

REPORT ON MARS, No. 13.

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LATITUDES AND LONGITUDES.

An investigation has been made of the best method of determining latitudes and longitudes on Mars. While it is not yet complete, a preliminary statement may be made in time for this opposition. The best method of determining longitudes does not require a micrometer, but only a position circle. The thread is set parallel to the axis of the planet in accordance with the ephemeris, and the time recorded when the given point and the center of the northern polar cap are equally distant from the thread. This method has given excellent results in the hands of Dr. Lowell, and while there are theoretical objections to it, yet in practice it has proved very satisfactory. A correction must be made for the phase, and also for the slight eccentricity of the cap, the center of which according to Dr. Lowell in 1903 lay in longitude 195° , latitude $89^\circ.4$ (Bulletin No. 18).

The best method of determining latitudes is by means of the micrometer, a measure being made just before and again just after the point reaches the central meridian. If a micrometer is not available, very nearly as good results may be obtained by a series of drawings. Since it is only necessary to locate the given point on the disk, this observation need not require very much time. These methods of measurement can be used to best advantage near the time of opposition. While at other times the correction for phase is larger, this may always be made by graphical methods, making the measures on a large scale drawing, constructed from the ephemeris.

When it is desired to locate points not seen to transit the central meridian, the micrometer method is the best. Here too, much computation may be saved by graphical methods which are available for this purpose, since no high degree of accuracy is possible in any case on so small a disk as the planet presents. When a point is sharply defined and well seen, we should be able to locate its position within rather less than 1° , that is to within less than forty miles, or sixty kilometers. Orthographic projections of the sphere eight inches in

diameter may now be purchased of the J. L. Hammett Co. of New York and Boston, and the measures plotted directly on them, a correction being made later for the inclination in latitude of the line of sight.

Besides their obvious purpose of map making, there are two other reasons why determinations of position should be secured. First to settle the period of rotation of the planet, which controls future computations of the ephemeris, and second to determine the extent and direction of the local shift of the various markings upon the surface. While the shift is in most cases so slow as to be noticeable only from one presentation to another, yet in the case of the polar marshes, the Syrtis marsh, and the polar bands, the change may be watched occurring from night to night, and sometimes even from hour to hour. The gradual shift is most marked among the dark markings of the planet in the southern hemisphere, but it is of more interest among the lakes and canals.

To determine the period of rotation, observations of the following points, which seem to be fairly stationary on the disk, are recommended: The promontories of Hamonis and Edom, especially the latter, and the bay where Euphrates enters Sabaeus. The first two are not marked on Schiaparelli's map given in Report No. 1, but may be described as the promontories following the Syrtis Major and preceding the forked bay of Sabaeus. Phoenices and Titanum at the northern extremity of Sirenum also appear to be excellent points, although the latter was suspected of some motion during the last opposition. The center of Solis Lacus according to most observers is fairly stationary. These points have all been widely observed in the past.

Points which clearly shift through a considerable range are Oxia Palus at the northern extremity of Margaritifer, the junction of Nectar and Aurorae, and the Syrtis minor. Several of the lakes appear to shift more or less; Siloe, (known also as Dirce,) Juventae Fons, Propontis, Trivium Charontis and Ismenius. The extent of the maximum shift from the mean ranges in general from 3° to 5° , 120 to 200 miles. The mean latitudes and longitudes of these various objects are given in Table I. The mean longitudes of Aryn on the present ephemeris is $359^{\circ}.2$. Its latitude ranges from $+6^{\circ}.8$ to $-5^{\circ}.6$, mean value $+0^{\circ}.1$. Since its axis is usually inclined about 15° to the meridian, its longitude would obviously vary appreciably from this cause alone, if for no other. In point of fact Lau's observations make its longitude $355^{\circ}.9$ when reduced to a common standard with the other observers, while those of Wislicenus and of Lowell in 1894, similarly reduced, make it $0^{\circ}.1$, total range $4^{\circ}.2$.

TABLE I.
LATITUDES AND LONGITUDES OF CERTAIN POINTS.

For Rotation		
Solis Lacus, center	-26.9	86.0
Phoenicis	-13.6	107.5
Titanum	-18.9	169.6
Hammonis	-11.2	315.5
Sabaeus, Euphrates	- 6.5	337.7
Edom	- 7.4	352.3
For Shift		
Margaritifer (Oxia)	+ 8.1	19.0
Aurorae Nectar	-26.1	64.3
Syrtis Minor	- 6.5	255.6
Lakes for Shift		
Siloe	+34.0	3.9
Juventae Fons	- 1.0	64.0
Propontis	+49.0	175.0
Trivium Charontis	+17.2	198.9
Ismenius	+42.1	335.7

THE POLAR CAP.

There seems to be considerable variation in the date assigned by different observers for the maximum size of the northern polar cap. That it should differ somewhat in different years we may well believe, but that the difference should be as great as the various observers indicate appears incredible. It is an observation easily made, by simply measuring a series of carefully executed drawings, and then dividing the diameter of the snow cap by that of the planet. The accuracy which can be secured by this means is much greater than one might naturally expect. Thus a comparison of observations made at the same time by Professor Douglass and the writer showed that the average deviation between the results was $2^{\circ}.2$, or 85 miles (136 km). This amounts to one fiftieth of the diameter of the planet, which corresponded to about $0''.3$ at that time (Report No. 3).

In 1882 the maximum size was reached according to Schiaparelli at more than one month after the vernal equinox (Flammarion I, 460). This would correspond to $\odot = 13^{\circ}.8 +$ or to M. D. March 29 +. The latitude reached was $67^{\circ}.5$. Turning to Lowell's "Mars as the Abode of Life", p. 268, we find two determinations of \odot for the maximum size, 8° in 1897, and 273° in 1907. The latter was not a favorable year for the

observation. These longitudes would correspond to the Martian dates March 17 and December 16. The mean latitudes reached were $51^{\circ}.5$ and $45^{\circ}.0$. In the Report of the Mars Section of the B. A. A. for 1893 are given two curves indicating that the maximum in 1898-9 and 1900-1 came as much as 180 days before the summer solstice. This would correspond to $\odot 9^{\circ}.5$ or M.D. March 20. There are however only half a dozen observations extending back as far even as 200 days in the first curve, that is to the equinox, $\odot 0^{\circ}.0$, and only one preceding the supposed maximum in the second. The dates are therefore very uncertain, giving in fact only maximum values of \odot . The mean latitudes reached are 64° and $64^{\circ}.5$. The dates thus range from December 16 to later than March 29, and the latitudes from 45° to $67^{\circ}.5$. Regarding Dr. Lowell's two observations which differ widely from one another, no details are given, the other three determinations are obviously unsatisfactory.

It might appear at first sight that neither 1913 nor 1915 were particularly favorable years in which to determine these two quantities, since in both cases the date of maximum size came appreciably earlier than the date of opposition. On examining our results however we found that only one recent opposition, that of 1911, would have been more favorable, and that there would be no further opportunity to make a satisfactory determination for a number of years.

In Figure 1 are shown all the observations that were obtained in Jamaica during the opposition of 1913-4 and all of those obtained in 1915 through November 30. The former are indicated by dots, the latter by small circles. The ordinates represent degrees of Martian latitude, and the abscissas degrees of solar longitude \odot . These latter are given beneath the curves, and below them the corresponding Martian dates. At the top are given terrestrial dates, the upper row those for 1913-4, the lower those for 1915-6. The two short vertical lines indicate the dates of opposition, the left hand one that of 1914, the other that of the present year. The smooth curves show the mean positions of the snow line in the two Martian years, and indicate, as already pointed out in Report No. 12, that the present year was the colder, or at all events the more snowy upon Mars. On comparing the drawings of the two years this difference is quite noticeable.

On carefully reading over our own notes, we found that on only one occasion during each of the two years considered, was it at all likely that prior to $\odot 350^{\circ}$ it was the snow itself that was observed. On all the other dates the bright area was described either as cloud, as yellow, or as greenish. In other words as long as the polar cap was increasing in size, it seems to have been concealed by something,—undoubtedly cloud. As soon as this cloud cleared away, at about \odot

350°, the brilliant area appeared, and was invariably described as white. Immediately after this it began to diminish in size.

A large bright cloud visible in the Martian December in 1907 may well have been mistaken by Lowell for snow, while the lack of brilliancy of the polar cap in 1898 and 1900 may have led the British observers to doubt if what they saw during their earlier observations was really the cap at all. Lowell's result in 1897 is probably more nearly correct. The four crosses indicate the positions of the maximum size as determined by Schiaparelli, the British observers, and Lowell in 1897. The determination by the latter in 1907, \odot 273°, would not fall upon the sheet. It will be remembered that Schiaparelli gives merely a minimum longitude.

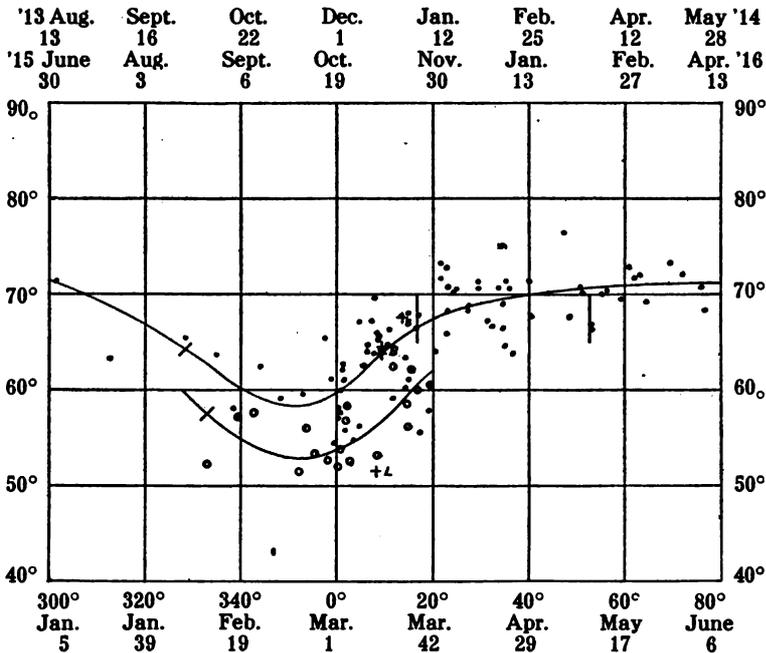


FIGURE 1.

The dark band surrounding the polar cap, and due to its melting, was first detected in 1913 at \odot 328°.2, M. D. January 53, and in 1915 at \odot 332°.9, M. D. February 5. These dates are indicated by short diagonal lines. This band and the study of the curves leads us to believe that the size of the cloud could not in general have been very different from the size of the snow beneath it, except in the case of the observation at abscissa 345°, when the cloudy area was unusually extended. It gives us at all events a southern limit in latitude. Whether when we observed it, during the Martian daytime, snow was actually falling, or

cloud and mist were merely rising from the melting snow that had fallen during the previous night, we cannot tell, but observations made later in the Martian year lead us to believe that at that time at least most of the precipitation occurred at night.

Returning to the Figure, at the time of opposition a deviation of 5° of latitude from the line giving the mean diameter of the snow cap, would represent an angular deviation of $0''.6$, but at abscissas 320° and 60° in 1913-4 the angular deviation would be reduced to about $0''.3$. The later deviations however seem to be no greater than those recorded near opposition. While as a rule they do not exceed 5° , we find a series of large deviations in 1913-4 occurring at fairly regular intervals at about solar longitudes 345° , 0° , 17° , 36° , and 53° , at which times the cap seemed to be unusually large. The mean longitude of the central meridian at the time that these observations were made was $357^\circ \pm 30^\circ$.

This cannot indicate an elliptical shape of the spot, since in that case larger diameters should also be found at 180° from this position, or in longitude 177° , which is not the case. The most probable explanation seems to be that the cap was really larger in this position, owing to its greater extension towards the sunrise or sunset limb. It could hardly be the latter, but clouds or snow might persist for a time after sunrise in certain localities under suitable conditions, and thus apparently increase the size of the cap on that side. Measuring 90° towards the sunrise limb from longitude 357° brings us to longitude 87° which lies slightly to the west of the following or western border of the Acidalium marsh, the largest of the four marshes surrounding the polar cap, and the only one that was conspicuous after February. This is exactly where we should expect to find cloud at sunrise, according to Reports Nos. 3 and 4, and also according to the observations already made at this opposition.

In Report No. 4 we noticed the slow increase in longitude of the twin polar bays, as they gradually shifted to the west, as the result of the daily evaporation and nightly deposition of their moisture, combined with its southerly motion toward the equator. Nine measures of favorable drawings of the southern end of the following side of Acidalium, made during the same period, give its longitude as follows:— Nov. 26 36° , Dec. 1 42° , Dec. 4 40° , Jan. 5 41° , Feb. 8 47° , Feb. 10 45° , Feb. 12 50° , Mar. 20 60° , Apr. 21 60° (?) The same gradual change of position it will be seen occurs.

The inclination of the planet's axis to its orbit is determined by observations of the position angle of its polar caps. If the northern cap is more extended towards the sunrise than towards the sunset limb in certain longitudes, owing to the deposition of snow or cloud, it is clear

that a correction not wholly negligible, due to this cause, should be taken into consideration in future determinations of the inclination of the axis.

Using the smooth curves of the Figure as average values, we find that the snowy season reached its maximum in both years shortly after abscissa \odot 350° , corresponding to the Martian dates of February 39 and 43, and that in latitude 60° the snow persisted from February 20 to March 2 in the former opposition, and from January 53 until March 32 in the present one. These seem rather short seasons to us for so high a latitude, when counted by months, although the former lasted for 38 days and the latter 91. This is due without doubt to the small amount of water on the planet. The lowest latitudes reached were 58° and 53° , giving a difference of 185 miles (295 km).

OBSERVATIONS IN NOVEMBER.

On November 4, M. D. March 17, a drawing was made with the central meridian ω in longitude 112° . The polar cap was white and brilliant, there was no cloud on the terminator, but a very slight haze at the south pole, and the southern limb was the same brightness as the centre of the disk, which shone clear and red,—No. 9 on the color scale with tungsten, and No. 14 with the standard blue. There was therefore no cloud on the disk. Nevertheless all the detail, save the polar cap and the grey band to the south of it, was excessively faint. The greys and greens had as yet in no way developed, all the water apparently being at first deflected to other points of the planet, leaving the surface red and barren. This was true also at the last opposition, this longitude being the last to develop at that time. The region about Solis Lacus, that is Thaumasia and the Solis itself were a light uniform grey. Next in visibility came a light bay pointing to the north, and located some 20° to the north of Nodus Gordii and slightly to the west of it, in longitude 131° , latitude $+25^\circ$. This same marking, although rather more distinct at that time, had been recognized in 1913, M. D. December 54. As far as the writer is aware it had never been seen before, nor since that date, until this year. The darkened area was of perhaps double the size of Solis Lacus, but exceedingly faint. Portions of Pyriphlegethon and Gigas were suspected. In 1913 the Solis was first seen December 25, M. D. March 25, and within five days had developed in great detail.

November 13, ω 29° , M.D. March 25; although the seeing was fair, and the Acidalius marsh extended nearly 0.4 way across the disk, the southern maria were exceedingly faint, their northern boundary extending east and west in a straight line without detail and without darkening. They were indeed only detected by their pale green

color. The marsh showed slight polarization when examined with a double image prism and quartz plate, indicating a surface, liquid in part.

November 17, ω 357°, M. D. March 30. Sabaeus showed the first signs of development as a slight projection towards the north, and darker than anything save the Acidalium marsh. The southern maria were green, the northern grey. The most unexpected feature was the persistence of the north and south band, which starting from slightly to the east of the marsh stretched straight across to Sabaeus. Its western border was hazy, and its breadth was about 300 miles. It lay in the region between Gehon and Indus. The next day it had become markedly narrower. The brightness of the deserts was 7 and the band 6. Perhaps the most interesting thing about it was a slight tendency towards the double effect. Conditions were unfavorable however, and no conclusion was reached.

If we compare Figure 2 with the four figures given in Report No. 11, we shall be struck with the different development in different regions of the planet. Thus, while the Martian date is later in the present Figure, and the Acidalium marsh more developed than in any of the others, save Figure 3, yet Sabaeus itself is no further advanced than in Figure 1. As compared with Figure 2 the marsh in the present Figure is more developed, and Sabaeus less so. As compared with

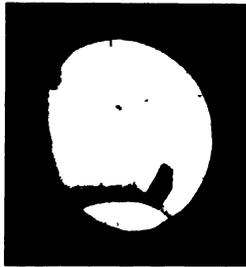


FIG. 2
1915 November 17
Martian Date March 30
357° 7''8

Figure 3, Sabaeus is in a most undeveloped condition, although the Martian date is four weeks later. Compare also with the colored Figure 2, issued with the Index, which was drawn but six days later in the Martian year than the present figure. Sabaeus was still connected with the dark band when last seen November 19, and the projection of the Forked Bay had become slightly more pronounced. The southern boundary had also appeared, so it is quite possible that its development will take place quite rapidly before we next observe it in December. In the mean time it is hoped that some of our Associates

in Australia or Asia may watch and record the gradual process of its development in that case, and send us notes and drawings of the same. In the mean time we may ask (*a*) will the north and south band continue until Sabaeus is as far advanced as it was when the band disappeared in 1913, Figure 2, or (*b*) will the band cease immediately, now that the polar cap has become equally reduced in size? The two short lines in the Figure indicate the position-angle of the poles. Obviously there is no trace of Aryn, so far in the Martian year.

In Report No. 12, Table III, line 8, it was assumed that the north and south band had disappeared on the Martian date of February 53. It is now shown to have been clearly visible on March 32, or 35 days later, thus removing this phenomenon from the list of those which came early this year, and adding it to those which came late. On comparing the phenomena of these two oppositions we see that besides the changes in place occurring on Mars, we have also changes in time. The former are well illustrated by the unexpected appearance of Thoth in 1911 and 1913, as illustrated in Report No. 7, Plate XXXII, and also by the development of the twin polar bays Propontis and Castorius, mapped in Report No. 4,—where a swamp 1200 miles in length developed, which in previous years had appeared only as a small and inconspicuous lake, barely 100 miles in diameter. It is much as if Lake Ontario should suddenly develop into a swamp reaching from New York to Omaha, and as broad as the lake is long.

It is possible that some day we may be able to predict these developments in advance, but at present we see not the slightest chance of being able to do so, and can only record them with all their attendant phenomena as fully as possible, to furnish data to be used by the astronomers who follow us. With regard to the changes in time however, we are in a somewhat different position. Comparing the present and the past oppositions, we find that in both cases the snow cap reached its maximum development at about the same date, but that at the present opposition the snow extended nearly 200 miles or five degrees farther south than it did at the other. If in the case of our own planet the isotherm of melting snow should one year extend 200 miles farther south than the next, that one year for instance it did not extend beyond New York, and the next should reach as far as Richmond, we should not be surprised to find that vegetation was a few weeks delayed in consequence in its development. With the longer year upon Mars, the delay might be still greater than with us.

What we actually find by Report No. 12, Table III, is that while the Acidalium marsh, situated 200 miles farther south than before, at the edge of the snow, developed this year four weeks earlier than in 1913, that the Syrtis marsh and vegetation, far to the south of Acida-

lium, developed from four to nine weeks later. With such brief and limited observations we cannot of course claim to have demonstrated a connection between the phenomena considered, but we can at least say that a connection between them seems plausible, and that a later development in a colder year is what we should naturally expect. It will certainly be of interest at the next opposition to see if these results are in any way confirmed. It would at least suggest that in the future we might predict approximately the week of appearance of any given marking by the size of the snow cap. It will also further interest us if a colder winter on Mars, as indicated by our observations of the past September, October, and November should be followed by a colder or more snowy winter on our own planet.

Another point which the writer wishes to make clear is that in order to determine the exact time at which the various features on Mars develop, it is most important to secure continuous observations of them from the earth. These can only be obtained by means of a series of stations located all around our planet, with their reports sent in to one central authority. This is the main object of the organization known as the Associated Observers of Mars, and it is greatly to be hoped that some of its members located on the other side of our globe will be willing and able to secure the early morning observations which are necessary during the period two or three months preceding the date of each opposition.

On November 18 the duplication of the north and south band was again suspected, but the continuance of unfavorable conditions, mainly wind, again rendered its confirmation impossible. A dark spot visible the previous night in the region of the Forked Bay was now invisible. The continuous canal named in different sections Protonilus and Deuteronilus had clearly developed. The cloud which usually follows the Acidalium marsh was well seen, though the marsh itself was invisible. Since the latter was within 60° of the central meridian, it was presumably at this time covered by the cloud. The polar band was invisible, though well seen the previous night, see Figure 2. Mars was 0.1 magnitude brighter than Procyon, but still 0.6 fainter than Saturn.

November 19, ω 315° , M. D. March 32. The cloud at the south pole was white in color, not yellow, but was clearly less brilliant than the snow. A minute cloud was noticed bounding the snow cap on the south near longitude 0° . It was within perhaps two hours of the central meridian. Ismenius Lacus had developed, but was still a delicate object. The southern boundary of Sabaeus was seen for the first time. It certainly was not visible November 17 or 18, although on the latter date the Sabaeus region was drawn as slightly darker than that to the south of it, showing gradual development.

The writer confirms the result of other observers that when the seeing is excellent, looking through a piece of very light yellow glass slightly improves the definition. On approaching the terminator the Syrtis disappeared at a distance of 40° from the central meridian. The duplication of the north and south band was suspected for the third time, and again without reaching any conclusion. Seeing 9.

The position angle of the band just before it crossed the central meridian was found to be 9° , i.e. 9° west of north as measured on the planet. In August and September it was inclined about as much to the east of north. It will probably finally develop into the canal Gehon. The first color sketch was made this year, $\omega 341^\circ$. The green of the Sabaeus region was very faint, apparently fainter than last year at this Martian date.

November 21, M. D. March 34, $\omega 293^\circ$. The difference in brightness of the desert regions on either side of the Syrtis is very striking, that preceding it, between it and Thoth, being only 4, while following the Syrtis, that is to the west of it, it is 6. The south pole was 8, and of a greyish yellow. The Syrtis marsh was grey, brightness 2. The southern maria like those at the north were grey. Libya was the greenest region, but even there the color was not marked. The equatorial limb was only slightly brighter than the center, indicating that the disk was free from cloud. No clouds were detected on either the limb or terminator. The south pole was recorded as of the same color as the snow, though less brilliant, 9.

The scale of Canals described in Report No. 7 was first tried with Mars in June 1914, but the planet was then so remote that the results were unreliable. It was next tried this year November 19, but with Scale J, drawn with a number 3 pencil. This scale matched Sabaeus and the Syrtis marsh very well, but was much too dark for the canals. The results were unsatisfactory, but the necessity of matching the canals exactly in density was made very obvious. The color and brightness of the paper were found to match the surface of the planet satisfactorily when a magnification of 660 was employed. With this power one millimeter on the scale corresponds to $0''.065$. Scale E drawn with a number 4 pencil was now substituted for J, and the following results obtained, $\omega 315^\circ$, seeing 7, Syrtis marsh measured east and west through middle $0''.39$, Deuteronilus $0''.32$, north and south band $0''.13$, Sabaeus $0''.39$. Reducing these for the inclination of the surface at the time of observation, gives us the following breadths:— Syrtis 233 miles (374 km), Deuteronilus 194 miles (310 km), north and south band 95 miles (152 km), and Sabaeus 250 miles (400 km). Measurements made from a drawing on November 19 give us for the Syrtis

272 miles, deviation + 39, for Deuteronilus 182 miles, deviation - 12, for the north and south band 58 miles, deviation - 37 and for Sabaeus 317 miles, deviation + 67. Considering the remoteness of the planet at the present time, and the consequent fact that 52 miles equal $0''.1$, these deviations are no greater than we might naturally expect. While for these comparatively wide canals it is believed that the scale gives more accurate results than the drawing, it is thought that for still narrower canals the scale will give very much more accurate results. These observations indicate that there is no large systematic error introduced by the scale readings, at least as far as the drawings can serve as a standard of comparison. Later, when more and finer canals are visible, we shall test the method for accidental errors.

November 23, ω 308° , M.D. March 36. The Syrtis marsh was but little darker than the region surrounding it, and it is doubtful if it now contained much water. Heavy clouds were seen on the terminator to the south of the Syrtis. A very fine line of cloud bounding Protonilus on the north and crossing the central meridian was detected. Clouds seem to favor the northern and following sides of dark markings at all seasons of the year. An east and west rift in the snow cap was suspected. Orontes glimpsed, but still doubtful. There was no trace of green in the Syrtis, although the seeing was 11. A little was suspected near Libya.

November 26, M.D. March 39. At 15h 20m when about 30° west of the central meridian Casius was very marked and dark; two hours later when central is seemed much less so. In this longitude the southern maria are clearly greenish. A minute white cloud was detected near the central meridian half-way between the Syrtis and Thoth; the next night it could not be found.

November 27, ω 242° , M. D. March 40. Polarization suspected in the canal Nilosyrtis, but not seen anywhere else. A white area was noted near Novissima Thyle in latitude -70° , and measuring about 1000 miles across, which was as white and as brilliant as the northern polar cap. It was surrounded by a fainter belt of cloud. It seems possible that it was the beginning of the southern snow cap, from a portion of which the clouds had temporarily cleared. Seven canals were visible this evening.

November 29 a bright cloud was seen on the northern limb extending half-way to the central meridian. A large marsh, Propontis, was visible near the terminator.

TABLE II.
DATA OF THE OBSERVATIONS.

No.	1915	☉	M. D.	Long.	Lat.	Sun	Diam.	Seeing
22	Nov. 4	8.2	Mar. 17	112°	+17°	+3	7.2	10
23	" 13	12.0	" 25	29	18	5	7.7	8
24	" 17	14.4	" 30	357	19	6	7.8	7
25	" 18	14.8	" 31	329	"	"	7.9	6
26	" 19	15.4	" 32	315	"	"	8.0	10
27	" "	"	" "	341	"	"	"	8
28	" 21	16.4	" 34	293	"	7	8.1	8
29	" 23	17.3	" 36	308	"	"	8.2	11
30	" 27	19.2	" 40	242	"	8	8.5	7

The following lakes and canals were seen:—

- Nov. 4 **C** Pыррhlegethon, Gigas, Eurotas.
- Nov. 13 **A** Tanais.
- Nov. 17 **A** Callirrhoe.
- Nov. 18 **F** Protonilus, Deuteronilus.
- Nov. 19 **FA** Nilosyrteis, Protonilus, Deuteronilus, Gehon.
Ismenius Lacus.
- Nov. 21 **F** Nilosyrteis, Thoth, Nepenthes, Protonilus. Ismenius
Lacus.
- Nov. 23 **F** Nilosyrteis, Protonilus, Deuteronilus, Orontes (?)
Ismenius Lacus.
- Nov. 27 **E** Nilosyrteis, Casius (formerly referred to as Boreosyr-
teis), Thoth, Nepenthes, Cerberus, Eunostos, Alcyonius.

Communications have been received from Messrs. McEwen and Lau, of the Associated Observers. Both succeeded in seeing the north and south band. This is most important as corroborative evidence of a striking phenomenon, first seen at its maximum dimensions in 1913 and 1915, and first seen upon a smaller scale in 1911, at the observatory of M. Jarry Desloges (Observations 3, Plates 7 to 10). So striking and conspicuous indeed is the phenomenon when at its maximum, that we can scarcely doubt that it is a new development upon the planet. The very fact that it was visible to Messrs. McEwen and Lau with only 5-inch and 4-inch telescopes, when its breadth and density were well past their maximum, and the band had already become comparatively inconspicuous, indicates that had it appeared of its full size and density at earlier oppositions, it would certainly have been discovered by some one. If a phenomenon of this size, covering over a million square miles of surface upon the planet, is really a new development, it is unnecessary to call further attention to its importance.

On September 27 Mr. McEwen writes "A fainter shading extended southwards from Lacus Niliacus to about the position of Margaritifer Sinus. This shading probably included Indus and Hydaspes....It was doubtful if Margaritifer Sinus was visible, although Indus and Hydaspes were clearly seen, the latter as a faint band lying in a N and S direction." This is where we saw the band on October 9. On September 28 he writes "Indus and Hydaspes presented the same appearance as yesterday." September 30, "Indus broad and diffused, starting from Mare Acidalium. It was faintest at the N end; towards the S end at Margaritifer Sinus the tint deepened, making the E boundary sharp and the W somewhat softer." If we examine Figure 2 we shall see that his description of the difference between the eastern and western sides is fully confirmed, although by November the band had gradually shifted its position in an easterly direction, so as now to connect the eastern side of the Acidalium marsh and the Forked Bay of Sabaeus.

Professor Lau sent a drawing made November 9, which is practically identical with Figure 2, except that by that date the northern end of the band had not advanced quite so far, and consequently joined the southern end of the marsh to the Forked Bay. The band presents the same characteristics of the sharp eastern and hazy western borders.

KING WINTER'S GALAXY.

Resplendent 'mid bespangled skies.

King Winter's galaxy is seen,
Where Pleiades wink tiny eyes
And Taurus in red fury lies,
And bright Capella reigns—a Queen!

Where like some background in the sky
Yon Jacob's Ladder gleams between
Orion's gems and Gemini,
When Canis Minor's sun near by
And Sirius adorn the scene.

Supernal—silent—and sublime!
The same today as they have been
Since Nature woke terrest'ral time
Or pyramid was in its prime,
Or Earth with life's first dawn was green.

CHARLES NEVERS HOLMES.