM 241° @ 209°
D@ +4°3 D 18°7



AUG. 21, 06:15 U.T.
12" RFT. 500X
WRATTEN #25 RED FILTER
CM 114° @ 219°
D@ +2°5 D 16°4



AUG. 25, 04:00 U.T.
12" RFL. 420X
CM 44° @ 221°5
D@ +2°0 D 15°9



SEPT. 5, 04:05 U.T.
12" RFL. 420X & 336X
RED FILTER
CM 301° @ 228°
D@ 0°0 D 14°5

MARS - 1954

OBSERVER: CLARK C. McCLELLAND



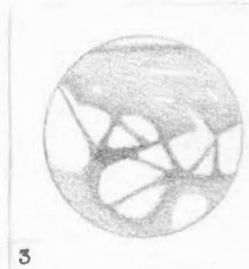
1

JUNE 18, 01:30 TO 01:56
E.D.S.T.
13" RFT, 230X
CM 315° @180°5
D@ -0°2 D 21°1



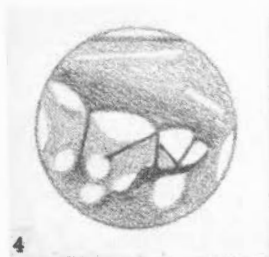
2

JUNE 20, 00:30 TO 01:11
E.D.S.T.
13" RFT, 230X
CM 283° @181°7
D@ +0°1 D 21°3



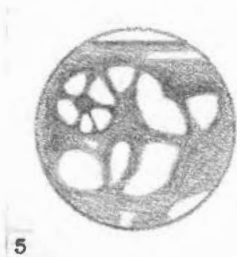
3

JUNE 30, 01:40 TO
02:11 E.D.S.T.
13" RFT, 230X
CM 219° @187°5
D@ +1°8 D 21°86



4

JULY 2, 00:25 TO 01:06
E.D.S.T.
13" RFT, 230X
CM 168° @188°6
D@ +2°2 D 21°88



5

JULY 10, 00:25 TO 00:59
E.D.S.T.
13" RFT, 230X
CM 126° @193°5
D@ +3°4 D 21°7



6

JULY 17, 00:56 TO
01:27 E.D.S.T.
13" RFT, 230X & 400X
CM 57° @197°5
D@ +4°1 D 21°1



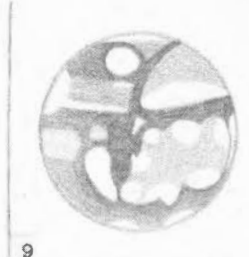
7

JULY 18, 00:26 TO 00:46
E.D.S.T.
13" RFT, 230X
CM 32° @198°1
D@ +4°2 D 21°0



8

JULY 23, 23:32 TO 23:53
E.D.S.T.
13" RFT, 230X
CM 333° @201°1
D@ +4°4 D 20°5



9

JULY 26, 23:30 TO
24:00 E.D.S.T.
13" RFT, 230X
CM 306° @202°1
D@ +4°5 D 20°1

I do not dispute that some "streaky" features may exist, and some photographs support this. Differences in eyesight may also play a part, and a simple experiment once conducted by Baum and myself showed that his eyes are much more sensitive than mine with regard to short wavelengths. But streaks are different from radial spokes, and in any case there seems no basis for the contention that the streaks are even semi-permanent. Once we support the idea of permanency we must go back to the 225-day rotation period, which has been shown conclusively to be false.

I now bow my head to await the stern!

OBJECT BETA:

A CASE OF IDENTITY

by James C. Bartlett, Jr.

The student of lunar surface changes suffers more than his fair share of disabilities, for should he chance to uncover something promising no one will believe him and what is more he had better not believe himself until he has had a second look at his prodigy. The traps which lunar perspective sets for the unwary are many and various, and what may seem a mound in one light will appear as a depression in another. The case of Linné is classical.

I first become acquainted with the strange object which forms the subject of this paper in the summer of 1949, when I was fetched by a remarkable metamorphosis which illustrates very graphically how cautious one should be in drawing lunar inferences. At that time I was engaged in browsing about the lunar arctic which is notable for the numbers of unconventional formations to be found there, and which frequently take the forms of rhombuses and rhomboids apparently squares and parallelograms seen askew. Could we but view them in better perspective it is probable that some at least would prove as remarkable as Maedler's famous Square. Associated with those odd structures are smaller objects to be found here and there, notably in J. J. Cassini, the natures of which are very obscure. J. J. Cassini itself is of considerable interest being a large, ill-defined open space bounded on the east by a high curving escarpment and on the west by what appears to be a shallow valley separating this area from the site of Maedler's Square. Parallelism is a marked feature hereabout and under some angles of illumination a number of alternate whitish and darkish streaks comes out on the surface of J. J. Cassini, giving to that formation a strangely grooved appearance somewhat resembling the effects of glacial striae. These finely pencilled lines are parallel and show a general N.W. to S.E. orientation. One also finds a number of parallel ridges.

In the N. W. corner of J. J. Cassini, about opposite to Birmingham A which lies across the valley, there emerges at sunrise an object of somewhat remarkable appearance (Fig. 1). This takes the form of a long, rectangular block with a bright upper surface which seems to be covered with minute asperities making it appear to be rather rough. The northern side of the block appears to be in shadow and a tapering shadow extends eastward from the block's end. The perspective is that of a solid and fairly high rectangle. A little later a minute craterlet appears on the extreme S.E. corner of the formation, perched upon its very edge, and sometimes a dark diagonal line is seen to cross the block's upper surface (Fig. 2). As the altitude of the sun increases a subtle transformation takes place, and presently the upper surface of the block becomes very dark and its northern side very bright (Fig. 3). Meanwhile changes in the intensity of the surrounding territory make the object increasingly difficult to pick out, and towards sunset it has become reduced to a faint rectangular gray patch of no apparent elevation. Finally, when it comes to the evening terminator, the solid aspect emerges once more but the shadowed top of the block instead of appearing flat now seems to be concave (Fig. 4).

When I first noticed this structure its unusual nature impressed me to the extent that I resolved to study it closely, from sunrise to sunset,



Fig. 1. Object Beta.
James C. Bartlett, Jr.
June 6, 1949.
2^h 14^m, U.T. Col. 26° 8.
3.5-inch refl. at 100X.



Fig. 2. Object Beta.
James C. Bartlett, Jr.
May 4, 1952.
1^h 40^m, U.T. Col. 24° 6
3.5-inch refl. at 100X.



Fig. 3. Object Beta prime.
James C. Bartlett, Jr.
August 20, 1951.
4^h 48^m, U.T. Col. 123° 7.
3.5-inch refl. at 100X.

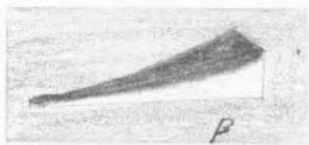


Fig. 4. Object Beta.
James C. Bartlett, Jr.
August 26, 1951.
7^h 31^m, U.T. Col. 198° 3
3.5-inch refl. at 100X.



Fig. 5. Object Beta.
James C. Bartlett, Jr.
September 13, 1951.
3^h 45^m, U.T. Col. 56° 3.
3.5-inch refl. at 100X.

in order to determine its true structural nature. Accordingly I assigned to it the Greek letter beta for purposes of identification.

A first run with Object Beta led to nothing. It seemed to be simply a block and nothing more. Consultation of several maps also led to nothing. Goodacre's map does not show it in any recognizable form, and indeed he makes J. J. Cassini mostly a blank. It is not certainly present in the 1946 edition of Dr. Wilkins' map, though possibly indicated. One difficulty is that the foreshortening here is so severe that conventional drawing of an object to a mean state of libration may differ so from the reality as to make identification of questionable objects very uncertain. Still, all things considered, Object Beta did appear to have a real existence; so I considered how it might be explained in terms of geological experience modified by the peculiarities of the lunar environment.

It looked like a long, narrow outlier or perhaps a peculiar form of mesa; but both types as we are acquainted with them are due to aqueous erosion which, I am told, has never taken place on the moon. For the same reason it did not appear to be the eroded remnant of a dike. It might have been a horst which, if you remember your geology, is an elevated section of the crust separated from similar sections by intervening downthrusts called graben. But horsts and graben usually occur in association whereas this object was isolated. It might have been a block mountain, similar to certain structures in the western United States; but block mountains are sculptured by erosion, either aqueous or aeolian. What could have tailored Object Beta to the clean-cut rectangle it presented?

Having gotten nowhere with theory I thereupon did what I usually do in such cases, namely, wrote a letter. This was addressed to Mr. Elmer J Reese, and after some exposition of the difficulties Mr. Reese was asked to express his opinion of the nature of this object. In his reply Mr. Reese informed me that he was familiar with the formation and that far from being a block of any kind it actually was the ruin of an ancient ring! Moreover the walls were of no great height and the depression was rather shallow. In short the thing was quite commonplace.

This intelligence fairly astounded me and sent me back to the literature for a recheck, but with no results. So the next thing was to re-observe Object Beta from sunrise to sunset, and this time I was more fortunate. On September 11, 1951 (U. T. times and dates here and hereafter), I began a resurvey at $2^h 0^m$, col. 31° . Object Beta appeared in its usual rectangular form complete with the little craterlet perched so curiously on its very edge. It was impossible to believe that this structure was not a solid, rectangular mass. At col. 44° the appearance of the block was about the same, though I did notice a slight apparent deformation such that the top had a look of concavity. It was as if the block had become warped, but still unquestionably a rectangle. Usually at this point in an investigation the weather closes in, one misses the next succeeding colongitude, and so the whole record is thrown into uncertainty; but by some miracle col. 56° arrived on the wings of a very clear night and, as later transpired, this was precisely the colongitude missing from all my previous observations of Object Beta.

Now colongitude does not furnish us with an unvarying measure of the illumination, thanks to the moon's librations. Actually the true angle of incidence of sunlight may vary very appreciably for very nearly the same colongitudes, but this is of little effect near the center of the disc. However, near the limbs, it becomes of very great effect for very small differences.

Thus on June 8, 1949, at col. $51^\circ 4$, Object Beta was its familiar self; but now on September 13, 1951, at col. 56.3 - which is only $4^\circ.9$ difference - Object Beta had undergone a marvelous transformation. In place of the hard, clear lines of the usual block I was bemused to find a flat and shallow oval depression with a familiar craterlet under the rim - if any - of its southeastern wall (Fig. 5).

Here was a classic example of how extremely serious errors may be made in lunar matters; for had I measured this object in its block phase I should have unhesitatingly put it down as a solid rectangle of so many miles length, breadth, and height - and for all I know to the contrary, it may so appear somewhere in the literature. Here also was a pointed reminder of the tremendous importance of consecutive, long-continued observation of lunar objects before one is in position to say much about them. For jackdaws often parade in peacocks' feathers - on the moon. But to get back to Object Beta.

In its true role of a ruined ring the interior was seen to be a bright white and to contain a number of low and minute asperities on the floor. It is this surface which appears as the rough top of the "block" when the object is in its rectangular phase. The wall appears to be highest on the north side and to be very low or possibly wanting altogether on the south. The northern wall also appears to be higher at its eastern end, and a little east of center there appears to be a breach down to the level of the outside surface. The upper surface of this wall appears to be jagged, as small spires of shadow are thrown from the rim. The little craterlet which appears to perch upon the corner of the "block" is seen to lie just under the southeastern rim.

On September 14, 1951, at col. 68.07 , Object Beta remained visible under its new aspect of a shallow oval; but on this occasion I made another discovery of great significance. East of Beta I found a dark, rectangular patch of surface which looked very much like Beta itself when in its block phase. On September 15, at col. 93.01 , Beta itself could no longer be distinguished; but this dark rectangle was very prominent.

It may be recalled that when Object Beta is first seen after sunrise it appears as a bright-topped block with a shadowed northern side. This aspect is maintained until around col. 56° when the true nature of the formation becomes apparent. But before I had made the col. 56° observation I had previously observed what I took to be the same object at colongitudes past 100°, when, as previously noted, it appeared as a dark-topped block with a bright white northern side. The 1951 observations, however, showed that around col. 93° Beta becomes invisible. Hence it is fairly certain that what I had really observed was the dark rectangle east of Beta. This strip of surface - for so it appears to be - is bordered on the north by a corresponding bright strip, and the whole is so similar in shape and proportions to Beta itself when in block phase that a wrong identification is virtually guaranteed. This curious surface strip, which I designated Beta prime, has an amazing appearance of solidity - Nature's own 3-D in the lunar theatre. It might be wondered why a careful eye would not notice that Beta prime is farther east than Beta itself and so avoid confusing the two; but one must ask: farther east of what? For Beta itself vanishes as do all other reference points, including Birmingham A, under high sun.

Most of the enigmas attaching to Object Beta had thus been cleared up. Beta is not a block of crust elevated high above the surrounding surface, but a shallow ring of ancient vintage. Its apparent white top does not become dark, and its dark side does not become white. One merely confuses it with Beta prime. However, the fundamental question remained: By what process does this ruined ring assume the appearance of a rectangular block?

This appearance is very definite and sharply defined, though large apertures would probably dispel the illusion and perhaps even reveal the true nature of the object long before it becomes evident to smaller instruments. However that may be, the south side of the formation appears to have a straight edge denoted by a thin dark line. It is probable that this particular line is merely a subjective delusion. It is there for the same reason that artists give bounding outlines to their figures, though no such lines exist in nature. Probably we see it because we expect to see a definite boundary to a definite object.

For the rest mention has previously been made of the marked parallelism of the surface in J. J. Cassini. Streak markings are common and are most prominently developed shortly after sunrise, which is to say at a time when Object Beta appears so convincingly rectangular. When we reflect that the long sides of the apparent rectangle are parallel also to these streaks, it becomes very probable that it is they which determine its apparent orientation and give to it the character of a block. By the time when Beta emerges in its true form, these confusing streaks have greatly faded.

Libration also has very powerful effects in these far northern regions, and when displacement is to the north objects tend to take on such a linear aspect that one is reminded of the nightmarish angles in The Cabinet of Dr. Caligari. Poor, mad César never had greater difficulty in finding his way through his world of crazy geometry than I have had in identifying objects hereabout.

Such experiences greatly strengthen the position of those who argue against real surface changes on the moon; who maintain that all is illusion, mistake, fantasy. But I remain unrepentant and unabashed and do affirm that such changes do take place, and that they can be disentangled from the snares of lighting and libration.

Nevertheless, should I ever grow too dogmatic, let someone take me aside and gently whisper: "Object Beta".

JUPITER IN 1954-55: SECOND INTERIM REPORT

by Robert G. Brookes

Observers. This report is for the period February 1, 1955 through April 30, 1955. In addition to reports received from observers whose names were published in the First Interim Report (The Strolling Astronomer, March-April 1955) reports have been received from the following observers:

<u>Name</u>	<u>Telescope</u>	<u>Station</u>
Harold Allengray	12.5-inch refr†	Columbus, Ohio
Dr. James C. Bartlett, Jr.	3.5-inch refl.	Baltimore, Md.
	5-inch refl.	
M. Jane Gann	12.5-inch refr.*	Columbus, Ohio
William H. Glenn	6-inch refl.	New York, N.Y.
Noel Gutry	12.5-inch refr.*	Columbus, Ohio
Bill Hartmann	2.4-inch refr.	New Kensington, Pa.
Robert G. Johnsson	6-inch refl.	Chicago, Ill.
Ralph J. Joyce	12.5-inch refr.*	Columbus, Ohio
James Knight	12.5-inch refr.*	Columbus, Ohio
Richard C. Leupold	12.5-inch refr.*	Columbus, Ohio
Ivan E. Ioffis	12.5-inch refr.*	Columbus, Ohio
Roger H. Loftis	12.5-inch refr.*	Columbus, Ohio
George Nielson	12.5-inch refr.*	Columbus, Ohio
Raymond Oxford, Jr.	4-inch refr.	Decatur, Georgia
Belle Rettman	12.5-inch refr.*	Columbus, Ohio
H. T. Sherman	4-inch refl.	St. Paul, Minn.
Chester J. Smith	6-inch refr.	Oakland, Calif.
J. Russell Smith	8 & 16-inch refls.	Eagle Pass, Texas
Ralph Walls	12.5-inch refr†	Columbus, Ohio

* McMillin Refractor at the Ohio State University.

Description. During the period of time covered by this Report the activity seen on Jupiter has increased considerably over that during the period covered by the First Interim Report (The Strolling Astronomer, March-April, 1955). This increase is due, mainly, to a major Disturbance in the SEB.

Belts. The NEB remains, by far, the most prominent belt. The SEB has become darker and more prominent in some longitudes following the SEB Disturbance (see below: The SEB Disturbance). The STB and NTB are about equally conspicuous. The NTB is generally recorded as being a double belt for some longitudes. The exact rank of conspicuousness of the STB, SEB_n, and NTB_n is rather difficult to determine because at times they have all been recorded as being the second most conspicuous belt. But, on the average, the SEB_n seems to have been the most conspicuous belt of the three with the NTB_n following. The rank of the belts in decreasing, relative conspicuousness was: NEB, SEB_n, NTB_n, STB, SSTB, NNTB, NTB_s, SEB_s, and EB. These are averages through March 1955. Figures 6-11 show some of Jupiter's various aspects. C. J. Smith shows on his drawing (Figure 6) one of the first views of the SEB Disturbance. He also shows the EB. The EB is being recorded regularly by observers using telescopes of both large and small apertures so that we can safely conclude that there is an EB this apparition. Also, there is photographic evidence of the EB; on a photograph taken by Philip R. Lichtman the EB is shown. (The date and time of Mr. Lichtman's photograph are not known). Owen C. Ranck shows the double NTB and the EB on many of his drawings. Figure 7 is a good example of his views of Jupiter. J. Russell Smith shows very well the changing aspect of Jupiter, in a short period of time, on his drawings of March 2, 1955, 2: 03 and 3: 45 U.T. (Figures 3 and 9). Figure 8 shows a doubling of the STB on one preceding side of the C.M., the SEB Disturbance, the EB extending almost completely across the disc, and a single NTB. Figure 9, made 1 hour and 42 minutes later, shows the RS, the EB ending abruptly near the preceding limb of Jupiter, and the NTB as double. Leonard E. Abbey, Jr. showed the SEB_n as a very fine double on several of his drawings; Figure 10 demonstrates this appearance very well. Figures 10 and 11 show the double NTB and some small black spots in the SEB, NEB and NTB; remarks pertaining to the Jovian black spots will be made below.

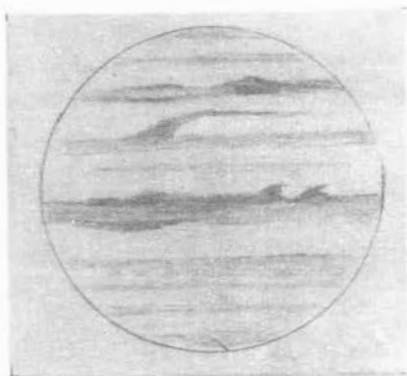


Figure 6. Jupiter.
 Chester J. Smith. $3^h 50^m$, U.T.
 February 8, 1955. 6-inch refractor. 200X.
 $C. M._1 = 48^\circ$. $C. M._2 = 223^\circ$.

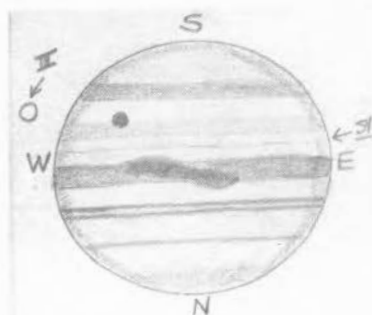


Figure 7. Jupiter.
 Owen C. Ranek.
 February 24, 1955. $0^h 55^m$, U.T.
 4-inch refractor. 150X.
 $C. M._1 = 308^\circ$. $C. M._2 = 2^\circ$.

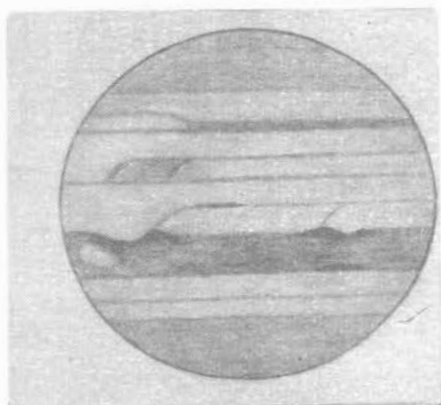


Figure 8. Jupiter.
 J. Russell Smith.
 March 2, 1955. $2^h 3^m$, U.T.
 8-inch reflector. 180X.
 $C. M._1 = 217^\circ$. $C. M._2 = 225^\circ$.

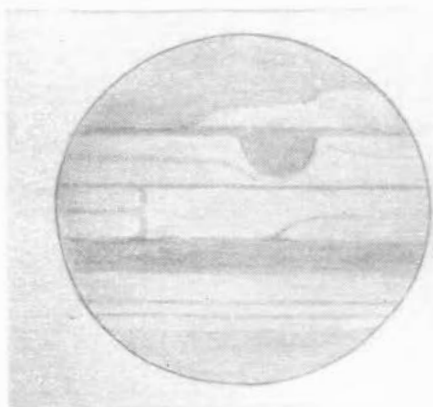


Figure 9. Jupiter.
 J. Russell Smith.
 March 2, 1955. $3^h 45^m$, U.T.
 8-inch reflector. 180X.
 $C. M._1 = 279^\circ$. $C. M._2 = 287^\circ$.

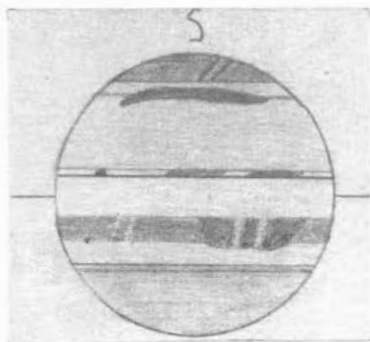


Figure 10. Jupiter.
 Leonard B. Abbey, Jr.
 March 12, 1955. $4^h 0^m$, U.T.
 6-inch reflector. 225X.
 $C. M._1 = 67^\circ$. $C. M._2 = 358^\circ$.

The South Equatorial Belt Disturbance. On February 8, 1955 at about 4:00 U.T. while observing Jupiter Walter H. Haas and Chester J. Smith both observed a dark column in the SEB (Figures 6 and 12). The dark column appeared to be based on the SEB_n and was swept back toward increasing longitude forming the SEB_g , which appeared dark just following the dark column but faded rapidly and became invisible (?) near the longitude of the preceding end of the RS. The SEB_g was not seen preceding the dark column. The longitudes (II) of the dark column are shown on Figure 12. These observations of Mr. Haas and Mr. C.J. Smith resembled initial outbreaks of previous major SEB Disturbances in certain aspects. On February 16, 1955 (U.T.) Elmer J. Reese observed the Disturbance and remarked that it resembled the SEB Disturbance of a former year when it was two weeks old. Transits by Mr. Reese placed the longitude (II) of the Disturbance at 201° for the preceding end and 223° for the following end. He recorded the SEB_n as being disturbed as far as longitude (II) 188° . A drawing (Figure 13) made by A. P. Lenham on February 28, 1955 shows the aspect of the SEB Disturbance and adjacent areas about twenty days after the Disturbance was first observed. Mr. Lenham first observed the Disturbance on February 11, 1955 as a dark streak joining the SEB_n and the SEB_g . The SEB_g was not visible to him just preceding the dark streak. J. R. Smith's drawing of March 2, 1955 (Figure 8) shows another aspect of the SEB Disturbance. By March 30, 1955 the preceding end of the Disturbance had advanced toward decreasing longitude to approximately longitude (II) 117° , the following end being at approximately 230° . Mr. Reese's composite drawing of March 24, 29 and 30, 1955 (Figure 14) shows the continuing activity and development of the Disturbance. Mr. Haas observed a faint dark column between the components of the SEB on April 15, 1955: the longitude of its base on the SEB_n was 78° . At that time Mr. Haas made these remarks about the marking: "[This feature] is presumably the preceding end of the 1955 SEB Disturbance. However, this dark column is less conspicuous than the one observed between the components of the SEB in February, nor does the SEB_g darken at [longitude (II) 78°]. The SEB_n widens and shows more structure following [longitude (II) 78°]." On April 18, 1955 Mr. Reese secured a drawing (Figure 15) of the area observed by Mr. Haas on April 15; the faint dark column at longitude (II) 70° on this drawing is probably the same faint dark column Mr. Haas observed on April 15. Mr. Reese's observation of April 18, 1955 is the last received, pertaining to the SEB Disturbance, for the period covered by this Report. The 1955 SEB Disturbance appears to be of major proportions; and if it continues to develop as previous major SEB Disturbances did, we can expect the SEB to darken and become very dark, probably rivaling the NEB on occasion. Already on one occasion the SEB has been recorded to be as dark and wide as the NEB. This aspect was shown by R. M. Adams on a drawing made on May 1, 1955, 2:00 U.T., CM_1 321° , CM_2 232° . Also, the aspect of the RS area will change from that of the Spot to that of a Hollow; a change which is now apparently taking place (see below: Red Spot).

Zones. The Jovian zones remain on the whole less intense than during the last apparition. The EZ and NTrZ are still the brightest zones. The long-enduring brighter sections of the STeZ are shown and lettered on Figures 14 and 15. Also, the bright oval in the STeZ on Figure 13 at about longitude (II) 250° is the bright section D-E as shown on Mr. Reese's drawings. Note the fine doubling of the STB between C and D on Figure 14. This doubling is also shown on Figures 13 and 15.

The Red Spot. The appearance of the RS is again changing (see First Interim Report, The Strolling Astronomer, March-April, 1955). At the beginning of February the RS was a dark reddish-brown ellipse centered near longitude (II) 290° ; a faint Bay was sometimes recorded in the SEB. On February 8, 1955, Walter Haas had an unusual view of the RS (Figure 16). Mr. Haas recorded the preceding and following ends of the Spot to be pointed; also he suspected that the long (major) axis of the Spot was not parallel to the equator of Jupiter. Figure 16 shows a faint shoulder of the RS Bay. A CM transit by Mr. Haas placed the center of the RS at longitude (II) 296° on that date. On Mr. Lenham's drawing of February 28, 1955 (Figure 13) he shows the RS as a dark ellipse centered at longitude (II) 300° ; the RS Bay is shown complete but faint in the SEB.



Figure 11. Jupiter.
Leonard B. Abbey, Jr.
April 9, 1955. $3^h 0^m$, U.T.
6-inch reflector. 300X.
C.M.₁ = 128° . C.M.₂ = 206° .



Figure 12. Dark Column in
S.E.B. of Jupiter.
Walter H. Haas.
February 8, 1955. $4^h 0^m$, U.T.
12.5-inch reflector. 367X.



Figure 13. Red Spot, S.E.B. Disturbance and
Vicinity on Jupiter.

A. P. Lenham.
February 28, 1955. $19^h 0^m$ - $22^h 10^m$, U.T.
9-inch reflector. 300X..



Figure 14. S.E.B., S.Tr.Z., S.T.B., and S.Te.Z. of Jupiter.
Composite Drawing on March 24, 29, and 30, 1955 by Elmer J.
Reese with a 6-inch reflector.



Figure 15. Part of S.E.B., S.Tr.Z., S.T.B.,
and S. Te. Z. of Jupiter.

Elmer J. Reese, April 18, 1955.
 $0^h 58^m$ - $2^h 50^m$, U.T.
6-inch reflector. 320X.

Toward the later part of March some observers were reporting the RS as becoming less conspicuous. As the RS became less conspicuous, the RS Bay in the SEB became more prominent; and the aspect of the area became more that of the Hollow. On Figure 14, Mr. Reese shows the RS as less distinct and more disturbed than previously recorded; this drawing also shows the increased conspicuousness of the RS Bay. Figure 9 shows another view of the RS. On a series of four photographs taken by Philip R. Lichtman on March 31, 1955, 1:52 to 3:01 U.T., the disturbed RS area is shown as it advances from the limb of the planet to near the CM. On the photographs the RS appears less symmetrical than on previous photographs taken by Mr. Lichtman. On the first two photographs taken at 1:52 U.T., CM₂ 254° and 2:04 U.T., CM₂ 261° the SEB is shown as a wide double, possibly wider than the NEB, but not nearly so dark. Both components of the SEB were about the same intensity. On the next two photographs taken at 2:49 U.T., CM₂ 288° and at 3:01 U.T., CM₂ 296° the SEB doesn't show so distinctly as being a wide double. (However, this aspect could be inherent in the photographs and not real). Immediately following the RS the SEB is seen and, possibly, a faint SEB₂ which isn't nearly so intense as preceding the RS.

Unusual Satellite Phenomena. On February 20, 1955 (U.T.) Elmer J. Reese observed JII to transit directly across JIII; mid-transit occurred at 2:22 U.T. This phenomenon was also seen by William H. Glenn and others in his observing group. Mr. Glenn writes as follows of their observation: "On the night of [February 20, 1955] several members of the Observing Group of the Amateur Astronomers Association here (New York, N.Y.) observed a very unusual phenomenon among Jupiter's satellites. We were observing the planet with a 6-in. refl. . . . [about 250X], and at [2:45 U.T.] observed that there was only one satellite on the west, and two on the east. This was nothing unusual, and we assumed that one of the satellites was in eclipse or transit. Much to our amazement when we next turned our attention to the satellites at [3:45 U.T.], there were two [satellites] clearly seen on the west, separated very slightly." When the New York group made their 2:45 U.T. observation the two satellites were still probably in contact; but the observers, not having previous knowledge of the configuration of the satellites, failed to recognize just what was taking place. Only after their 3:45 U.T. observation were they aware that something unusual had taken place, and they correctly concluded that a mutual occultation, or very close approach, of JII and JIII had occurred. Also on the same night at 0:00 U.T., Dr. James C. Bartlett, Jr. saw only one satellite (he presumed it was JIII) where there should have been two. At the time Dr. Bartlett made his observation the satellites JII and JIII were separated by only 2.4 seconds of arc and his telescope failed to resolve them. Mutual occultations of Jupiter's satellites can occur about every six years; and during 1950 - according to the B.A.A. Handbook 1950 - 27 such phenomena were predicted for JI and JII. Thus probably the most unusual thing about the February 20, 1955 mutual occultation of JII and JIII was that it was not predicted, at least not in the A.E.N.A., Handbook of the B.A.A. nor Observers' Handbook of the R.A.S.C.

On February 13, 1955 Walter H. Haas observed a non-central transit of JII across JIII with a 12.5-inch reflector at 367X in average seeing. He recorded first external contact of the two satellites at 4:34, U.T., the first internal contact at 4:46, and the last internal contact at 5:04, these times being uncertain by several minutes. The final external contact had apparently not yet occurred when both satellites were occulted by Jupiter near 5:23, U.T. The center of JII passed to the south of the center of JIII so that about one-third of the diameter of III was not occulted. As it ingressed upon the disc of III, the limb of II appeared to be bordered by a dark gray band, presumably an optical effect. The greater surface brightness of II compared to III was at all times very evident.

Are the Jovian Black Spots the Source of Natural Radio Signals Received From Jupiter? In recent correspondence with Dr. Bartlett this question was posed and answered, speculatively, by him. First a brief comment as to the radio signals received from Jupiter: Early this year radio signals of 22 megacycles frequency were detected being emitted from Jupiter by Carnegie Institute astronomers with their narrow beam radio-telescope located at Seneca, Maryland. Drs. B. F. Burke and K. L. Franklin of



Figure 16. Red Spot on Jupiter.
Walter H. Haas.
February 8, 1955. $5^h 40^m$, U.T.
12.5-inch reflector. 367X.
 $G.M_2 = 290^\circ$.

Carnegie Institute reported the above findings to the American Astronomical Society at Princeton; and they are quoted: "What causes these radio signals of a frequency of 22 megacycles remains to be explained. The emissions are probably caused by violent disturbances in the atmosphere of Jupiter, similar to our thunderstorms but on a much larger scale." (The above was taken from the Baltimore News-Post). Just recently the Jupiter Recorder received a letter from Dr. G. de Vaucouleurs (see Jan.-Feb. 1955 issue of The Strolling Astronomer) in which Dr. de Vaucouleurs wrote that recent studies by him and his Australian colleagues of radio sound tracings made in 1950 and 1951 confirmed the findings of the "Washington Group". The above is all the data we now have pertaining to radio signals received from Jupiter.

Now for Dr. Bartlett's speculation as to a possible Jovian phenomenon that might give rise to the radio signals. Dr. Bartlett writes as follows: "The suspicion occurs to me that these signals may have an intimate relation to the Jovian black spots (some of these spots are shown on Figures 10, 11 and 15) and indeed may be coming from them. My only reason however for speculating is because the signals have been tentatively attributed to electrical storms in the Jovian atmosphere.

"Such storms would be a little different from those with which we are familiar, of course, but the thought does seem reasonable that major atmospheric disturbances on Jupiter might be accompanied by the generation of static electricity. Indeed since to build potential difference it is required only to have friction between non-conducting, or nearly non-conducting surfaces, such disturbances must be accompanied by electrical discharge and therefore by radio signals.

"Application to the Jovian black spots is valid only if we can regard them as moving atmospheric systems probably representing Jovian barometric lows. I know of no evidence that can decisively settle the point; but there is considerable evidence to support the possibility:

- 1) These spots arise spontaneously, have a relatively short existence, then disappear. It is probable therefore that they are atmospheric phenomena rather than solids.
- 2) They have independent movement generally, perhaps always, in the direction of rotation.
- 3) By drift past contiguous atmospheric strata difference of potential must be established.

"Points 1 and 2 are certain and supported by observation and point 3 is extremely probable (if we could be sure of the exact nature of the spots it too would become certain). Therefore it is entirely reasonable: (a) to suppose that these Jovian spots represent atmospheric systems, and (b) to suspect that they may be accompanied by electrical phenomena and therefore may represent at least one source of the radio signals."

Since the above was written a short article about the Jovian radio signals has appeared in the June 1955 issue of Sky & Telescope, page 324 and in the June 1955 issue of Scientific American, page 50. The reader is referred to those articles for further particulars about the Jovian radio signals.

MAJOR S. E. B. DISTURBANCES ON JUPITER

AND AN APPARENT CLUE TO THE TRUE ROTATION OF THE GIANT PLANET

It has long been known that the clouds at the visible surface of Jupiter show a wide variety of rotation-periods. The vigorous observations of the Jupiter Section of the B.A.A. have established the existence of about a dozen different latitudinal currents; and, in a very general way, markings near the equator rotate in about $9^h 50^m$ (System I), and those in higher latitudes in about $9^h 55^m$ (System II). Nevertheless, it must be stressed that only observation can establish the period of rotation of a particular surface feature.

Now one of the riddles of the ever-changing Jovian panorama is the occasional occurrence of great outbreaks of activity in the South Equatorial Belt. These are called S.E.B. Disturbances and have been recorded in 1919, 1928, 1943, 1949, 1952, and 1955. Each S.E.B. Disturbance has followed a similar pattern of development. Beginning with one or two very dark spots in the S.E.B., the activity advances in the direction of decreasing longitude at the rate of several degrees a day. The space between the S.E.B. components darkens behind this advancing front, and new spots and streaks continue to appear at or near the longitude of the initial outburst (pg. 66). Eventually the Disturbance may girdle the whole globe of Jupiter, and the S.E.B. in the longitudes covered by the Disturbance may be the most conspicuous belt on Jupiter.

In a very stimulating and perhaps extremely significant paper "A Possible Clue to the Rotation Period of the Solid Nucleus of Jupiter", J.B.A.A., Vol. 63, pg. 219, 1953, Mr. Elmer J. Reese speculates that the source of these S.E.B. Disturbances may be a gigantic volcano below the surface cloud layers. Of course, Jovian vulcanism might be very different in nature from vulcanism on the earth. If volcanic activity is the cause, then since such a volcano would be fixed in position on a solid or semi-solid core of Jupiter, the longitudes of the initial outbursts of activity in the S.E.B. should be compatible with a constant period of rotation. Mr. Reese investigated this problem and found that the longitudes of the observed initial outbursts could be related to the longitudes of two hypothetical subsurface volcanoes, each having a period of $9^h 55^m 42^s.66$. He suggested that the appearance of future S. E. B. Disturbances might confirm or refute this idea, and therefore the 1955 S.E. B. Disturbance was of very great interest. In recent months Mr. Reese has sent us some valuable correspondence, charts, and drawings relating to this problem of what S.E.B. Disturbances may tell us about the true rotation of Jupiter. We quote:

"There can now be little doubt that the present [1955] disturbance in Jupiter's South Equatorial Belt belongs in the same category as the other six major disturbances. Note the similarity of the longitude charts pertaining to the last three disturbances. [Mr. Reese has sent us charts for the 1949, 1952-53, and 1955 S.E.B. Disturbances. Observations were most numerous in 1949, and the chart for that year is reproduced on pg. 68. In the second column of the table on that page these abbreviations are used: D for dark, W for white, p for preceding end, c for center, and f for following end. The third column gives the beginning and ending dates of observation; the fourth column, the corresponding longitudes (II). The fifth column gives the longitude on September 3, 1949; the sixth column, the number of transits observed; and the seventh column, the change in longitude per 30 days.] The longitude of the initial eruption of the present disturbance falls very near a straight line passing through the plotted longitudes of the initial eruptions of the disturbances of 1928, 1943, 1949 and 1952. [See graph on pg. 67.] The major disturbance of 1919 and the secondary disturbance of 1943 fall on another line exactly parallel to the 1928 - 1955 line. Thus it seems that the disturbance of 1955 has considerably strengthened the hypothesis that the disturbances are caused by two fixed sources of commotion located beneath the visible cloud layers. If we adopt $9^h 55^m 42^s.66$ as the constant rotation period of the hypothetical sources and if we base a drift line on the 1943 disturbance, we have the following residuals (observed longitude - computed longitude):

1928	+ 9°	1919	0°
1943	0	1943a	0
1949	+ 19		
1952	+ 9		
1955	- 8		

These residuals are large enough to make one wary of the hypothesis; and small enough to make one even more wary that the longitudes of the various disturbances were at random.

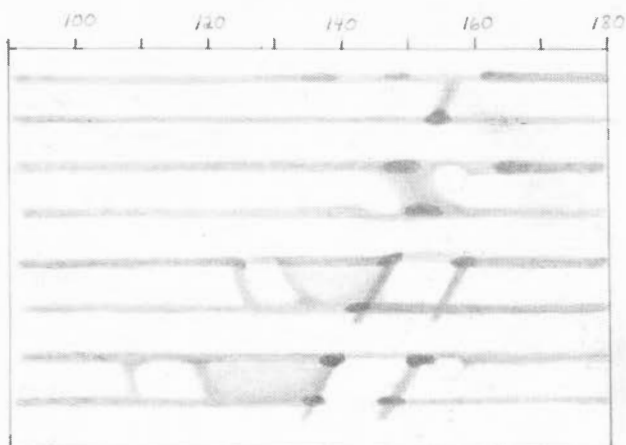
"The small X- marks on [the graph on pg. 67] show the positions of six lesser disturbances (in some cases isolated spots) in the interior of the S.E.B. Five of the six disturbances fall fairly close to one or the other of the drift lines

"In my opinion, the most likely explanation for the residuals between the computed and observed longitudes of the initial outbreaks would be that the observed outbreaks lie at variable distances from their source as a result of variable wind velocities in the Jovian atmosphere and variable velocities of ascent of the erupted material. I do not think that a major part of these residuals can be imputed to late discoveries of the initial outbreaks because the initial longitude can be checked and rechecked during the first month or two of the disturbance. This may seem absurd but it really is not. The volcano - if that is what it is - does not erupt once and quit, but erupts many times at irregular intervals during the life of the disturbance. Each succeeding eruption becomes visible at approximately the same longitude (II) as the first eruption, and each in turn drifts westward along the interior of the S.E.B. As a result, the interior of the S.E.B. becomes filled with dusky matter at an ever increasing distance west of the longitude of the initial eruption, but the interior of the belt remains clear and bright following that longitude - at least for the first month or two. [Refer to drawings on pg. 66.] If we plot the longitudes of the following end of a disturbance for a month or two, we can (1) obtain a reliable longitude for the place where the erupted material first penetrates the observable outer atmosphere, (2) check the rotation period of the volcano during that month or two, (3) determine whether or not the erupted material is affected by varying atmospheric winds during its ascent. A study of available data pertaining to all of the major disturbances to date gives the following results: The rotation period of the following end of each disturbance (and hence of the causative volcano) is approximately $9^h 55^m 43^s$ which nicely confirms the period already suggested for the solid nucleus of the planet. The drift of the following end of each disturbance, while usually fairly linear, does at times become quite sinuous varying as much as 15° on either side of its mean position. Hence we have observable evidence that the erupted material can be displaced by as much as 30° in longitude by the time it reaches the visible surface of the planet (Q. E. D.).

"Of course the validity of these postulates depends on the validity of the fundamental assumption that the S.E.B. disturbances are caused by eruptions from two fixed sources at a lower level within Jupiter."

Mr. Reese directs attention to the following extract from Astronomy, Vol. 1, pp. 368 - 369, by Russell, Dugan, and Stewart:

"It is probable that the visible markings on Jupiter are at different levels, - the rapidly changing ones being in the rarefied outer gaseous layers, while the more permanent ones lie deeper and probably originate from eruptions from denser layers, where disturbances may maintain themselves for a long time. The rotation period at these lower levels must be nearly uniform, - for fluid friction would soon smooth out any considerable irregularities, - and is probably about equal to that of the great red spot. The shorter periods, on this view, correspond to currents in the upper atmosphere, running in the direction of the planet's rotation. The great equatorial current, which has fairly well-defined gaseous banks, runs eastward at the rate of 250 miles an hour. Winds in the earth's upper atmosphere - also eastward - have often been observed to go half as fast." In this quotation eastward is taken as the direction of the planet's rotation and not in its more usual sense of a direction in the terrestrial sky. The required velocity for the



System II

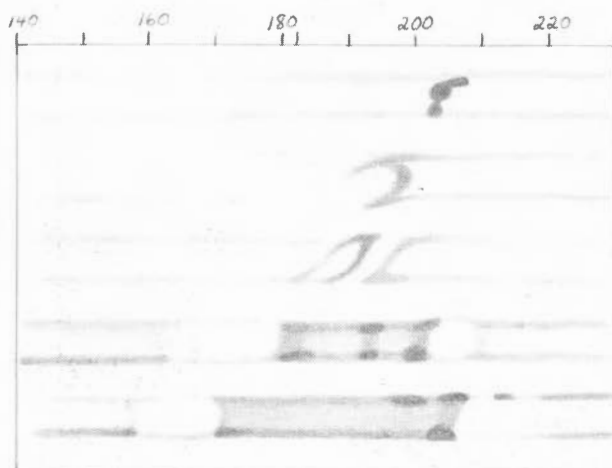
Jul. 23
(Hare and Murayama)

Jul. 25
(Monger, O'Toole, Reese)

Jul. 28
(Hare and Reese)

Aug. 1
(O'Toole and Reese)

Early Stages in the Development of the SEB Disturbance of 1949



System II

Oct. 22
(Reese)

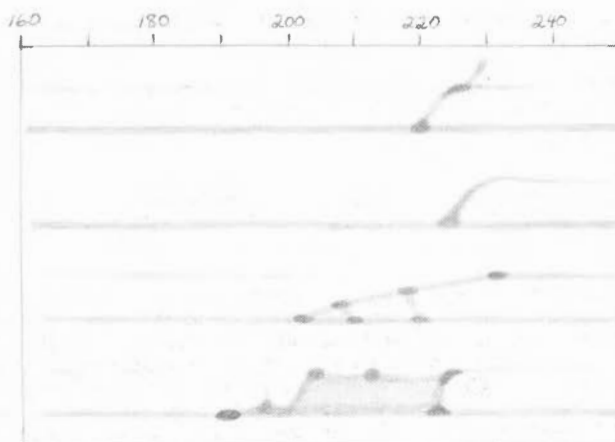
Oct. 24
(Komoda)

Oct. 29
(Komoda)

Nov. 5
(Reese)

Nov. 12
(Reese)

Early Stages in the Development of the SEB Disturbance of 1952



System II

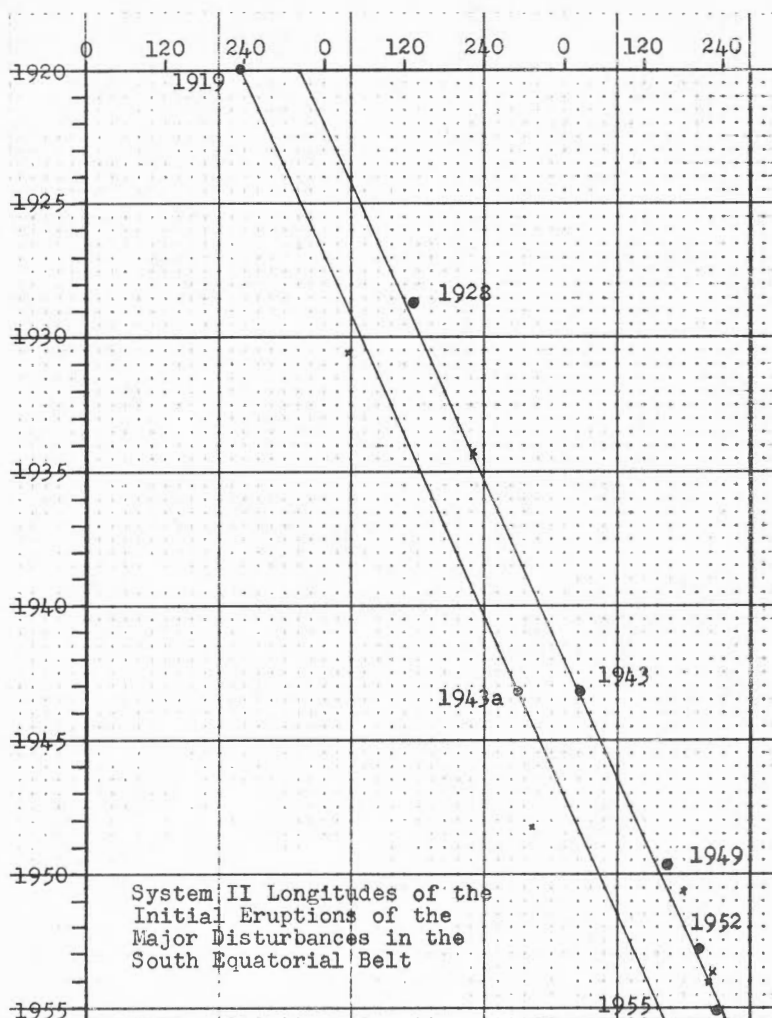
(Ruggieri)
Feb. 4

Feb. 8
(Haas)

Feb. 11
(Lenham)

Feb. 16
(Reese)

Early Stages in the Development of the SEB Disturbance of 1955



Jovian equatorial current is comparable to that of the jet stream in the earth's upper atmosphere.

We congratulate Mr. Reese on an excellent piece of work and eagerly await the appearance of the next S. E. B. Disturbance.

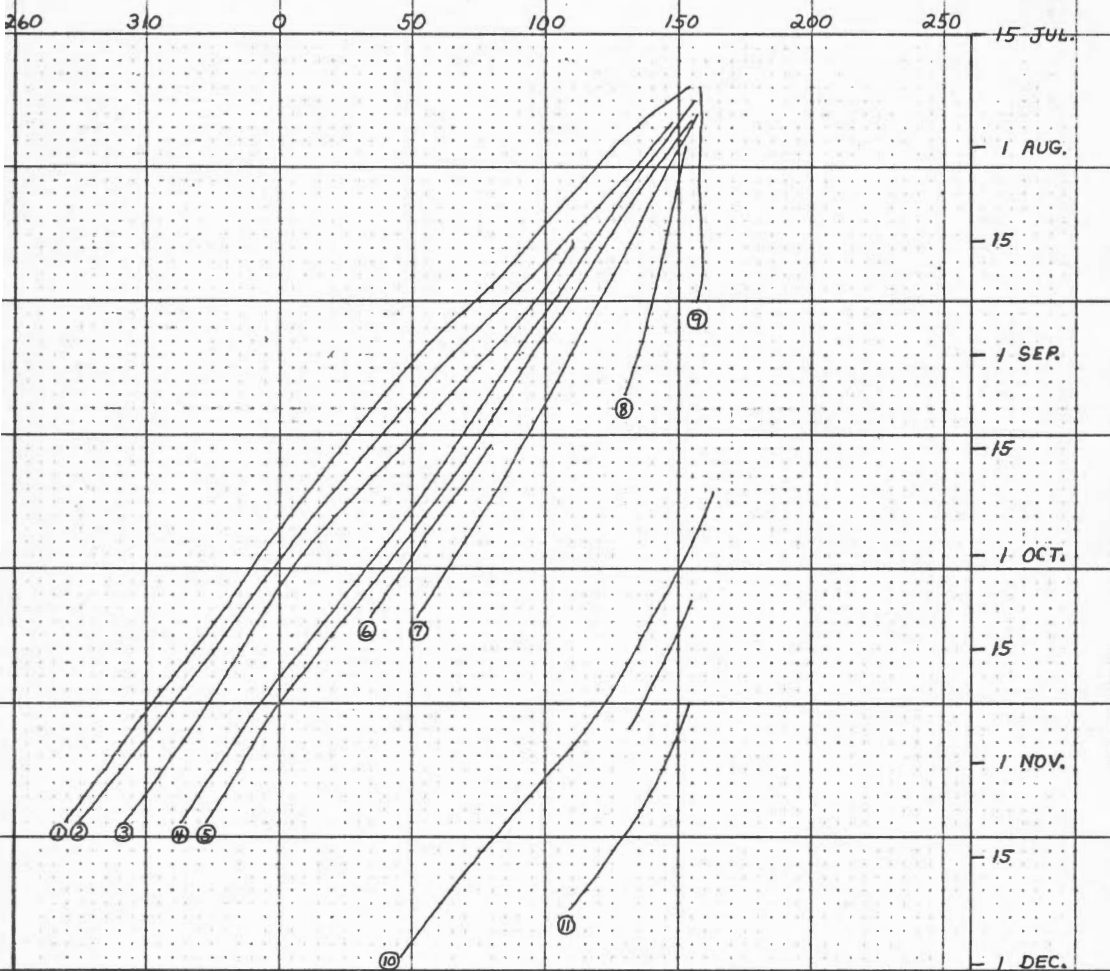
THE SEVENTH CONVENTION OF WESTERN AMATEUR ASTRONOMERS

by Walter H. Haas

The Western Amateur Astronomers, a loose federation of amateur astronomical societies in California and neighboring states, held its Seventh Annual Convention at Camp Curry in Yosemite National Park, California on August 19-21, 1955. More than 200 persons attended to bring about a singularly enjoyable and successful Convention. The tree-studded floor of the Yosemite Valley, with sheer cliffs rising thousands of feet above it, provided a very lovely setting for the gathering; and the weather was as fine as it presumably always is in California. The host societies were the Central Valley

S. EQUATORIAL BELT DISTURBANCE OF 1949

SYSTEM II



NO.	MARK	LIMITING DATES	LIMITING λ	λ SEP. 3	TRANSITS	$\Delta\lambda/30^d$
1	Df	JUL. 23 - NOV. 10	154 - 279	48	17	-64.1
2	Df	JUL. 28 - NOV. 10	147 - 283	64	12	-64.0
3	Df	AUG. 25 - NOV. 10	93 - 302	75	7	-59.6
4	Wc	JUL. 25 - NOV. 10	157 - 323	84	9	-53.9
5	Df	JUL. 28 - NOV. 10	154 - 332	91	15	-52.0
6	Df	SEP. 14 - OCT. 10	79 - 35	98	4	-50.8
7	Dc	JUL. 27 - OCT. 10	158 - 53	107	9	-42.0
8	Df	AUG. 1 - SEP. 7	153 - 129	132	6	-19.5
9	Df	JUL. 23 - AUG. 24	158 - 158	(158)	10	0.0
10	Df	SEP. 21 - NOV. 30	162 - 46	(186)	11	-49.7
11	Df	OCT. 28 - NOV. 23	149 - 109	(235)	4	-46.2

MEAN (WITHOUT NOS. 8, 9) - 53.6

MEAN ROTATION PERIOD $9^h 54^m 27^s$

TRANSITS BY:

E.E. HARE, W.H. HAAS, D. O'TOOLE, S. EBISAWA, S. MURAYAMA, L.T. JOHNSON,
E.K. WHITE, E.J. REESE.

Astronomers of Fresno, the Stockton Astronomical Society of Stockton, and the Sacramento Valley Astronomical Society of Sacramento. Mr. Carl W. Anderson was the General Chairman of the Convention. To him and his hard-working Convention Committee all who were there owe a debt of gratitude. The program was so full of tasty astronomical fare that sometimes there were two or three concurrent sessions - one almost felt like the spectator at a three-ring circus and had to choose what to watch!

The papers presented covered a wide variety of subjects. Two Morrison Lectures by professional astronomers were sponsored by the Astronomical Society of the Pacific. Dr. E. C. Slipher of the Lowell Observatory spoke upon "Mars in 1954", describing his highly successful photographic observations of Mars in South Africa last year and their interpretation. There is considerable interest in the "blue clearing", which will be closely watched in 1956. The second Morrison Lecture was by Dr. Gerald Kron of the Lick Observatory and dealt with "Photons, Electrons, and Our Universe." A whole session of papers was given over to lunar and planetary observing. Mr. Neil Stockton presented a paper on "Observing Our Moon"; Mr. Thomas R. Cave, Jr. spoke on "Mars, 1956 - A Challenge to the Amateur"; Mr. Robert G. Brookes in absentia told us about "Jupiter - Observations for the Amateur and the 1954-55 Apparition"; Mr. Chester J. Smith described "Jupiter - South Tropical Disturbance of February 1955", actually the South Equatorial Belt Disturbance discussed elsewhere in this issue; Mr. Thomas Cragg talked upon "Saturn's Rings - A Newly Discovered Division, and a Proposed Division Designation System", the "new" division being near the middle of Ring B; and the writer spoke on "Opportunities for the Amateur in Lunar and Planetary Astronomy". Another session was devoted to papers on instrument and telescope making. At yet another session Mr. Arthur Leonard and others conducted a symposium on "Unobstructed Reflecting Telescopes". They analyzed the inherent shortcomings of the conventional reflector and discussed various proposed optical designs for remedying them. Some of these are novel indeed, and it will be interesting to hear what the actual performance is of these off-axis reflectors and unobstructed compound reflectors after they have been built and tested. Other papers at other sessions dealt with the use of amateur telescopes for "sky touring" to find galaxies, nebulae, double stars, and other interesting objects, "The U.S. Naval Observatory", "The Origin of Surface Features of the Earth and Moon", "An Occultation of Venus", "Current Behavior of the Variable Star R Geminorum", "Solar Astronomy at the National Bureau of Standards" (research with a radio telescope at Boulder, Colorado), and "Photo-electric Recording of Occultations". In addition, a number of astronomical movies were shown. Mr. Rolf F. Illsley of the Optical Coating Laboratory, Santa Rosa, California presented a paper on "Aluminizing Telescope Mirrors" and followed it with an actual demonstration in the Convention Exhibit Room. The exhibits, in this writer's opinion, were especially deserving of praise. Mr. Victor Killick and his co-workers had assembled an imposing array of telescopes, books, and miscellaneous gadgets. One could not help being impressed at this Convention by the high quality of some amateur work and by the great amount of time and effort which some amateurs give to their avocation.

No Convention is complete without a Star Party. The Yosemite Star Party was held at Glacier Point some 8,000 feet above sea level. Late afternoon clouds caused a little anxiety, but by nightfall the sky was very clear. Dozens of portable telescopes were soon pointed at the crescent moon, Saturn, M. 13, and favorite double stars and nebulae, as well as Comet 1955 f (or was it g?). These telescopes were a cross section of amateur instruments, ranging from the smallest and crudest to imposing professional jobs as much as 12 inches in aperture - above which size portability is not easy to achieve! There was a complete true democracy as people slowly moved from telescope to telescope, young and old, unknown amateurs and the famous, sharing a common love for the stars. It was an experience long to be remembered. A few hardy souls braved the cold to remain at Glacier Point most of the night.

The Convention presented its G. Bruce Blair Award for 1955 to the writer - most undeservedly, he feels. The Award is given each year for "achievement in amateur astronomy" and was presented in 1954 to Mr. Albert Ingalls, whose writings in Scientific American magazine are known to all of us. The Award is named for the late Professor G. Bruce Blair, who did a great deal to found the Western Amateurs and to initiate their Annual Conventions. The writer

is well aware that his personal astronomical work has been very small in amount for some time and feels that this generous recognition from the W.A.A. must rather be for what our Association of Lunar and Planetary Observers has achieved since its inception in 1947. From this point of view we may take justifiable pride that our efforts to date have been thought so worthy, and we may also properly dedicate ourselves to trying to do still better work in the future. We need, for example, a systematic method of reviewing books pertaining to lunar and planetary astronomy and related fields; we need some way of disseminating the more important information in magazines we exchange with The Strolling Astronomer among our members; we need a translating service for astronomical material received in foreign languages; we need some kind of rapid communication among our widely scattered members when potentially valuable observations require immediate attempted confirmation. We have, in brief, no cause for complacency. On behalf of the A.L.P.O. the writer thanks the W.A.A. for this fine Award, and we hope that we shall show ourselves worthy of it.

During the Convention Mr. Arthur Leonard set up a target at Glacier Point to be viewed in telescopes at Camp Curry. On the target were strung wires of accurately known widths, the thinnest considerably less than a second of arc in diameter as viewed from Camp Curry. Such tests are of obvious interest to A.L.P.O. members because of their relation to the visibility of fine lunar and planetary detail.

It has been said that the most important part of a Convention is outside of the regular and formal meetings. Certainly it is a pleasure to make new friends and to renew acquaintances with old ones. At Yosemite, as at other W.A.A. Conventions, there were at all times little knots of amateur astronomers in conversation upon a wide variety of subjects. It is especially gratifying to meet in-the-flesh astronomical friends previously known only through correspondence. There is an easy and informal air about such amateur gatherings which all who attend find very enjoyable.

At this time the site of the 1956 Convention of Western Amateur Astronomers has not been selected. One possibility being considered is the Lowell Observatory at Flagstaff, Arizona; and Mars would be near its closest possible approach at the expected dates of the Convention. The Lowell Observatory staff is agreeable to the idea, and it might even be possible to observe Mars through the famous and excellent 24-inch Clark refractor. With such an inducement, perhaps we could have at the same time and place a meeting of our far-flung A.L.P.O. Should we try?



Figure 17. Some of the A.L.P.O. Members at the Seventh Annual Convention of Western Amateur Astronomers, Yosemite National Park, California, August 19-21, 1955. Left to Right: Clarence P. Custer, M.D., D. P. Avigliano, Frank Kettlewell, Walter H. Haas, David P. Barcroft, and Thomas R. Cave, Jr.

THE CHILDREN OF COPERNICUS ?

by Howard G. Allen

Among the best lunar photographs ever taken are the First and Last Quarter views that have been enlarged and printed as the Lick Photographic Atlas. Recently the writer began a search through the atlas for elliptical pits that might result from rocks hurled from a crater in its explosive birth. Many suspects were found, but by far the greater number visible on these plates (with one possible exception) are in the vicinity of Copernicus. A chart of the most probable ones was made by pin-pricking their positions into a sheet of heavy paper. To do this the back cover of Sky and Telescope for June 1947 was used. The cover had been taken from the atlas and this left Plate XV unmarked for further study of the pits.

Most of these features are so delicate and so near Copernicus that they are difficult to distinguish from the broken area of radial ridges. A few may have been confused with crevices or two circular pits in contact; yet the vast majority must be true elliptical pits. An area of avoidance for some distance from the rim seems indicated (see Figure 18). The lack of them to the east of Copernicus would be due to the high-sun absence of fine detail. Many more objects are suggested on the plate; however, the nature of these objects is too uncertain for them to be included on the chart. This chart (Figure 18) shows the positions of the pits and the directions of their major axes. No attempt at size or amount of elongation is meant. The directions of the axes away from the crater seem far greater in number than any chance alignment, even were the surrounding sea area covered with similar objects in haphazard arrangement. Yet they are not well centered on the crater. In fact the distribution, disregarding the worst examples, appears to be about as confused as the famous web-like network of rays and must be as surely associated with Copernicus. A close study of Plate XV will indicate this as they appear to be connected with the more conspicuous parts of the ray system. Even the uncharted suggestions omitted from Figure 18 behave nearly as well. Should this apparent relation gain acceptance, it provides a strong argument against any theory for the composition and origin of the rays other than blown volcanic or meteoritic ash.¹ The finest examples are the string of three pits west of Pytheas along the line of a well defined ray and the isolated one west of Gambart. Here is a thin ray containing a large light patch with the pit beautifully centered on it. Moreover this pit is one of the few that definitely show a direction; that is, its smaller diameter is away from Copernicus. This is undoubtedly the shallower end; and according to Rinehart's principle², the missile that formed this pit came from the direction of the crater. Another fine example is the northernmost of the pair immediately north of Eratosthenes with the direction away from this crater. A few others probably connected with Eratosthenes can be found on Plate XII along with ill-defined radial ridges. Less often noticed is a faint ray system of this crater visible on good full moon photographs looking drowned in the bright splash of its grander companion. Reproductions of other prints were examined and found wanting. Particularly disappointing for this study is the popular 200-inch photograph of this region as there is a north-south distortion present. Worthwhile, however, is an excellent high contrast plate of the same Lick view in Bedell's Album of Celestial Photographs.³

Possible Orphans. The possible exception to the area of most numerous elliptical pits mentioned before is that in the region of Eudoxus and Aristotle north to the limb. Here there may be a larger field of such features. The majority, however, are merely hints on Plate VII. Some good objects can be picked out in the mountainous spread of the Caucasus, but those most distinct are on the sea north of Aristotle. Supposing that they are true pits some extreme speculation can be indulged in, perhaps suggestive to someone better able to judge. Some may owe their origin to Aristotle; still the overwhelming majority cover this section with major axes pointing southwest and northeast arranged roughly, by groups and blank spaces, in a fan-shaped pattern spreading to the limb. These are mostly faint markings with now and then an indisputable pit, nearly all turned poleward. Dr. H. P. Wilkins has described this area well in contrast to the rest of the moon.⁴ From the sea to the limb the thin walls of craters are broken and cut through and in some places remain only as rows of hills.

Much of this aspect would be due to the intrusion of the lava sea; yet this must be only partly the cause. This portion of the moon may have met a hail of stone, its fortress walls bombarded -- as well they might be had the graveled nucleus of a small comet brushed here.

References

1. "The Bright Rays on the Moon" by Guenter D. Roth - The Strolling Astronomer, Vol. 6, No. 12, Dec. 1952.
2. "Four Possible Meteorite Craters in Utah" by Richard N. Thomas - Sky and Telescope, Oct. 1952.
3. "An Album of Celestial Photographs" by A. L. Bedell - A. L. Bedell, St. Louis, Mo., Plate 12, 1946.
4. "Our Moon" by Dr. H. P. Wilkins, F.R.A.S. - Frederick Muller Ltd., London, 1954, pp. 51, 52, 53, 61.

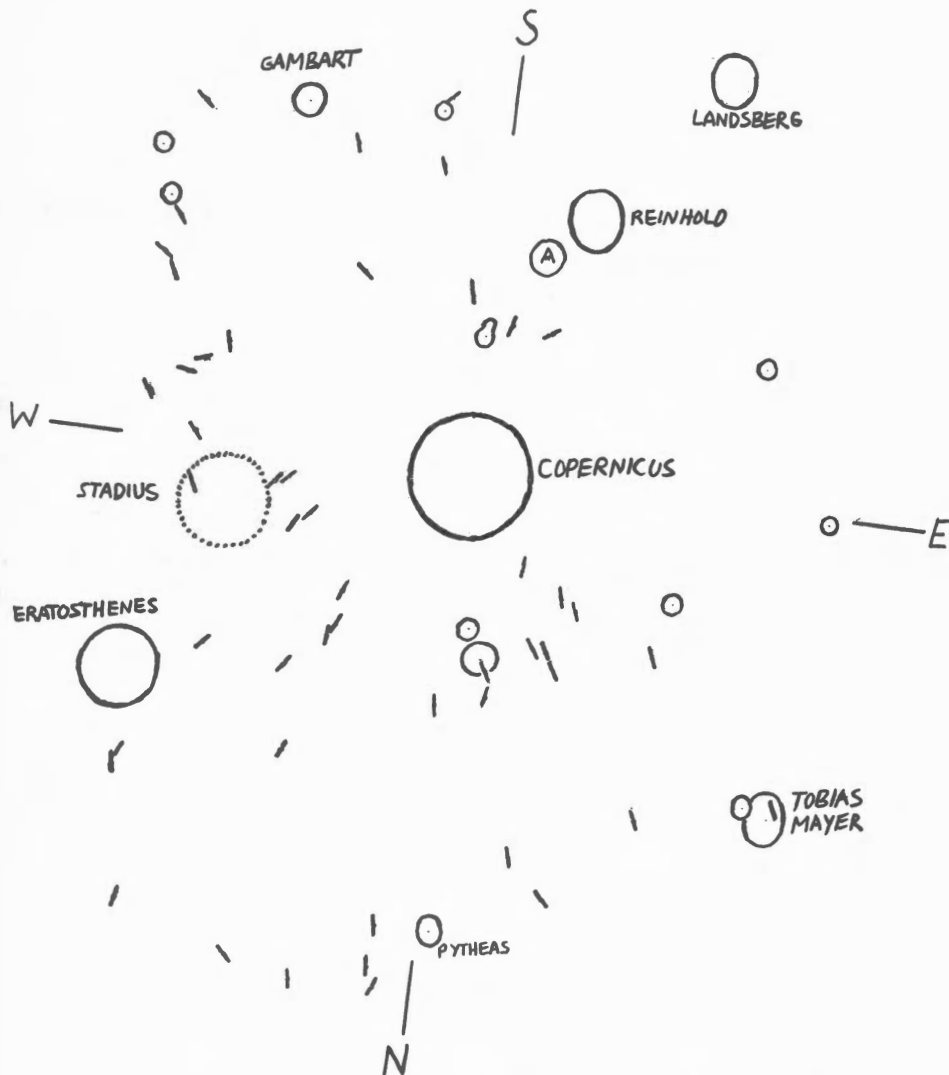


Figure 18. Chart by Howard G. Allen of the Most Probable Elliptical Grater-Pits in the Vicinity of the Lunar Grater Copernicus. Based on Lick Photographic Atlas, Plate XV.

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