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OF THE  
**British Astronomical Association.**

VOL. XXI.—PART III.

**ELEVENTH REPORT OF THE SECTION**

FOR THE OBSERVATION OF

**M A R S,**

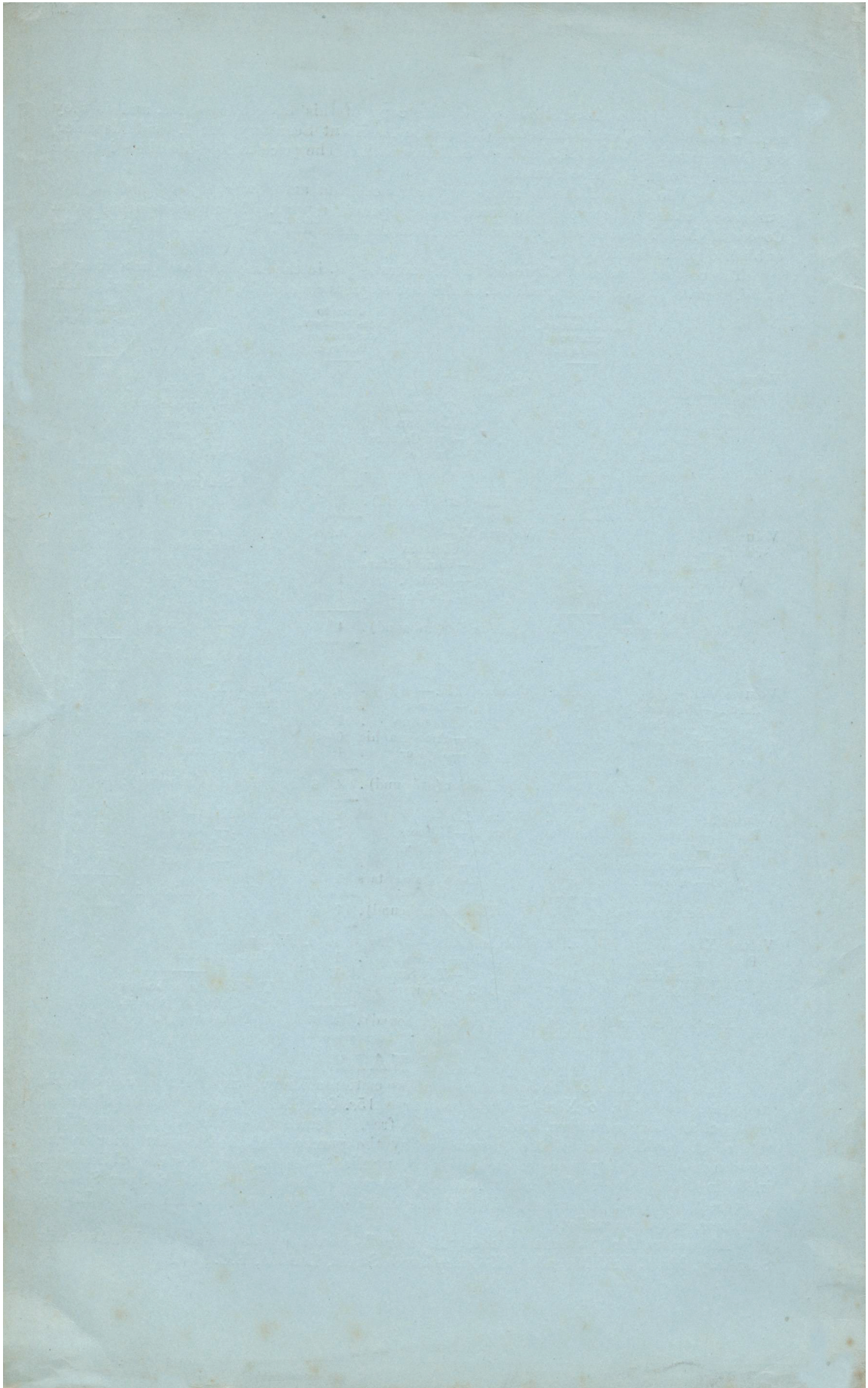
DEALING WITH THE APPARITION OF 1913-1914.

*Director—E. M. Antoniadi, F.R.A.S.*

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# SECTION FOR THE OBSERVATION OF MARS.

DIRECTOR.—E. M. ANTONIADI, F.R.A.S.

## REPORT OF THE SECTION, 1913-1914.

### PART I.

#### PROLEGOMENA.

##### 1. The Apparition of 1913-1914.

This opposition occurred early in January 1914, and was rather an unfavourable one. For, notwithstanding the very high altitude of the planet in Europe, its distance from the Earth, on the first day of the year, was not less than 0.622 (58,000,000 miles), as against 0.511 (47,400,000 miles) in November 1911.

##### *Phenomena.*

Mars in W. Quadrature with the Sun	1913, October 2.
Vernal Equinox of N. hemisphere	1913, December 1.
Autumnal Equinox of S. hemisphere	
Mars in Apparitional Perigee	1914, January 1.
Diameter of Mars in Apparitional Perigee	15".04.
Mars in Opposition with the Sun	1914, January 5.
Heliocentric longitude of Mars in Opposition	104° 36'.
Position of Mars in Opposition	
Diameter of Mars in Opposition	15".0.
Position angle of the N. pole of Mars in Opposition	342°.
Latitude of the centre of the disk at Opposition	
Mars in E. Quadrature with the Sun	1914, April 11.
Mars in Aphelion	1914, April 27.
Summer Solstice of N. hemisphere	1914, June 18.
Winter Solstice of S. hemisphere	

The latitude of the centre of the disk increased from  $-5^{\circ}4$  on 1913, August 15, to  $+10^{\circ}1$  on November 18; it then decreased to  $+1^{\circ}1$  on 1914, February 9; after which it increased constantly, attaining  $+17^{\circ}8$  by May 31, and higher values to the end of the apparition.

## 2. The Members of the Section and their Instruments.

The names of the Sectional Members in 1913-1914, their equipment, and drawings sent, are as follows:—

Observer.	Locality.	Aperture of Instrument in Inches.	Drawings.
ANTONIADI, E. M., F.R.A.S.	{ Meudon } France	{ $8\frac{1}{2}$ Spec.	{ 13
	{ La Frette }	{ $12\frac{1}{2}$ Spec.	
BACKHOUSE, T. W., F.R.A.S.	Sunderland - -	$4\frac{1}{2}$ O.G.	—
McEWEN, H. - - -	Glasgow - - -	5 O.G.	96
O'HARA, C. - - -	Derrylin, Ireland -	$8\frac{1}{4}$ Spec.	3
PHILLIPS, REV. T. E. R., M.A., F.R.A.S.	{ Ashtead, Surrey -	{ $12\frac{1}{4}$ Spec.	{ 15
	{ - - - - -	{ 8 O.G.	
PORHOUSE, W. - - -	Manchester - - -	$8\frac{1}{2}$ Spec.	3
THOMSON, H., F.R.A.S.	Newcastle-on-Tyne	{ $12\frac{1}{4}$ Spec.	{ 17
		{ 8 O.G.	
			147

The observations cover a period of 8 months and 25 days, the extreme records, both due to McEwen, being 1913, August 15, and 1914, May 10.

## 3. Observational Notes.

Owing to extensive repairs in the dome, the  $32\frac{3}{4}$ -in. was not available during this apparition.

Porthouse found that "drawings were out of the question unless definition permitted a magnification of 250 to 300."

Phillips had some good seeing; Porthouse was somewhat disappointed with "the thick air of Manchester"; while Thomson and the Director complain of the bad definition prevailing.

4. The Colour of the Disk.

The relation between the yellowness of the planet and the faintness of the dusky areas has shown, in 1914, the following phenomena to the Director :—

Date.	$\omega$	Colour of Disk.	Intensity of Dark Spots.	Date.	$\omega$	Colour of Disk.	Intensity of Dark Spots.
1914. Feb. 1	350	Ruddy	Darkish.	1914. April 16	73	Yellow	Faint.
" 2	43	Yellow	Faintish.	" 18	63	Yellowish	Faintish.
" 24	150	Yellowish	do.	" 20	40	Yellow	do.
" 28	141	Yellow	do.	" 22	12	Yellowish	do.
Mar. 1	112	do.	Faint.	" 26	321	Ruddy	Darkish.
" 31	223	Yellowish	Faintish.	" 28	313	Yellowish	Faintish.
April 12	83	Ruddy	do.				

No very remarkable cloudy formations were noted during this apparition.

## PART II.

## THE OBSERVATIONS.

Abbreviations :— $\Omega$  = areocentric longitude ;  $\Phi$  = areocentric latitude ;  $\omega$  = longitude of the centre of the disk ;  $\phi$  = latitude of the same ; N. = North ; S. = South ; E. = Areographic East = *p.* = preceding ; W. = Areographic West = *f.* = following ; C.M. = central meridian ;  $\eta$  = heliocentric longitude of Mars. The dates are given in G.C.M.T.

## SECTION I.

## Sinus Sabæus.

$$\Omega = 310^\circ \text{ to } 10^\circ ; \Phi = -60^\circ \text{ to } +60^\circ.$$

*HELLESPONTUS* was frequently veiled by yellow cloud in 1913–1914. The drawings of McEwen, O'Hara, Phillips,

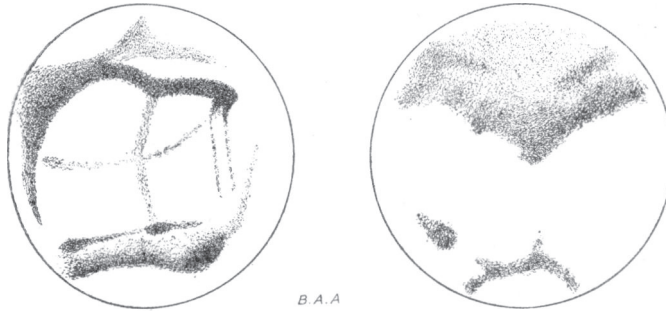


FIG. 1.—November 27,  $\omega = 339^\circ$ .  
(Phillips.)

FIG. 2.—December 28,  $\omega = 343^\circ$ .  
(Porthouse.)

The *Sinus Sabæus* region of Mars in 1913.

Porthouse, Thomson and the Director show that this “strait” was apparently very faint on 1913, September 15; faintish on November 27 (Fig. 1); indiscernible on December 28 (Fig. 2); darkish on December 29 (Plate I., Fig. 1) and 30; faintish on December 31 and 1914, January 2; faint to N.E., dark to S.W., on January 3; dark to N. only, on January 6; very faint on January 7; faintish on February 1 (Plate II., Fig. 6); dark to N.E. on February 4; faint on February 5; dark on February 10; very faint on March 21 to 24; and unnoticed on April 24, 26 and 28.

On March 21 and 22, McEwen recorded a bright protruding spot hereabout (Figs. 3 and 4).

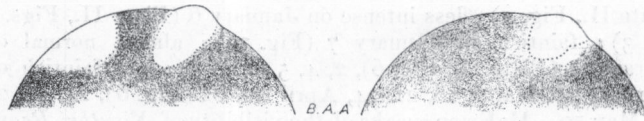


FIG. 3.—1914, March 21,  $\omega = 308^\circ$ . FIG. 4.—March 22,  $\omega = 293^\circ$ .  
White cloud over S.W. *Hellespontus*. (McEwen.)

*NOACHIS*, according to the drawings of McEwen, Phillips, Porthouse and of the Director, appeared white on C.M. on September 15; shaded on December 29, January 2, 6 and 7; very bright on C.M. on January 31; shaded on February 1 (Plate II., Fig. 6) and 4; brightish to N.W. on February 5 (Fig. 5); shaded on February 10; bright risen on March 21; shaded on March 22; bright risen on March 23; white setting on April 20; white on C.M. on April 24; shaded on April 26 and 28; and white risen on April 28.

*PANDORÆ FRETUM* was again faint in 1913-1914. The data of McEwen, O'Hara, Phillips, Porthouse, Thomson and the Director show that this "channel" was very faint on October 20 and November 27 (Fig. 1); invisible on December 26; rather conspicuous on December 27 (Fig. 7); invisible on December 28; very faint on December 29 (Plate I., Fig. 1), 30, 31, January 2 and 3; invisible on January 6 and 7; very faint on February 1 (Plate II., Fig. 6), 4, 5, 10; and again invisible on March 16, 21-23, April 22, 24, 26 and 28.

*VULCANI PELAGUS*, according to the same observers, was apparently dusky on September 15; unnoticed on November 21 and December 26; moderately dark on December 27 (Figs. 7 and 8), 28, 29, and 31; exceedingly faint on January 3 (Plate II., Fig. 5), February 1 (Plate II., Fig. 6), 2, 4, 5 (Fig. 5) and March 16; not seen on April 16; darkish on April 18; obliterated by white cloud on April 19; faint on April 20; and indiscernible on April 22, 24, 26, 28 and May 10.

*DEUCALIONIS REGIO* showed its usual form, but, like all "lands," looked slightly larger, owing to the greater distance of Mars and to our less powerful equipment. Its shaded appearance was caught by McEwen, Porthouse and the Director, but not by Phillips and Thomson. "A very bright whitish spot" was discovered on it by O'Hara on December 30,  $\omega = 320^\circ$  (Plate II., Fig. 4), and this is supported by Thomson's drawing of January 7,  $\omega = 316^\circ$  (Fig. 32). Curiously enough, the "island" was not seen as a marginal glare, by the Section, in 1913-1914.

*SINUS SABÆUS*, narrowed, like the other *maria*, by increased diffraction, was generally a strong marking. The data of McEwen, O'Hara, Phillips, Porthouse, Thomson and the Director show the *Sinus* dark on September 15, November 21, 22 and 27 (Fig. 1); faintish on December 26; very dark on December 27; less so on December 28 (Fig. 2); very dark on December 29 (Plate I., Fig. 1), 30 (Plate II., Fig. 4), 31, January 2 and 3

(Plate II., Fig. 5) ; less intense on January 6 (Plate II., Figs. 2 and 3) ; faintish on January 7 (Fig. 32) ; almost normal on February 1 (Plate II., Fig. 6), 2, 4, 5 (Fig. 5) ; and faintish on February 10, March 16, 21-24, April 20, 22 (Fig. 6), 24, 26, 28 and May 10. McEwen speaks of the visibility of *Xisuthri Regio*, which no other Member could descry.

*PORTUS SIGEUS* is recognisable as a more or less shallow dark notch in the drawings of McEwen, O'Hara, Phillips, Porthouse, Thomson and the Director.

*SINUS FURCOSUS* presented nothing abnormal. McEwen writes that on December 28 he saw the "forks . . . beautifully," and that the "E. fork was darker than the W. one." Yet the prongs were inaccessible to O'Hara (Plate II., Fig. 4) and Porthouse (Figs. 2 and 5), difficult to the Director (Plate II., Fig. 6), and often confused to Phillips and Thomson. However, the  $12\frac{1}{4}$ -in. of the last-named observers resolved "Dawes' Forked Bay" clearly on November 27 (Fig. 1), December 27 (Fig. 7), and January 3 (Plate II., Fig. 5).

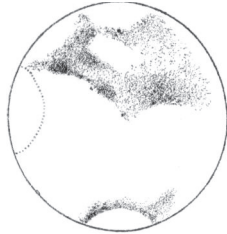


FIG. 5.—February 5,  $\omega = 348^\circ$ .  
(Porthouse.)



FIG. 6.—April 22,  $\omega = 12^\circ$ .  
(The Director.)

The *Sinus Sabæus* region in 1914.

*Sinus Furcosus* was usually very dark, rivalling *Mare Acidalium* and *Syrtis Major*, and its intensity underwent practically the same apparent changes as that of *Sinus Sabæus*.

*FASTIGIUM ARYN* looked well defined to Phillips and Thomson on November 27, December 27 and January 3 ; and it was shaded to Phillips and the Director (Plate II., Fig. 6).

*THYMIAMATA* rose white to McEwen on September 15 ; set bright to him on October 13, to Phillips on December 22, and to the Director, especially to S., on April 16.

*EDOM PROMONTORIUM* appeared often bright by contrast to McEwen, and to Phillips and Thomson on January 3 (Fig. 33 and Plate II., Fig. 5).

*EDOM* rose whitish to McEwen on March 23 and set bright to him on April 17 and 20.

*AERIA* was seen "brighter and of a more orange tint than the rest of the planet" by O'Hara on December 30. It set



whitish to Porthouse on February 5; rose whitish to McEwen on March 27 and set whitish to him on April 24.

*HAMMONIS CORNU* comes out blunted on almost all drawings, but it is more pronounced on Porthouse's truthful picture of January 6 (Plate II., Fig. 2).

*ARABIA* appeared slightly shaded. It was white near C.M. to McEwen on March 23.

*EDEN* was seen dusky between *Hiddekel* and *Gehon* by the Director on February 1 (Plate II., Fig. 6). It set white to Thomson on February 4 and rose white to McEwen on March 23.

*ARETHUSA FONNS* is drawn as a knot, 8° across, by McEwen on December 26.

*ISMENIUS LACUS* had the form of an irregular ellipse, under good conditions (Plate II., Fig. 5). The drawings of McEwen, Phillips, Porthouse, Thomson and the Director show this "lake" rather faintish on November 27 (Fig. 1); darkish on December 28 (Fig. 2) and 29 (Plate I., Fig. 1); dark on January 3 (Fig. 33 and Plate II., Fig. 5); dusky on January 7 (Fig. 32); indiscernible on February 1 (Plate II., Fig. 6); and faintish on February 4, after which it was not seen.

*DIOSCURIA* seemed shaded to Phillips and the Director. On January 7, Thomson caught here a white streak, jutting into *Meroe* (Fig. 32).

*CYDONIA* is also shaded by Phillips and the Director. On December 29, Phillips saw a white spot just *p.* the *Achillis Pons* (Plate I., Fig. 1).

#### MINOR DETAIL.

*ARNON*.—Phillips: January 3, to S. only, width 4°, faint.—Thomson: January 3, to S. only, width 4° faint.

*DEUTERONILUS*.—Phillips: November 27, width 2°, darkish; December 29, width 3°, darkish, edge of shaded *Cydonia*; February 4, width 4°, darkish.

*EUPHRATES*.—McEwen: December 31, to S. chiefly, width 3°, faint; January 2, double, 2° wide branches, 8° apart.—Phillips: November 27, convex to E., mean width 3½°, faintish (Fig. 1); January 3, to S. only, double, width 7° (Fig. 33); February 4, to S. chiefly, width 4°, faint.—Thomson: January 3, to N. chiefly, mean width 4°, faint (Plate II., Fig. 5).

*GEHON*.—McEwen: December 26, 28, 29, 31, January 2, width 2½° generally, faint; edge of shade to E. on December 26, 28 and 29.—Phillips: November 27, convex to E., double, 2° wide bands, 7° apart to S., 10° to N. (Fig. 1). The objective impossibility of this gemination is obvious by the fact that the two lines appeared straight and parallel when midway between the centre and limb, and at right angles to radius; for nothing short of a miracle could conjure two divergent arcs of small circles to appear only straight and parallel to the observer. December 27, January 3, convex to E., width 3°, faint; February 4, convex to E., width 4°, faint.—Thomson: November 22, straight, width 4°, drawn conspicuously; December 27, February 4, convex to E., width 3°, faint.—The Director: February 1, glimpsed as the E. edge of shaded *Eden*.

*HIDDEKEL*.—McEwen: December 26, 28, 29, 31, January 2, width 2°, faintish; on the first three dates, edge of shade to W.—O'Hara: December 30, edge of shaded *Eden*.—The Director: February 1, glimpsed edge of shaded *Eden*.

*ORONTES*.—McEwen: December 29, 31, January 2, generally convex to N.W., width 3°, faint; March 16, edge of shaded *Arabia*.—Thomson: February 10, "very uncertain," convex to N.W., width 4°, edge of shaded *Arabia*.

*OXUS*.—McEwen: December 27, 28, 29, January 2, width 3°; on December 29, edge of shade to N.W.—Phillips: November 27, width 6° to N., 4° to S., smudgy.

*PHISON*.—McEwen: December 31, to S. chiefly, convex to N.W., width 3°, faint; January 2, double, 2° bands, 7° apart.—Phillips: February 4, to S. only, width 5°, very faint and diffused.—Thomson: January 3, seen all along, width 4°, very faint.

*PROTONILUS*.—McEwen: December 31, January 2, width 4°, darkish.—Phillips: November 27, January 3, February 4, width 2½°, faintish.—Thomson: January 3, width 3°, wavy, dark, severed from *Nylasyrtis* (Plate II, Fig. 5); a most important observation of permanent objective detail.\*—The Director: April 26, edge of shaded *Dioscuria*.

*SITACUS*.—McEwen: January 2, to N.E. only, width 3°.—Phillips: November 27, 29, January 3, to S.W. only, width 3½°, faint (Fig. 33); February 4, to S.W. only, width 5°, very faint.—Thomson: January 3, to S.W. only, convex to N.W., width 4°, faint (Plate II, Fig. 5).

*TYPHONIUS*.—McEwen: December 29, width 3½°, faint; 31, to W. chiefly, width 3°, faint; January 2, whole band, convex to N., width 3°, faint.—Thomson: February 10, starts near *Hammonis Cornu*, convex to N.E., width 3°, edge of shade to N.

## SECTION II.

## Mare Erythræum, Margaritifer Sinus, Auroræ Sinus, and Mare Acidalium.

$$\Omega = 10^\circ \text{ to } 70^\circ; \Phi = -60^\circ \text{ to } +60^\circ.$$

*ARGYRE I.*, according to the drawings of McEwen, Phillips, Porthouse, Thomson and the Director, glistened at sunrise on September 15; was bright setting on November 10; was unnoticed on C.M. on November 21–22; indiscernible risen on

\* The Director believes that the *Protonilus* is contracted into a very narrow dark streak for some 8° from *Coloe Palus*. The observations on which this view is based are as follows:—

1875, June 16.	Holden.	<i>Protonilus</i> narrowest to E.
1882, chart.	Schiaparelli.	Do.
1884, February 19.	Do.	Do.
1886, April 5.	Do.	Interrupted for a short distance to E.
1888, May 30.	Do.	Do.
1888, June 4.	Perrotin.	Narrowest to E.
1890, May 16.	Schiaparelli.	Interrupted for 8°, where it is replaced by a narrow line.
1890, July 6.	Keeler.	Do., but less detailed.
1903, April 5.	Molesworth.	Interrupted for 6°, but continued by two narrow lines.
1905, May 15.	Ward.	Disconnected from <i>Coloe Palus</i> .

November 22 and 27; not seen setting on December 22-23; invisible on C.M. on December 24; unnoticed risen on December 26; was very bright on C.M., but indiscernible setting on December 27; was bright risen on December 28; invisible risen on December 29; rose white on December 31; rose brilliant and protruding on January 2 and 3; was bright near C.M. on January 23 and 26 (Plate I., Fig. 3); rose and set white on January 31; was unnoticed risen on February 1 and 2; looked very bright risen, but scarcely whitish near C.M., on February 4; was invisible risen on February 5; set bright on March 6 and 10; appeared white near C.M. on March 12; rose whitish on March 16; was unnoticed setting on April 13; set very white indeed on April 14, 15, 16 and 18; was white on C.M. on April 18, 19 and 20; and rose white on April 22 (Fig. 6) and 24.

*MARE ERYTHRÆUM* looked "greenish" to Thomson on November 22. The joint data of McEwen, Phillips, Porthouse, Thomson and the Director show this *mare* seemingly faintish on September 15, November 21 and 22; almost normal on December 21-23; faintish on December 24, 26 and 27; very faint on December 28; faintish on December 29 and 31; very faint on January 3; faintish on January 26, 31, February 1, 2, 4, 5, March 6, 10, 12, 16, April 12-16 and 18; darkish on April 19-20; faintish on April 22; and darkish on April 24.

A "bright" streak was seen by McEwen near *Protei Regio* on March 6 (Fig. 13).

*PYRRHÆ REGIO* is almost conspicuous on Phillips' and Thomson's drawings of December 27 (Figs. 7 and 8) and on Phillips' of December 29 (Plate I., Fig. 1).

*MARGARITIFER SINUS*, "greenish" to Thomson on November 22, was, as usual, much fainter than *Sinus Furcosus*. From the joint data of McEwen, Phillips, Porthouse, Thomson and the Director we infer that this "gulf" was probably faintish on November 21; exceedingly faint on November 22; faintish on December 23, 24 (Plate I., Fig. 2) and 26; darkish on December 27 (Figs. 7 and 8); faintish on December 28 and 29; darkish



FIG. 7.—December 27,  $\omega = 28^\circ$ .  
(Phillips.)



FIG. 8.—December 27,  $\omega = 36^\circ$ .  
(Thomson.)

The *Margaritifer Sinus* region in 1914.

on December 31, January 2 and 31; faint on February 1-2; darkish on February 4; faintish on February 5 and March 10; darkish on March 12 and 16; very faint on April 16; faint on April 18; darkish on April 19-20; and faintish on April 22 and 24.

*IANI FRETUM*, heavily shaded to Porthouse (Fig. 2), seemed normal to McEwen, Thomson (Fig. 8) and the Director (Plate II., Fig. 6); but Phillips did not draw it (Plate I., Fig. 1 and text Figs. 1 and 7).

*AROMATUM PROMONTORIUM* is blunted on all drawings, and appeared occasionally brightish, through the propinquity of the *S. maria* (Fig. 7).

*AURORÆ SINUS* was normally outlined, and its duskiess extended further S. than in 1911-1912. The drawings of McEwen, Phillips, Thomson and the Director apparently show this "bay" faintish on November 21-22 and December 20-22; darkish on December 23, 24, 26, 27 (Figs. 7 and 8) and 28; faintish on December 29; faint, veiled, on January 26; darkish on January 31; faintish on February 2, 4 and 5, March 1 and 6; darkish on March 10 and 12; faintish on April 12-16, 18-20; and normal on April 22 and 24.

*CHRYSE* rose bright to McEwen on September 15 and to the Director on February 1 (Plate II., Fig. 6); it set very white to the latter on February 28 (Fig. 17) and on April 12; and also to McEwen on April 15.

On December 27 (Fig. 8) and February 4, Thomson saw a bright spot here, near the "estuary" of *Jamuna* in *Aurora Sinus*.

*XANTHE* comes out shaded on some drawings of McEwen, Phillips and Thomson (Plate I., Fig. 3). A cloud area, elongated E.N.E. to W.S.W., was detected by Thomson near *Luna Lacus* on December 22 (Fig. 12). *Xanthe* set white to the Director on February 28 (Fig. 17).

*JUVENTE FONS* was "only suspected" by Phillips on December 21.

*LUNÆ LACUS* had the disappointing appearance of a faint, diffused smudge. Nor was it always there. From the data of McEwen, Phillips, Thomson and the Director we conclude that this object was seemingly dusky on December 20-24, 26-28, January 26; darker perhaps on January 31; diffused on February 4, 6 and 10; and very faint on March 12, April 14 and 16. McEwen's drawing of December 24 shows two condensations hereabout (Plate I., Fig. 2); but no Member confirms this.

*NILIACUS LACUS*, after the results of McEwen, Phillips, Porthouse, Thomson and the Director, was apparently darkish on November 22 and 27; faintish on December 20; darkish on December 21; faintish on December 22 and 23; darkish on December 24; confused on December 26; faintish on December

27-28; faint on December 29 (Plate I., Fig. 1), 31 and January 1; faintish on January 31; invisible on February 1 (Plate II., Fig. 6); but dark on February 2 (Fig. 10); faintish on February 4 and 5 (Fig. 5); very faint on March 6; dark on March 10; faintish on March 12; obliterated by white cloud on March 16; faintish on April 14; darkish on April 15-16; unnoticed on April 18; faintish on April 19; and confused on April 22 and 24.

*ACHILLIS PONS* was frequently drawn by McEwen, even when Mars subtended  $6''.6$ . But Porthouse and the Director could not make it out near opposition. Thomson often missed it; yet he described it slanting E.N.E. to W.S.W. on December 27 (Fig. 8) and February 4; while Phillips depicted it shaded on December 27 (Fig. 7), when it was "glimpsed, but faint"; he also saw it on December 29, when it was slanting (Plate I., Fig. 1), and again on February 4 (Fig. 11).

*MARE ACIDALIUM* looked like a sombre trapezoidal mark over the snows. Thomson's drawing of December 27 (Fig. 8) and Phillips' of December 29 (Plate I., Fig. 1) show it bulging to E. beyond  $\Phi = +50^\circ$ , and pointed to S.W. Thomson found it "bluish grey" on November 22, perhaps "greenish" on February 4. It was never blackish, as in November 1896 ( $\eta = 72^\circ$ , as against  $47^\circ - 160^\circ$  in 1913-1914), its intensity, when greatest, slightly surpassing that of *Sinus Furcosus* (Fig. 10 and Plate I., Fig. 1); otherwise it fell short of it (Figs. 7-8). The delineations of McEwen, Phillips, Porthouse, Thomson and the Director show *Mare Acidalium* apparently very dark on November 21 and 22 (Fig. 9); dark on November 27 (Fig. 1); faintish on December 20; very dark on December 21-22 (Fig. 12); dark on December 23, 24, 26, 27 (Figs. 7 and 8), 28 and 29; faint on December 31; faintish and small on January 2; very dark on January 26 (Plate I., Fig. 3) and 31; invisible on February 1 (Plate II., Fig. 6); dark on February 2 (Fig. 10); darkish on February 4 (Fig. 11); faint on February 5 and

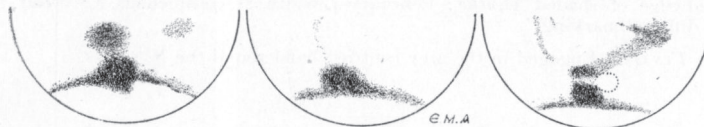


FIG. 9.—November 22.  $\omega = 43^\circ$ . (McEwen.)      FIG. 10.—February 2.  $\omega = 43^\circ$ . (The Director.)      FIG. 11.—February 4.  $\omega = 43^\circ$ . (Phillips.)

The *Mare Acidalium* in 1913-1914.

March 6; very dark on March 10 and 12; blotted out by cloud on March 16; darkish on April 14-16; almost invisible on April 18; and faintish on April 19, 20, 22 and 24.

*TEMPE* showed a bright spot *f.* the *Achillis Pons* to Phillips on February 4 (Fig. 11). On April 18, 19, 20 and 24, it rose bright to McEwen.

## MINOR DETAIL.

*DARDANUS*.—McEwen : December 27–28, edge of shade to S.

*GANGES*.—McEwen : November 22, width 4°; December 23, width 2°; 27–28, width 4½°, darkish; January 31, width 6°, darkish, diffused; March 10, 12, width 6°, faint.—Phillips : December 21, width 6°, double (Plate I., Fig. 4); 27, width 8°, darkish, diffused; February 4, width 9°, darkish, diffused.—Thomson : December 20, width 4°; 22, width 4° to S., 10° to N., faint; 27, mean width 5°, faintish; January 26, intense edge of shaded *Xanthe* (Plate I., Fig. 3); February 4, width 7°, conspicuous, “broad and diffused.”—The Director : February 2, March 1, April 12, 16, 18, 20, indiscernible.

*HYDASPES*.—McEwen : November 21, December 24 (Plate I., Fig. 2), 28, January 31, drawn some 2° wide, darkish.

*HYDRAOTES*.—Phillips : December 27, February 4, to N.W. only, width 3°, very faint and diffused.

*INDUS*.—McEwen : usually drawn convex to E. November 21, width 5°; December 23, 24 (Plate I., Fig. 2), width 4½°, faint; 26, diffused, patchy; 27–28, width 4°, edge of shade to W.; January 2, width 3°; 31, width 6°, diffused; March 10, width 8°, diffused; 12, edge of shade to *Oxus*.—Phillips : December 27, 29, to S. only, convex to E., width 3°, faintish.—Thomson : December 27, to S. only, width 3°, faint; February 4, whole length, convex to N.E., width 3°, faintish.—The Director : February 2, April 22 (Fig. 6), glimpsed to S. chiefly, convex to E., width 5°, very faint.

*JAMUNA*.—McEwen : November 22, width 4°; December 23, 27, 28, width 3°, faint; January 31, convex to N.W., width 3°, faint.—Phillips : December 27, mean width 5°, very faint.—Thomson : November 22, December 27, width 4½°, very faint; February 4, width 4°, seen “plainly.”

*NILOKERAS*.—McEwen : November 22, width 3°; December 24, drawn anomalously double, 3° bands, 12° apart to E., 18° to W., where each ends in a knob, as if *Luna Lacus* were doubled into round spots (Plate I., Fig. 2); 27, 28, January 31, width 6°, darkish; March 12, width 6°, very faint; April 18, width 10°, edge of bright *Tempe*.—Phillips : December 21, amorphous, width 8° at least, double; 27, width 12° to E., 7° to W., darkish, diffused (Fig. 7); February 4, width 10° to E., 15° to W., diffused.—Thomson : December 20, width 10°, conspicuously depicted; 27, mean width 5°, darkish, runs into *Mare Acidalium* (Fig. 8); January 26, intensified edge of shaded *Xanthe*; February 4, width 8°, conspicuous, a “broad, diffused marking.”

*TANAIS*.—Engaged in the grey contrast band round the N. snows.

## SECTION III.

## Solis Lacus.

$$\Omega = 70^\circ \text{ to } 120^\circ; \Phi = -60^\circ \text{ to } +60^\circ.$$

*BOSPORUS GEMMATUS* was faint in 1913–1914, the only sketch in which it is darkish being Thomson’s of January 26 (Plate I., Fig. 3).

*AEONIUS SINUS* was indiscernible to Phillips (Plate I., Fig. 4), Thomson and the Director (Figs. 14 and 17). But McEwen described it “distinctly outlined” on October 7: “clearly

“ visible ” on November 10 and December 16; distinct “ with the pointed N. end ” on April 7; “ the darkest visible detail ” on April 11, 13 and 14; and “ very dark ” on April 15-16.

*THAUMASIA* appeared to Phillips, Thomson and the Director outlined only to E. and S.E., owing to the extreme faintness of *Sinus Aonius*. The resulting form is charted in Plate III. *Thaumasia*'s S.E. part rose white to McEwen on September 6 and 7; its S.W. part rose “ bright white ” to him on October 10; the “ land ” was bright risen to him on October 13; its S. part rose white to him on December 24; the whole district appeared to him white on C.M. on December 27; Thomson saw it whitish setting on January 22; and McEwen on April 7 and 9; and the “ land ” looked again brightish to McEwen on April 14.

On December 21, Phillips drew a whitish spot on *Thaumasia*, due W. of *Solis Lacus* (Plate I., Fig. 4); while Thomson wrote on January 26 that over the *f.* “ part of *Thaumasia* there was “ a light patch. ” As Phillips saw almost the same thing in 1911, and the Director in 1909, this lighter district would seem to be permanent here.

*AUREA CHERSO*. “ appears to have encroached E. into “ *Aurora* ” *Sinus*, according to McEwen; a statement which Thomson confirms on January 26 (Plate I., Fig. 3) and Phillips controverts on December 21 (Plate I., Fig. 4).

*SOLIS LACUS*, oval to Thomson (Plate I., Fig. 3) and the Director (Fig. 14), looked pear-shaped and revealed more

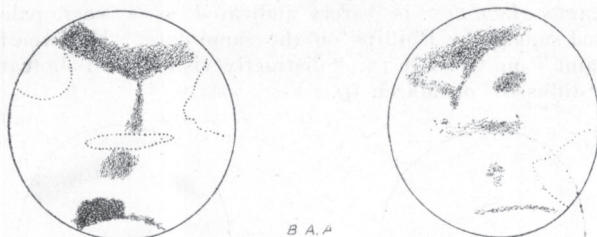


FIG. 12.—December 22,  $\omega = 72^\circ$ .  
(Thomson.)

FIG. 13.—March 6,  $\omega = 87^\circ$ .  
(McEwen.)

The *Solis Lacus* region in 1913-1914.

structure to Phillips (Plate I., Fig. 4). It appeared occasionally dark. The data of McEwen, Phillips, Thomson and the Director show that this “ lake ” was seemingly dark on November 9; indiscernible on November 10 (Fig. 16) and 11; faintish on December 16 and 20; very dark on December 21; confused on December 22; invisible on December 27-28; very dark on January 23-24; normally dark on January 26; not seen on January 31; very faint on February 28 (Fig. 17), March 1 and 6; and again indiscernible from April 9 to 16 (Fig. 15).

*DÆDALIA* showed nothing abnormal.

*TITHONIUS LACUS* presented its ordinary compound form to Phillips (Plate I., Fig. 4), Thomson (Plate I., Fig. 3) and the

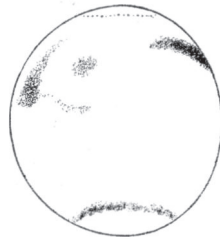


FIG. 14.—March 1,  $\omega = 112^\circ$ .  
(The Director.)

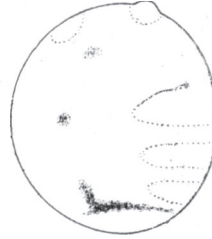


FIG. 15.—April 11,  $\omega = 111^\circ$ .  
(McEwen.)

The *Solis Lacus* region in 1914.

Director (Fig. 14); the W-shaped structure being caught by Phillips, the components, *Ceti Lacus* and *Melas Lacus*, by Thomson. The drawings of these observers, with those of McEwen, establish that the "lake" was apparently unnoticed on November 9; that it was very faint on November 10–11; confused on December 16 and 20; dark on December 21; again confused on December 22; faint on December 27–28; dark on January 26; faintish on January 31, February 28, March 1 and 6; and that it was not seen after.

*PHENICIS LACUS* was drawn by Phillips as a dark oval knot on December 21 (Plate I., Fig. 4).

*LACUS ASCRÆUS* is barely indicated as a very pale and diffused smudge by Phillips on the same date. McEwen found it "faint" on October 13, "distinctly visible" on January 31, and "diffused" on March 10.



FIG. 16.—November 10,  $\omega = 122^\circ$ .  
(McEwen.)



FIG. 17.—February 28,  $\omega = 141^\circ$ .  
(The Director.)

The *Solis Lacus* region in 1913–1914.

*OPHIR* rose whitish to Thomson on November 22 and December 27; set bright to the Director on February 28 (Fig. 17), and "very white" to McEwen on April 14.

*THARSIS* rose whitish to Thomson on December 22; and set whitish to Phillips on January 17 and 24, and to Thomson on January 27.



*ASCURIS LACUS* comes out as a dusky patch at the base of *Ceraunius* on the drawings of McEwen dated November 10, January 31, April 9 and 14.

*MÆOTIS PALUS* can be identified as a large, darkish condensation on McEwen's drawings of October 6 and 7, on those of Phillips of December 21 (Plate I., Fig. 4) and January 17 (Fig. 21), and on McEwen's sketch of April 15.

#### MINOR DETAIL.

*AGATHODÆMON*.—McEwen : December 27-28, width 3°, darkish ; January 31, width 2°, edge of shade to N.E.—Phillips : December 21, convex to S.W., width 3°, faintish (Plate I., Fig. 4).—Thomson : January 26, convex to S.W. near the *mare*, concave to S. further W. ; width 3° near "estuary," widens to 6° to W., knotted, "faint." A fine view of this object (Plate I., Fig. 3).—The Director : March 1, convex to S.W. near "estuary," thence concave to S., width 3° to E., 5° to W., faint (Fig. 14).

*CERAUNIUS*.—McEwen : November 10, anomalously double, 4° wide branches, 15° apart to N., 20° to S. ; December 16, edge of apparently shaded *Arcadia* ; January 31, width 7°, marked ; March 6, width 8° ; 10, width 12°, faint ; April 13-16, width 6°, darkish.—Phillips : December 21, width 5°, faint (Plate I., Fig. 4).—Thomson : December 20, width 6°, faint ; 22, January 26, invisible.—The Director : February 28 (Fig. 17), March 1 (Fig. 14), April 12, 16, 18, indiscernible.

McEwen rightly remarks that *Ceraunius* "seems to show up more when away from . . . C.M."

*CHRYSORRHOAS*.—McEwen : December 23, 27, 28, January 31, mean width 4°, faint.—Phillips : December 21, amorphous, width 6°, faint.—Thomson : December 20, width 8°, very faint ; January 26, convex to N.W., width 5°, faint.

*NECTAR*.—Phillips : December 21, does not run up to *Bosporos*, width 4°, dark, but diffused (Plate I., Fig. 4).—Thomson : January 26, continuous to *mare*, width 3°, dark (Plate I., Fig. 3).

*NILUS*.—McEwen : December 28, March 6, mean width 4½°, very faint.—Thomson : December 20, width 6°, very faint.

#### SECTION IV.

##### Mare Sirenum.

$$\Omega = 120^\circ \text{ to } 180^\circ ; \Phi = -60^\circ \text{ to } +60^\circ.$$

*ICARIA*, owing to the tilt of the axis, was observed under unfavourable conditions ; and its shading was invisible, save on January 22 to Thomson. It rose "very white" to McEwen on October 7.

*PHAETHONTIS* rose also "very white" to McEwen on October 7.

*MARE SIRENUM* presented its normal shape to McEwen (Fig. 18), Phillips (Plate I., Figs. 5 and 6), Thomson and the Director (Figs. 17 and 19), and was usually dark. The drawings of these Members show that the "sea" was apparently

very faint on October 7; dark on November 4; darkish on November 6; very dark on November 9; unnoticed on November 10 (Fig. 16) and 11; very dark on December 10; dark to W. on December 11; dark on December 12; normal on December 16-17; darkish to W. on January 11; dark on January 15; very dark on January 17; darkish on January 22 and 24; dark to E. on January 26; darkish on January 27; very dark on February 24; dark on February 28 and March 1; very faint on April 3-4; unnoticed on April 7; exceedingly faint on April 9; and indiscernible on April 11.

*ATLANTIS*, shown by McEwen, is also indicated by Phillips on December 17, as a long, narrow, dusky streak.

*MEMNONIA* presented a whitish spot to Phillips, E. of *Titan*, on November 9 (Plate I., Fig. 5). It rose bright, with *S. Amazonis*, to McEwen on November 10-11, to Thomson on December 20, and to Phillips on December 21 (Plate I., Fig. 4); it set whitish to McEwen on April 3-4; and rose brightish to him on April 11 (Fig. 15).

*NODUS GORDII* was perceived as a very faint undecipherable smudge by the Director on February 28 (Fig. 17), and appeared dimly defined to Phillips on December 21.

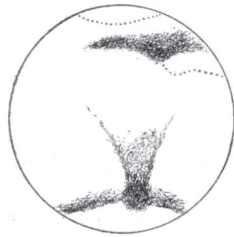


FIG. 18.—December 16,  $\omega = 139^\circ$ .  
(McEwen.)

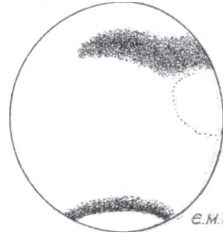


FIG. 19.—February 24,  $\omega = 150^\circ$ .  
(The Director.)

The *Mare Sirenum* district in 1913-1914.

*AMMONIUM* is recognisable as a diminutive object on Thomson's drawing of February 24 (Fig. 25).

*AMAZONIS* is sometimes drawn shaded by McEwen, Phillips and Thomson. It rose "bright white" to McEwen on November 10; was bright risen, to S., with *Memnonia*, to Phillips on December 21 (Plate I., Fig. 4); set whitish to McEwen on April 3; rose whitish to him, in its N. part, on April 9; showed two white spots, risen, to him on April 11 (Fig. 15); of which the S. one only was there on April 13, the N. one having drifted to E. apparently, as far as *Ceraunius*.

*ARCADIA* had a whitish spot next to *Ceraunius* to McEwen on April 13-15, and it set brightish to Phillips on January 17 to 24, and to Thomson on January 27; to McEwen it rose whitish on March 6 (Fig. 13), and set whitish on April 3.

*TITANIA*, or the shading detected by the Section in 1900-1901, was re-observed in 1913-1914 by McEwen (Fig. 18), Phillips (Plate I., Fig. 5), Thomson (Figs. 20 and 22), and the Director (Fig. 17). McEwen saw it whitish risen on April 11 (Fig. 15).

*EUXINUS LACUS* was clearly seen by Phillips and Thomson. On January 17, Phillips drew "two very dark 'lakes' near the 'N. snows'" (Fig. 21), of which the *f.*, or *Propontis*, was in  $\Omega = 183^\circ$ ,  $\Phi = +44^\circ$ . The *p.* one was situated in  $\Omega = 157^\circ$ ,

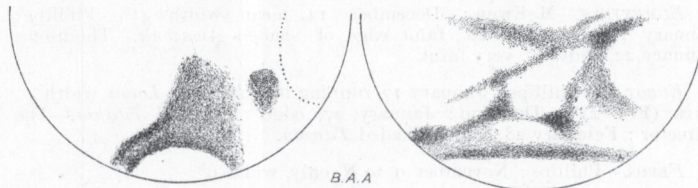


FIG. 20.—November 6,  $\omega = 153^\circ$ . (Thomson.)      FIG. 21.—January 17,  $\omega = 174^\circ$ . (Phillips.)



FIG. 22.—January 22,  $\omega = 136^\circ$ . (Thomson.)      FIG. 23.—January 24,  $\omega = 165^\circ$ . (Phillips.)

*Titania*, *Mæotis Palus*, *Euxinus Lacus*, *Castorius Lacus*, and *Propontis* in 1913-1914.

$\Phi = +41^\circ$ , thus corresponding to our *Euxinus Lacus* of 1900-1901 and 1903. On January 22, Thomson drew this object as a dark band, in  $\Omega = 153^\circ$ ,  $\Phi = +45^\circ$  (Fig. 22); and on January 24, Phillips located it in  $\Omega = 153^\circ$ ,  $\Phi = +41^\circ$  (Fig. 23). A faint, small companion "lake," near our *Ascania Palus* of 1903, is shown on both dates by Phillips S. of *Euxinus Lacus*.

*CASTORIUS LACUS*, drawn by McEwen on December 17 as notching the N. snows (Fig. 18), in  $\Omega = 151^\circ$ ,  $\Phi = +52^\circ$ , was also caught by Phillips on November 4 and 9 in mean  $\Omega = 152^\circ$ ,  $\Phi = +50^\circ$ , and by Thomson on January 22, in  $\Omega = 151^\circ$ ,  $\Phi = +55^\circ$ . Schiaparelli's position of *Castorius Lacus* in 1888 was  $\Omega = 157^\circ$ ,  $\Phi = +52^\circ$ .

*PROPONTIS*, an oval, dusky spot, according to the drawings of McEwen, Phillips, Thomson and the Director, was seemingly invisible on November 4; darkish on November 6 (Fig. 20); invisible on November 9; confused on December 6 and 10; very dark on December 11 (Fig. 24); confused on December 12; darkish on January 11; faintish on January 14 and 15; "very dark" on January 17 (Fig. 21); certainly invisible, veiled by

yellow cloud on January 22 (Fig. 22) and 24 (Fig. 23); blackish risen on January 26; invisible on January 27; diffused on February 24 and March 31; and darkish on April 1, 3, 4 and 7.

## MINOR DETAIL.

*ARAXES*.—Phillips: November 9, width  $5^{\circ}$ , darkish.

*BRONTES*.—McEwen: December 17, to N. only, width  $2^{\circ}$ .

*EUMENIDES*.—McEwen: December 12, mean width  $4\frac{1}{2}^{\circ}$ .—Phillips: January 17, 24, width  $10^{\circ}$ , faint edge of shaded *Amazonis*.—Thomson: January 22, width  $7^{\circ}$ , very faint.

*EUROTAS*.—Phillips: January 17, running into *Euxinus Lacus*, width  $4^{\circ}$ , dark (Fig. 21).—Thomson: January 27, edge of shaded *Titania*.—The Director: February 28, edge of shaded *Titania*.

*FEVOS*.—Phillips: November 9, to N. only, width  $9^{\circ}$ .

*GIGAS*.—Phillips: December 18, "vague smudgy shading."

*HYSCUS*.—Thomson: January 22, N.E. limit of *Icaria* shading.

*LYCUS*.—McEwen: December 17, edge of shade to S.W.

*PHLEGETHON*.—Phillips: January 17, only between *Euxinus Lacus* and *Propontis*, runs E. to W., width  $4^{\circ}$ , faintish (Fig. 21).

*PYRIPHLEGETHON*.—McEwen: December 12, mean width  $5^{\circ}$ .—Thomson: January 26, to S.E. only, width  $10^{\circ}$ , faint, diffused.

*TARTARUS*.—McEwen: February 24, W. edge of *Titan* shading.—Phillips: January 11, width  $5^{\circ}$ , very faint; 17, convex to N.E., mean width  $5^{\circ}$ , faint, diffused.—Thomson: December 10, width  $4^{\circ}$ , faintish.

*TITAN*.—McEwen: December 12, mean width  $5^{\circ}$ ; February 21, emerges out of *Titanum Sinus* and broadens to N.—Thomson: December 10, whole length, width  $4^{\circ}$ ; January 27, width  $4^{\circ}$ , very faint.

## SECTION V.

## Mare Cimmerium, Elysium, and Trivium Charontis.

$$\Omega = 180^{\circ} \text{ to } 250^{\circ}; \Phi = -60^{\circ} \text{ to } +60^{\circ}.$$

*MARE CHRONIUM* appeared like "a narrow dark line," bounding the S. whiteness, to Phillips on January 12; and on January 17 it was again streaky to him, but without a bright area to S. (Plate I., Fig. 6).

*ELECTRIS* rose "very bright" to McEwen October 6 and 7, and set bright to Thomson on February 24 (Fig. 25).

*ERIDANIA* also rose to McEwen "very bright" on October 6, and set "bright white" to him on February 18 (Fig. 28) and March 26. Otherwise it showed nothing abnormal.

*MARE CIMMERIUM*, tapering to W., according to Phillips (Fig. 31) and Thomson (Fig. 30), further revealed to the former the bulges of *Læstrygonum Sinus* and *Cyclopus Sinus*. It was moderately dark. The results of McEwen, O'Hara, Phillips,

Thomson and the Director show this *mare* apparently darkish on September 22 and November 4; darkish to E. on November 6; darkish to W. on December 4 (Fig. 27); darkish on December 6, 10, 11 (Fig. 24), and 12; faintish to W. on January 3 and 6; faintish on January 10 (Fig. 26); dark to W. on January 11; faintish to W. on January 12; darkish on January 14 and 15; darkish to E. on January 17 (Plate I., (Fig. 6)); darkish on January 24; very faint on February 16; darkish to W. on February 18 and 21; darkish on February 24; faintish to W. on March 26 and 27; darkish to W. on March 29; faintish on March 31 and April 1; darkish on April 3; darkish to E. on April 4; and faintish to E. on April 7.



B.A.A

FIG. 24.—December 11,  $\omega = 204^\circ$ .  
(Phillips.)

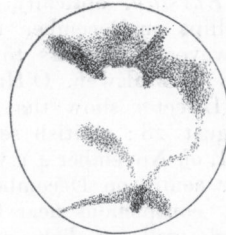
FIG. 25.—February 24,  $\omega = 217^\circ$ .  
(Thomson.)

The *Mare Cimmerium* region in 1913-1914.

*HESPERIA* is often shaded by McEwen, O'Hara (Fig. 26), Phillips (Fig. 31), Thomson, and the Director. McEwen saw a whitish area in its N. part on March 23 (Fig. 29). *Hesperia* never gleamed near the periphery in 1913-1914.

*ZEPHYRIA* showed a whitish spot W. of *Titan* to Phillips November 9 (Plate I., Fig. 5), while its whole S. district was brightish to him on December 11 (Fig. 24). It rose whitish to McEwen on October 7 and December 17 (Fig. 18) and to the Director on February 24 (Fig. 19), and it set "bright white" to McEwen on March 26 and April 1.

*ÆOLIS* rose white to McEwen on October 7 and to Thomson on December 10; and set "bright white" to McEwen on March 26 and 27.



B.A.A

FIG. 26.—January 10,  $\omega = 241^\circ$ .  
(O'Hara.)

FIG. 27.—December 4,  $\omega = 245^\circ$ .  
(McEwen.)

The *Mare Cimmerium* region in 1913-1914.

*CYCLOPIA* is slightly shaded on McEwen's drawings of February 18, 24 and March 23.

*ÆTHIOPIS* presented to Phillips on January 11-12 a whitish spot, some  $12^{\circ}$  across, in  $\Omega = 255^{\circ}$ ,  $\Phi = 0^{\circ}$  (Fig. 31). As



FIG. 28.—February 18,  $\omega = 246^{\circ}$ . FIG. 29.—March 23,  $\omega = 247^{\circ}$ .  
The *Mare Cimmerium* region in 1914. (McEwen.)

Gledhill in 1871, Burton in 1882, Eddie in 1907, and the Director in 1911, saw something analogous, the district hereabout is probably of a lighter tint than the ochre colour of the "continents."

*PAMBOTIS LACUS* is depicted only by Thomson on February 24 (Fig. 25).

*TRIVIUM CHARONTIS* was small but often dark in 1913-1914. Phillips found it a "round black spot" on January 12, but "elongated in the direction of the *Cerberus*" on January 17 (Fig. 21). The joint data of McEwen, O'Hara, Phillips, Thomson and the Director show that this "lake" was probably dark on November 4; indiscernible on November 6; very faint on December 4 and 6; faintish on December 10; darkish on December 11-12 (Fig. 24); very dark on January 10-12 (Fig. 26); confused on January 14-15; very dark on January 17 (Fig. 21 and Plate I., Fig. 6) and 22 (Fig. 22); dark on January 24 (Fig. 23); very dark on February 16; confused on February 18 and 21; darkish on February 24 (Fig. 25); invisible on March 26; very faint on March 31, April 1, 3 and 4; and not seen on April 7.

*ELYSIUM*, optically enlarged, had "an unusual shape" to Phillips on December 10, January 12 and 17 (Plate I., Fig. 6). However, it appears to have been roughly pentagonal. The data of McEwen, O'Hara, Phillips, Porthouse, Thomson and the Director show that *Elysium* was "very bright risen" on August 28; whitish setting on September 22; unnoticed near C.M. on November 4; whitish risen on November 6; confused near centre on December 4, 6 and 10; dull risen on December 10; conspicuous near C.M. on December 11 (Fig. 24); confused, well on disk, on December 12; invisible setting on January 3 and 6; very bright near sunset on January 10; ruddier (?) near C.M. than surrounding regions on January 11; invisible setting on January 12; confused on January 14

and 15; indiscernible risen on January 17, 22 and 24; confused on February 16, 18 and 21; bright to E. on February 24 (Fig. 25); invisible setting on March 22-24; whitish setting on March 26-27; indiscernible setting on March 29; whitish on C.M. on March 31; almost invisible on C.M. on April 1 and 3; whitish risen on April 4; and unnoticed risen on April 7.

*MORPHEOS LACUS* measured  $6^\circ$  across to Phillips on January 11, and seemed darkish.

*PHLEGRA* was shaded, as usual, although the greyish tint was not always easy. It rose bright on February 24 to McEwen.

*CEBRENIA* looked also dusky at times.

*STYMPHALIUS LACUS* is faintly indicated in Phillips' drawing of January 24 (Fig. 23).

*ÆTHERIA* seemed crossed by a whitish streak, running into *Neith Regio*, to McEwen on March 29.

#### MINOR DETAIL.

*ÆTHIOPS*.—McEwen: January 11, width  $3^\circ$ .—Phillips: January 17, width  $3^\circ$ , faint near limb.

*BOREAS*.—Phillips: January 17, width  $5^\circ$ , faintish (Plate I., Fig. 6).

*CERBERUS I.*—McEwen: December 4, 12, width  $5^\circ$ , faint; January 11, edge of ruddy (?) *Elysium*; 14, 15, width  $5^\circ$ , dark; February 18, edge of shaded (?) *Elysium*; 21, 24, mean width  $7^\circ$ , faint; March 23, edge of brightish *Elysium*; 24, mean width  $12^\circ$ , do.; April 1, 4, mean width  $6^\circ$ , do.—O'Hara: January 10, width  $7^\circ$ , very dark (Fig. 26).—Phillips: November 4, width  $5^\circ$ , dark to E.; December 11, width  $5^\circ$ , very dark, "with a faint parallel streak" to S.E.,  $7^\circ$  off (Fig. 24); January 11, convex to S.E., mean width  $5^\circ$ , very dark; faint parallel streak confirmed,  $10^\circ$  off; 12, width  $4^\circ$ , darkish, near limb (Fig. 31); 17, as on January 11 (Plate I., Fig. 6); 24, convex to S.E., mean width  $5^\circ$ , very dark (Fig. 23).—Thomson: December 10, width  $7^\circ$ , dark; January 6, width  $8^\circ$ , faint near limb (Plate II., Fig. 1); 22, width  $4^\circ$ , blackish risen (Fig. 22); February 16, width  $5^\circ$ , very dark; 24, width  $6^\circ$ , very dark, doublish? (Fig. 25).

*CERBERUS II.*—McEwen: January 11, convex to N.W., width  $2^\circ$ , darkish.

*CHAOS*.—McEwen: March 24, edge of bright *Elysium*.—O'Hara, January 10, width  $7^\circ$ , very faint edge of bright *Elysium*.—Phillips: December 11, width  $4^\circ$ ; January 11, 17, width  $5^\circ$ , faint edge of shaded *Cebrenia* (Plate I., Fig. 6).

*CYCLOPS*.—McEwen: January 11, width  $3^\circ$ , darkish; February 18, 24, March 23, edge of shaded *Cyclopa*.—O'Hara: January 10, to N. only, width  $11^\circ$ , darkish (Fig. 26).—Phillips: December 11, January 11 and 17, trending N.E. to S.W., convex to N.W., width  $5^\circ$  to  $6^\circ$ , faintish (Fig. 24 and Plate I., Fig. 6).—Thomson: February 16, 24, width  $3^\circ$ , faintish (Fig. 25).

*EREBUS*.—Phillips: January 17, 24, width  $4^\circ$ , faint (Figs. 21, 23 and Plate I., Fig. 6).

*EUNOTOS*.—McEwen: December 4, down to *Nubis Lacus*, width  $5^\circ$ , faint; January 11, edge of ruddy (?) *Elysium*; February 21, width  $6^\circ$ ; March 23, 24, edge of brightish *Elysium*.—O'Hara: January 10, width  $8^\circ$ , edge of bright *Elysium* (Fig. 26).—Phillips: December 11, width  $4^\circ$ , faintish; January 11, 12, 17, mean width  $4^\circ$ , faintish (Plate I., Fig. 6).—Thomson: January 6, to N.W. only, width  $5^\circ$ , faintish (Plate II., Fig. 1); February 16, 24, width  $4^\circ$ , faintish (Figs. 25 and 30).

*GALAXIAS*.—Thomson : February 24, to S. only, width  $3^{\circ}$ , very faint (Fig. 25).

*HADES*.—McEwen : January 14, 15, width  $5^{\circ}$ , darkish.—Phillips : November 4, December 11, January 11, 17, mean width  $5^{\circ}$ , faintish (Figs. 21, 24 and Plate I., Fig. 6); 24, edge of shaded *Phlegra* (Fig. 23).—Thomson : December 10, width  $4^{\circ}$ , faint.

*HEPHESTUS*.—McEwen : seen very often as a diffused smudge.

*HYBLÆUS*.—McEwen : March 23, 24, edge of bright *Elysium*.—O'Hara : January 10, width  $8^{\circ}$ , edge of bright *Elysium* (Fig. 26).—Phillips : December 11, January 11, 12, 17, mean width  $4^{\circ}$ , darkish (Fig. 24 and Plate I., Fig. 6).

*LÆSTRYMON*.—McEwen : January 14, February 24, width  $4^{\circ}$ .

*ORCUS*.—McEwen : December 6, edge of shaded *Amazonis*; 12, width  $5^{\circ}$ , faint.—Phillips : December 11, width  $8^{\circ}$ , "broad, soft, patchy, and very diffuse" (Fig. 24); January 11, width  $4^{\circ}$ , very faint and diffuse; 17, width  $12^{\circ}$ , double, very faint and diffuse, edge of shaded *Amazonis* (Fig. 21); 24, width  $12^{\circ}$ , very faint and diffused (Fig. 23).—Thomson : January 22, edge of shaded *Amazonis*.

*PACTOLUS*.—Phillips : January 11, width  $5^{\circ}$ , very faint to S.E.

*SCAMANDER*.—Phillips : January 17, mean width  $3^{\circ}$ , "quite dark" (Plate I., Fig. 6).

*STYX*.—McEwen : January 14, 15, width  $5^{\circ}$ , darkish; March 24, April 1, 4, edge of whitish *Elysium*.—O'Hara : January 10, mean width  $5^{\circ}$ , edge of bright *Elysium* (Fig. 26).—Phillips : December 11, width  $4^{\circ}$  (Fig. 24); January 11, 17, 24, mean width  $6^{\circ}$ , faint edge of shaded *Phlegra*.—Thomson : January 22, width  $4^{\circ}$ , very faint (Fig. 22); February 16, 24, mean width  $7^{\circ}$ , dark (Fig. 25).

## SECTION VI.

### Mare Tyrrhenum and Syrtis Major.

$$\Omega = 250^{\circ} \text{ to } 310^{\circ}; \Phi = -60^{\circ} \text{ to } +60^{\circ}.$$

*CHERSONESUS* is described as a "very bright streak" by McEwen on December 4.

*AUSONIA*, shaded and limitless, rose whitish, with *Hellas*, to McEwen on August 18; was white to him near *Hellas* on December 4 (Fig. 27); rose bright to Phillips on January 17 (Plate I., Fig. 6); was whitish *p. C.M.* to McEwen on February 18 (Fig. 28); set white to him on March 22 and 23; was whitish to S. on C.M. on March 26; and again set whitish to him on April 28.

*HADRIACUM MARE*, according to McEwen, O'Hara, Phillips, Porthouse, Thomson and the Director, was seemingly faintish on December 4, 6, 30, 31, January 2 and 3; very faint on January 6 (Plate II., Fig. 1); faintish on January 7 and 10; darkish on January 12, February 4 and 10; very faint on February 16 (Fig. 30) and 18; faint on March 21; obliterated by whitish cloud on March 22; faint on March 23, 24, 26, 27, April 26, 28 and May 10.



*HELLAS* presented especially its N. half, skirted by *Hadriacum Mare*. The drawings of the preceding observers show it apparently white risen with *Ausonia* on August 18; normal setting on November 27; brilliant rising, but fading later, on December 4; indiscernible setting on December 29; normal on December 30; unnoticed setting on December 31; normal setting on January 2; whitish on C.M. on January 3; normal about C.M. on January 6 and 7; indiscernible risen on January 10;

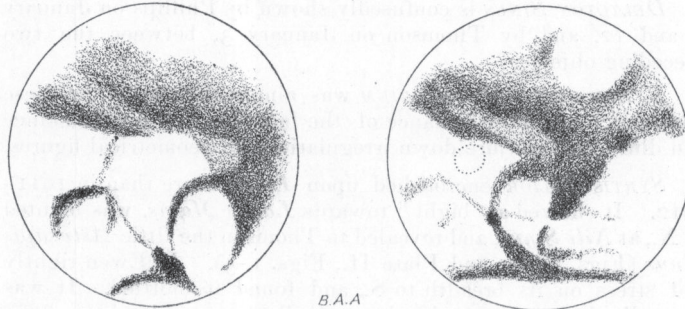


FIG. 30.—February 16,  $\omega = 254^\circ$ .  
(Thomson.)

FIG. 31.—January 12,  $\omega = 276^\circ$ .  
(Phillips.)

The *Syrtis Major* region in 1914.

bright risen on January 11; well outlined on C.M. on January 12 (Fig. 31); faintly whitish setting on February 1 (Plate II., Fig. 6); normal setting on February 4; brightish setting on February 10; invisible risen on February 16 (Fig. 30), 18 and 21; brightish on C.M. and setting on March 21-22; whitish on C.M. on March 23-24; whitish risen on March 26; unnoticed risen on March 27; whitish setting on April 26 and 28; whitish on C.M. on April 28; and whitish setting on May 10.

*YAONIS REGIO* is shown confusedly by Phillips on January 12 (Fig. 31).

*MARE TYRRHENUM* was normal in shape and almost in intensity. From the drawings of the observers mentioned, it follows that this long "sea" was apparently faintish on September 22; very faint to E. on December 4; faint on December 6 and 30; faintish to W. on December 31; dark to W. on January 2; faintish to W. on January 3; dark in middle ( $\Omega = 230^\circ - 260^\circ$ ), with bright cloud, on January 6 (Plate II., Figs. 1 and 2); darkish to W. on January 7; darkish on January 10, 11 and 12; darkish to W. on February 4; darkish on February 10, 16, 18, 21, March 21; faintish on March 22-24; darkish on March 26, 27 and 29; faintish on April 26; darkish on April 28; and faintish on May 10.

*SYRTIS PARVA*, an inconspicuous indentation, was, according to the same amateurs, probably faintish on September 22, December 4, January 3, 6 and 10; dark on January 11 and 12; faintish on February 16, 18, 21, and March 21-24; darkish on March 26-27 and April 28; and not seen on May 10.

*ÆNOTRIA*, indicated by McEwen, is well shown as a half-tone by Phillips on January 3 (Fig. 33) and 12 (Fig. 31); and by Thomson on January 3 (Plate II., Fig. 5) and 6 (Plate II., Fig. 1).

*INCURVA INSULA* is very vaguely drawn near *Hammonis Cornu* by Phillips and Thomson on January 3 (Fig. 33 and Plate II., Fig. 5). A whitish patch is depicted here by Porthouse on January 6 (Plate II., Fig. 2).

*DELTOTON SINUS* is confusedly shown by Phillips on January 3 and 12, and by Thomson on January 3, between the two preceding objects.

*NYMPHÆUM PROMONTORIUM* was almost unnoticed by these observers; one more instance of the fact that increased distance and diffraction conjure down irregularities to geometrical figures.

*SYRTIS MAJOR* encroached upon *Libya* more than in 1911-1912. It showed a "bight" towards *Lacus Mæris*, was blunted to N., at *Nili Sinus*, and revealed to Thomson the little *Astusapis Sinus* (Figs. 30-33 and Plate II., Figs. 1-5). McEwen rightly laid stress on its breadth to S., and found it mottled. It was generally dark. From the data of all observers having sent in drawings, it follows that the *Syrtis* was apparently intense on September 15 and 22; unnoticed setting on October 20; dark on November 27 (Fig. 1); faintish risen on December 4 (Fig. 27); faintish setting on December 29; dark to N. on December 30; dark on December 31; dark to W. on January 2-3; very dark to N. on January 3; dark to W. and N. (Plate II., Figs. 2 and 3) on January 6; very dark to N. on January 7 (Fig. 32); dark to W. on January 10; very dark, especially to N., on January 12 (Fig. 31); very dark on February 4; unnoticed near sunset on February 5 (Fig. 5); very dark on February 10, 16 and 18; faintish, especially to E., on March 21; dark to W. on March 22-24; darkish on March 27; faintish on April 26; darkish on April 28; and faint on May 10.

*NILI PONS* is prominent on Phillips' drawings of January 3 and 12 (Figs. 33 and 31), as well as on Thomson's of January 3 and 7 (Plate II., Fig. 5, and text Fig. 32).

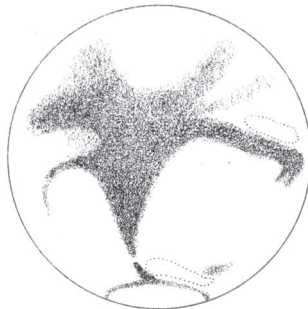


FIG. 32.—January 7,  $\omega = 316^\circ$ .  
(Thomson.)

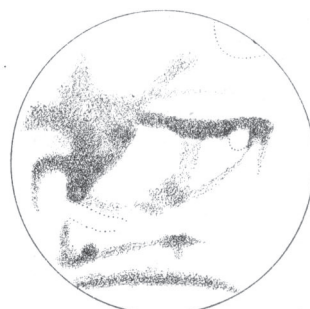


FIG. 33.—January 3,  $\omega = 319^\circ$ .  
(Phillips.)

The *Syrtis Major* region in 1914.

*LIBYA* was shaded as far as *Triton* to Phillips (Fig. 31), as far as *Rhesus* to Thomson (Fig. 30). The records of these observers, combined with those of O'Hara, Porthouse and the Director, show *Libya* certainly shaded on September 22, November 27 and December 4; apparently ochre on December 30, 31, January 2 and 3; shaded on January 6 and 7 (Fig. 32); ochre on January 10-11; shaded on January 12, February 4, 10 and 16 (Fig. 30); ochre on February 18; confused on March 21-22; bright *p. C.M.* on March 23 and 24; ochre perhaps on March 26, 27, April 26, 28 and May 10.

*MÆRIS LACUS* must have preserved the 1909 and 1911-1912 huge size and darkness; but it looked smaller, owing to the increased effect of diffraction resulting from smaller aperture and the greater distance of Mars. After the joint data of McEwen, O'Hara, Phillips, Porthouse, Thomson and the Director, we find that *Lacus Mæris* was not seen on September 22 and December 30, 31; had the appearance of a deep "gulf" on January 3 (Plate II., Fig. 5, and text Fig. 33), 6 (Plate II., Figs. 1 and 2) and 7 (Fig. 32); was not seen on January 10; was a deep "inlet" on January 12 (Fig. 31); February 10 and 16 (Fig. 30); and was unnoticed later.

*ISIDIS REGIO* showed nothing abnormal.

*NEITH REGIO* does not appear to have been observed shaded to S., but its N. part looked dusky to O'Hara on December 30. On January 2 McEwen saw "two brilliant spots . . . N. of *Coloe Palus*," and on March 29 a whitish streak running into *Ætheria*.

*NUBIS LACUS* again constituted the darkest part of the *Casius*. The records of the above observers show that this "lake" was probably not perceived on September 22; was very dark on December 4 (Fig. 27); confused on January 3; faint on January 6 (Plate II., Fig. 2); unnoticed on January 7 (Fig. 32); very dark on January 10 (Fig. 26) and 12 (Fig. 31); surprisingly dark on February 16 (Fig. 30); and not well seen later.

*MEROE* was invaded by a whitish streak coming from *Ismenius Lacus*, according to Thomson, on January 3 (Plate II., Fig. 5). This is confirmed by Phillips (Fig. 33), who, on January 5, however, did not notice this object. But on January 7, Thomson saw the streak extending into *Dioscuria* (Fig. 32). *Meroe* rose whitish to McEwen on March 27.

*COLOE PALUS* had the appearance of a dark knot, some 6° across. The preceding six observers show it diffused on November 27 and January 31; it was not seen on January 2; was dark, though lighter than *Nilosyrtis*, on January 3 (Plate II., Fig. 5, and text Fig. 33); dusky on January 6; unnoticed on January 7 (Fig. 32) and 12; faintish on February 4; indiscernible on February 10 and March 21; diffused on March 22; and not seen after.

*UTOPIA* is shaded on almost all drawings showing it, being particularly dark on January 10 to O'Hara (Fig. 26).

## MINOR DETAIL.

*ANUBIS*.—McEwen : January 2, width  $4^{\circ}$ .

*ASOPUS*.—Phillips : November 27, runs due W., where it joins *Sitacus* from S.W., width  $4^{\circ}$ , exceedingly faint (Fig. 1) ; January 3, as on November 27, patchy, faint (Fig. 33) ; February 4, do., but very diffuse and edge of shaded *Arabia*.—Thomson : January 3, runs to N.W. almost, width  $3^{\circ}$ , faint, broader and darker to E. (Plate II., Fig. 5).

*ASTABORAS*.—McEwen : January 2, width  $3^{\circ}$ .—Phillips : January 12, to E. only, winding, mean width  $4^{\circ}$ , faint (Fig. 31).

*ASTAPUS*.—McEwen : December 4, width  $7^{\circ}$ , diffused (Fig. 27).

*BOREOSYRTIS*.—Thomson : January 3, width  $5^{\circ}$ , very dark.

*CASIUS*.—O'Hara : January 10, edge of dark *Utopia* (Fig. 26).—Phillips : December 11, edge of *Utopia* shading ; January 11, width  $4^{\circ}$  to S.E.,  $20^{\circ}$  to N.W., hence edge of *Utopia* shading ; 12, width  $4^{\circ}$  to S.E.,  $9^{\circ}$  to N.W., do. (Fig. 31) ; 17, mean width  $10^{\circ}$  near limb.—Porthouse : January 6, double, S. band  $4^{\circ}$  wide, N.  $3^{\circ}$ , components  $9^{\circ}$  apart, faint, disobey perspective, as straight near the limb (Plate II., Fig. 2).—Thomson : January 6, width  $7^{\circ}$ , faintish ; February 16, mean width  $8^{\circ}$ , very dark (Fig. 30).

*LETHES*.—McEwen : January 3, 11, February 16 : convex to N.W., width  $3\frac{1}{2}^{\circ}$ , faint.

*NASAMON*.—O'Hara : December 30, edge of shaded N. *Neith Regio*.

*NEPENTHES-THOTH*.—McEwen : January 3, 6, running into *Hephaestus*, width  $3^{\circ}$ , faint.—Phillips : December 4, "very dark and strong, as in 1911" ; January 3, convex to S.E., width  $4^{\circ}$ , dark (Fig. 33) ; 12, do., "probably darker and stronger even than in 1911" (Fig. 31) ; 17, do., faintish (!) near limb ; February 15, "still very pronounced."—Thomson : January 3, convex to S.E., width  $3^{\circ}$ , dark, as "strong as last apparition" (Plate II., Fig. 5) ; 6, do., width  $4^{\circ}$ , very dark (Plate II., Fig. 1) ; 7, do., dark (Fig. 32) ; February 16, do., width  $5^{\circ}$ , very dark (Fig. 30) ; 24, do., width  $4^{\circ}$ , very dark.—The Director : April 28, convex to S.E., width  $4^{\circ}$ , dark near sunset.

Hence this remarkable stripe was in 1913-1914 quite as strong as in 1911-1912.

Thomson noted on February 16 "indications of a bright bridge across *Thoth*, near its junction with *Nubis Lacus*."

*NILOSYRTIS*.—McEwen : December 31, width  $3^{\circ}$ , darkish.—O'Hara : December 30, edge of shaded *Neith Regio*.—Phillips : January 3, 12, S. end invisible, convex to N.E., width  $4^{\circ}$ , darkish (Figs. 33 and 31).—Porthouse : January 6, to S. only, width  $4^{\circ}$ , faintish (Plate II., Fig. 2).—Thomson : January 3, 6, 7, S. end invisible, convex to N.E., width  $4^{\circ}$ , very dark (Plate II., Fig. 5, and Fig. 32).—The Director : April 26, 28, to S. only, convex to E., confused, edge of shaded *Neith Regio*.

*RHESUS*.—Thomson : January 6, February 16, E. edge of shaded *Libya* (Plate II., Fig. 1, and text Fig. 30).

*THOTH* II. (N. of *Nubis Lacus*).—O'Hara : January 10, E. edge of dark *Utopia* (Fig. 26).

*TRITON*.—Phillips : January 12, "ill-defined."

SECTION VII.

The South Polar Region.

$$\Omega = 0^\circ \text{ to } 360^\circ; \Phi = -60^\circ \text{ to } -90^\circ.$$

MARE AUSTRALE was but faintly shaded to our Members, owing to the tilt of the axis.

On December 23, McEwen saw a bright spot, "tending to project," in  $\Omega = 110^\circ, \Phi = -70^\circ$ ; which he confirmed on December 27 (Figs. 34-36).



FIG. 34.—December 23,  $\omega = 49^\circ$ . FIG. 35.—December 27,  $\omega = 33^\circ$ . FIG. 36.—December 27,  $\omega = 44^\circ$ .

Bright cloud over *Mare Australe* (Mc Ewen).

NOVISSIMA THYLE looked like a "brilliant white projection" risen to McEwen on September 22 and January 11.

ARGYRE II. was bright on C.M. to McEwen on December 28; rose bright to him on December 31; and set whitish on April 11.

THYLE I. rose bright to McEwen on December 16-17; was more brilliant than N. cap on C.M. to Thomson on January 25; set bright to McEwen on March 31 and April 7; and again rose bright to him on April 11 and 13.

THYLE II., after McEwen, set white on February 18; rose white on April 3; set bright on April 7; was "shining" on C.M. on March 27; was white on March 29; and brilliant white rising on April 3 and 4.

THE SOUTH POLAR WHITISHNESSES.

These presented the following peculiarities :—

Date.	$\omega$	Phenomena.	Observer.	Date.	$\omega$	Phenomena.	Observer.
1913.				1913.			
Sept. 15	323	Whitishness of $40^\circ$	ME.	Dec. 16	116	Nothing	ME.
" 22	251	Do. $40^\circ$	"	" 17	139	Do.	"
Nov. 4	186	Nothing near S. pole	Ph.	" 20	89	Do.	Th.
" 6	153	Do.	Th.	" 21	97	Whitishness of $30^\circ$	Ph.
" 9	125	Do.	Ph.	" 22	72	Nothing	Th.
" 10	122	Whitishness of $70^\circ$	ME.	" 23	49	Do.	ME.
" 11	118	Nothing	"	" 24	32	Do.	"
" 21	22	Do.	"	" 26	21	Do.	"
" 22	38	Do.	"	" 27	45	Do.	"
" 22	19	Do.	Th.	" 27	28	Do.	Ph.
" 27	339	Do.	Ph.	" 27	36	Do.	Th.
Dec. 4	236	Do.	ME.	" 28	14	Do.	ME.
" 6	209	Do.	"	" 28	343	Whitishness of $41^\circ$	Pt.
" 10	175	Do.	"	" 29	5	Do. $44^\circ$	Ph.
" 10	180	Do.	Th.	" 29	355	Nothing	ME.
" 11	204	Do.	Ph.	" 30	324	Do.	O'H.
" 12	159	Do.	ME.	" 31	339	Do.	ME.

Date.	$\omega$	Phenomena.	Observer.	Date.	$\omega$	Phenomena.	Observer.
1914.				1914.			
Jan. 2	317	Nothing	ME.	Mar. 10	43	Whitishness of 50°	ME.
" 3	275	Do.	"	" 12	40	Nothing	"
" 3	323	Do.	Th.	" 16	353	Whitishness of 60°	"
" 3	319	Do.	Ph.	" 21	304	Nothing	"
" 6	278	Do.	Th.	" 22	291	Whitishness of 50°	"
" 6	293	Whitishness of 18°	MP.	" 23	288	Do. 60°	"
" 6	286	Do. 39°	Pt.	" 24	278	Do. 60°	"
" 7	316	Nothing	Th.	" 26	248	Do. 70°	"
" 10	241	Whitishness of 40°	O'H.	" 27	257	Nothing	"
" 11	244	Do. 30°	ME.	" 29	247	Do.	"
" 11	231	Nothing	Ph.	" 31	213	Do.	"
" 12	276	Do.	"	" 31	223	Do.	A.
" 14	207	Do.	ME.	Apr. 1	204	Whitishness of 30°	ME.
" 15	206	Do.	"	" 3	195	Nothing	"
" 17	185	Whitishness of 43°	Ph.	" 4	176	Do.	"
" 22	136	Nothing	Th.	" 7	169	Two whitish areas,	"
" 24	165	Do.	Ph.			together 52°.	"
" 26	103	Whitishness of 28°	Th.	" 9	130	Whitishness of 45°	"
" 27	151	Nothing	"	" 11	124	Do. 35°	"
" 31	38	Whitishness of 38°	ME.	" 12	83	Bright whiteness of 40°	"
Feb. 1	350	Do. 28°	A.	" 13	93	Nothing	ME.
" 2	43	Do. 45°	"	" 14	83	Do.	"
" 4	46	Nothing	Th.	" 15	82	Do.	"
" 4	9	Do.	Ph.	" 16	64	Do.	"
" 5	348	Whitishness of 37°	Pt.	" 16	73	Whitishness of 35°	A.
" 10	320	Nothing	Th.	" 18	63	Nothing	"
" 16	254	Do.	"	" 18	51	Whitishness of 70°	ME.
" 16	258	Do.	ME.	" 19	35	Do. 85°	"
" 18	240	Do.	"	" 20	27	Dull whiteness of 80°	"
" 21	215	Whitishness of 50°	"	" 20	40	Nothing	A.
" 24	182	Do. 60°	"	" 22	12	Do.	"
" 24	217	Nothing	Th.	" 24	1	Large whiteness of 90°	ME.
" 24	150	Do.	A.	" 26	321	Nothing	A.
" 28	141	Whitishness of 50°	"	" 28	313	Do.	"
Mar. 1	112	Do. 45°	"	" 28	315	Whitishness of 90°	ME.
" 6	83	Do. 60°	ME.	May 10	303	Nothing	"

These normal phenomena are due to exceedingly thin haze. The meteor became more frequent and thicker towards the end of the apparition.

## SECTION VIII.

## The North Polar Region.

$$\Omega = 0^\circ \text{ to } 360^\circ; \Phi = +60^\circ \text{ to } +90^\circ.$$

*BALTIA-NERIGOS* were to a large extent covered by the N. snows.

*DIACRIA* rose bright to Phillips on December 21 (Plate I., Fig. 4) and to McEwen on April 9.

## THE NORTH POLAR SNOW CAP.

The N. snows were abnormally extensive in 1913-14, subtending more than 70° early in the apparition, hence stretching to N. latitude 55°. They were sometimes notched by *Mare Acidalium* (Plate I., Fig. 2, and text Fig. 9) and the dusky areas of *Titania* (Fig. 18 and Plate I., Fig. 5) and *Utopia* (Fig. 27). This is in accordance with the well-known fact that the polar snow diminishes more readily over the dark spots than over the ochre regions. The cap was often dull, and on two occasions, at least, presented "brilliant shining spots" in it. (Figs. 37 and 38.)

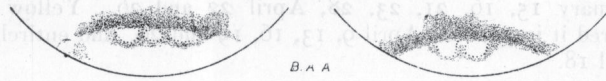


FIG. 37.—December 31,  $\omega = 347^\circ$ . FIG. 38.—January 2,  $\omega = 298^\circ$ .  
Bright spots in N. Polar Cap in 1913-1914. (McEwen.)

The N. snows diminished as follows :—\*

Date.	Size of N. Cap and other Phenomena.	Observer.	Date.	Size of N. Cap and other Phenomena.	Observer.
1913.			1914.		
Sept. 15	Cap subtends $70^\circ$ and is "white."	ME.	Jan. 31	$64^\circ$ , "fairly bright" - -	ME.
" 22	$70^\circ$ , "dull white" - -	"	Feb. 1	$65^\circ$ , "white," but "dull" - -	A.
Nov. 4	$73^\circ$ , "very bright" - -	Ph.	" 2	$62^\circ$ , "dull white" - -	"
" 6	$45^\circ$ - - - - -	Th.	" 4	$36^\circ$ , "very white" - -	Th.
" 9	$80^\circ$ - - - - -	Ph.	" 4	$65^\circ$ - - - - -	Ph.
" 10	$75^\circ$ , "white" - - - -	ME.	" 5	$32^\circ$ - - - - -	Pt.
" 11	$70^\circ$ , "bright white" - -	"	" 7	$30^\circ$ $\pm$ - - - - -	B.
" 21	$70^\circ$ do. - - - - -	"	" 10	$33^\circ$ , "exceedingly brilliant" -	Th.
" 22	$8^\circ$ - - - - -	"	" 15	$?$ - - - - -	Ph.
" 22	$40^\circ$ - - - - -	Th.	" 16	$30^\circ$ , "very bright and clear." - -	Th.
" 27	$70^\circ$ - - - - -	Ph.	" 16	$60^\circ$ , "bright white" - -	ME.
Dec. 4	$68^\circ$ , "very bright" - -	ME.	" 18	$66^\circ$ - - - - -	"
" 6	$70^\circ$ , "bright white" - -	"	" 21	$58^\circ$ , "very white" - -	"
" 10	$70^\circ$ do. - - - - -	"	" 23	$?$ , "brilliant" - - - - -	Ph.
" 10	$32^\circ$ - - - - -	Th.	" 24	$45^\circ$ , "rather bright white" -	ME.
" 11	$70^\circ$ - - - - -	Ph.	" 24	$30^\circ$ - - - - -	Th.
" 12	$67^\circ$ , "bright white" - -	ME.	" 24	$48^\circ$ , "dull white" - - - -	A.
" 16	$66^\circ$ , "white" - - - - -	"	" 28	$50^\circ$ , "brilliant white" - -	"
" 17	$65^\circ$ - - - - -	"	Mar. 1	$50^\circ$ , "white" - - - - -	"
" 20	$46^\circ$ - - - - -	Th.	" 6	$52^\circ$ , "very bright white" - -	ME.
" 21	$69^\circ$ - - - - -	Ph.	" 10	$60^\circ$ , "smudgy white" - -	"
" 22	$43^\circ$ - - - - -	Th.	" 12	$55^\circ$ , "not properly seen" - -	"
" 23	$56^\circ$ - - - - -	ME.	" 16	$50^\circ$ - - - - -	"
" 24	$74^\circ$ , "dull light" - -	"	" 21	$50^\circ$ , "dull white" - - - -	"
" 26	$63^\circ$ - - - - -	"	" 22	$50^\circ$ - - - - -	"
" 27	$70^\circ$ - - - - -	"	" 23	$45^\circ$ , "bright white" - - - -	"
" 27	$68^\circ$ - - - - -	Ph.	" 24	$54^\circ$ , "white, not bright" - -	"
" 27	$58^\circ$ - - - - -	Th.	" 26	$45^\circ$ , "very white" - - - -	"
" 28	$73^\circ$ - - - - -	ME.	" 27	$48^\circ$ , "dull white" - - - -	"
" 28	$40^\circ$ - - - - -	Pt.	" 28	$28^\circ$ do. - - - - -	"
" 29	$60^\circ$ - - - - -	Ph.	" 29	$45^\circ$ , "bright white" - - - -	"
" 29	$74^\circ$ , "white" - - - - -	ME.	" 31	$53^\circ$ , "very white" - - - -	A.
" 30	$49^\circ$ - - - - -	OH.	Apr. 1	$38^\circ$ , "bright white" - - - -	ME.
" 31	$66^\circ$ - - - - -	ME.	" 3	$46^\circ$ do. - - - - -	"
1914.			" 4	$46^\circ$ , "white" - - - - -	"
Jan. 2	$58^\circ$ , "bright white" - -	ME.	" 7	$47^\circ$ do. - - - - -	"
" 3	$60^\circ$ - - - - -	Th.	" 9	Not drawn - - - - -	"
" 3	$40^\circ$ - - - - -	Th.	" 11	$56^\circ$ - - - - -	"
" 3	$65^\circ$ - - - - -	Ph.	" 12	$60^\circ$ , "very white" - - - -	A.
" 6	$59^\circ$ - - - - -	Th.	" 13	Not drawn - - - - -	ME.
" 6	$64^\circ$ , "dull," "white" - -	ME.	" 14	$30^\circ$ , "greyish white" - - - -	"
" 6	$?$ - - - - -	Pt.	" 15	$50^\circ$ , "dull white" - - - -	"
" 7	$39^\circ$ - - - - -	Th.	" 16	$53^\circ$ , "white" - - - - -	"
" 10	$45^\circ$ - - - - -	OH.	" 16	$50^\circ$ , "yellowish white" - -	A.
" 11	$58^\circ$ , "dull," "white" - -	ME.	" 18	"Invisible" - - - - -	"
" 11	$65^\circ$ - - - - -	Ph.	" 18	Not drawn - - - - -	ME.
" 12	$68^\circ$ - - - - -	"	" 19	"Dull" - - - - -	"
" 14	$80^\circ$ , "fairly bright" - -	ME.	" 20	Do. - - - - -	"
" 15	$60^\circ$ - - - - -	"	" 20	"Invisible" - - - - -	A.
" 17	$65^\circ$ - - - - -	Ph.	" 22	$50^\circ$ , "brilliant white" - -	"
" 20	$35^\circ$ $\pm$ - - - - -	B.	" 24	$50^\circ$ , "bright white" - - - -	ME.
" 22	$55^\circ$ - - - - -	Th.	" 26	$52^\circ$ , "brilliant white" - -	A.
" 24	$53^\circ$ - - - - -	Ph.	" 28	$45^\circ$ , "white" - - - - -	"
" 26	$39^\circ$ - - - - -	Th.	" 28	$50^\circ$ , "dull" - - - - -	ME.
" 27	$45^\circ$ - - - - -	"	May 10	"Dull white" - - - - -	"

\* For most of the daily values of  $\omega$ , see preceding table of S. whitishnesses.

Hence the cap was very frequently veiled by whitish haze, the dates on which it shone untarnished being November 4,

February 15, 16, 21, 23, 28, April 22 and 26. Yellow dust covered it in part on April 9, 13, 16, 19 and 20, and entirely on April 18.

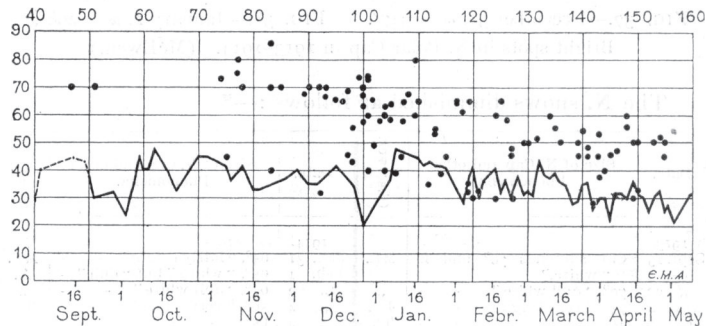


FIG. 39.—Size of the N. Polar Cap in 1913-1914 and its deviation from the normal, illustrating the effect of diminished solar radiation.

Comparing the diameter of these snows with the mean deduced from the measures of the N. cap in 1864, 1867, 1879-1880, 1881-1882, 1883-1884, 1886, 1896-1897, 1898-1899, 1900-1901 and 1911-1912, when Mars was observed partly or wholly in the same heliocentric longitudes as during the apparition we are considering ( $\eta = 47^\circ$  to  $160^\circ$ ), we find that the diminution of the snow was greatly retarded in 1913 (Fig. 39). Indeed, a detailed study of the phenomenon proves that the shrinkage was lagging behind the normal much more than at any time since 1864, *as if solar heat were lower in 1913 than during any of the ten apparitions above mentioned.*

#### CHARACTERISTICS OF THE 1913-1914 APPARITION.

These were :—

- (1) The huge size and exceptionally slow diminution of the N. polar snow cap; and the coincidence of this fact with the great solar minimum;
- (2) The persistent and remarkable conspicuousness of the *Nepenthes-Thoth*;
- (3) The vast dimensions of *Lacus Mæris*;
- (4) The faintness of *Pandoræ Fretum*;
- (5) The visibility of *Titania* and *Euxinus Lacus*;
- (6) The comparative faintness of *Mare Acidalium*;
- (7) The practical invisibility of *Aoniæ Sinus*;
- (8) The increased breadth of *Syrtis Major*;
- (9) The darkness of *Cerberus*;
- (10) The narrowing of *Protonilus* near *Coloe Palus*;
- (11) The tapering outline to N.W. of *Mare Cimmerium*; and
- (12) The shading of *Libya*.

Paris, 74, Rue Jouffroy,  
1918, April 12.

E. M. ANTONIADI,  
Director of the Section.

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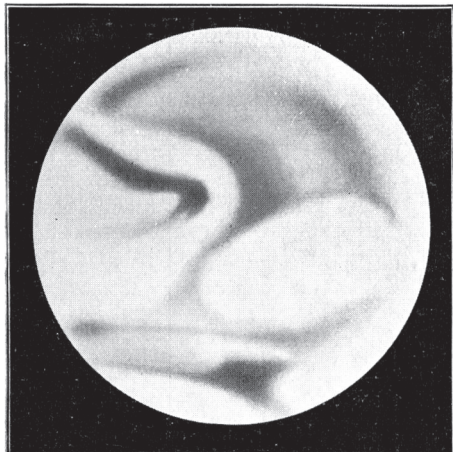


FIG. 1.—T. E. R. PHILLIPS.  $12\frac{1}{4}$ -in. Spec. 1913, December 29.  $\omega = 5^\circ$ ,  $\phi = + 5^\circ \cdot 8$ .



FIG. 2.—H. McEWEN. 5-in. O.G. 1913, December 24.  $\omega = 32^\circ$ ,  $\phi = + 6^\circ \cdot 8$ .

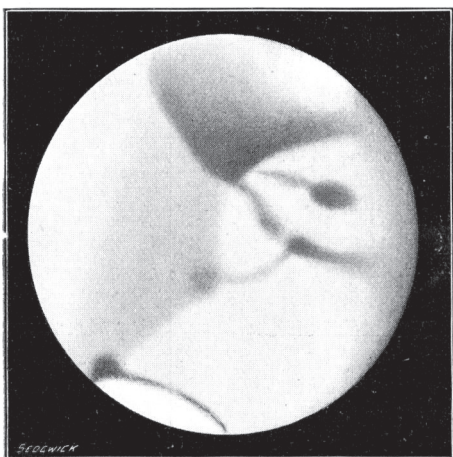


FIG. 3.—H. THOMSON.  $12\frac{1}{4}$ -in. Spec. 1914, January 26.  $\omega = 85^\circ$ ,  $\phi = + 1^\circ \cdot 7$ .

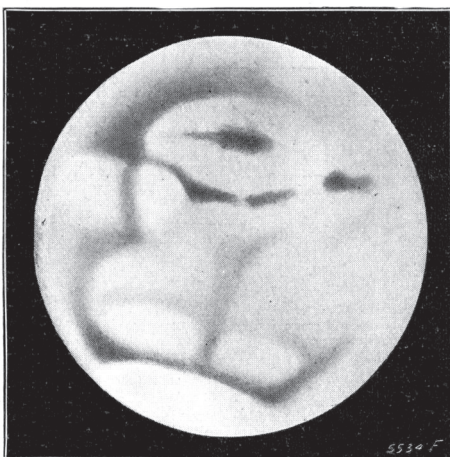


FIG. 4.—T. E. R. PHILLIPS.  $12\frac{1}{4}$ -in. Spec. 1913, December 21.  $\omega = 97^\circ$ ,  $\phi = + 7^\circ \cdot 3$ .

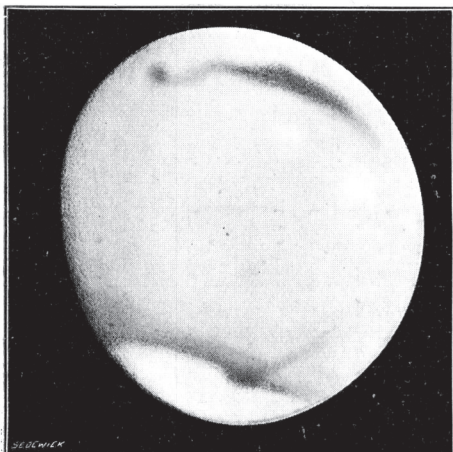


FIG. 5.—T. E. R. PHILLIPS.  $12\frac{1}{4}$ -in. Spec. 1913, November 9.  $\omega = 125^\circ$ ,  $\phi = + 9^\circ \cdot 9$ .

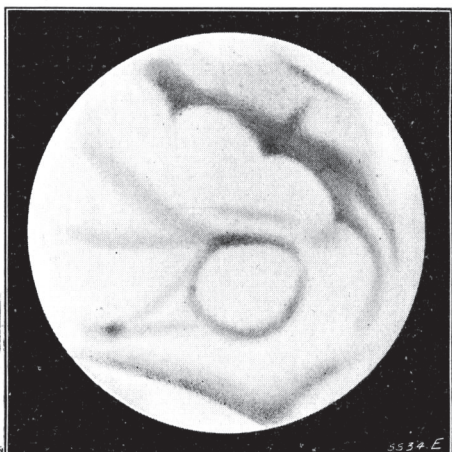


FIG. 6.—T. E. R. PHILLIPS.  $12\frac{1}{4}$ -in. Spec. 1914, January 17.  $\omega = 196^\circ$ ,  $\phi = + 2^\circ \cdot 6$ .

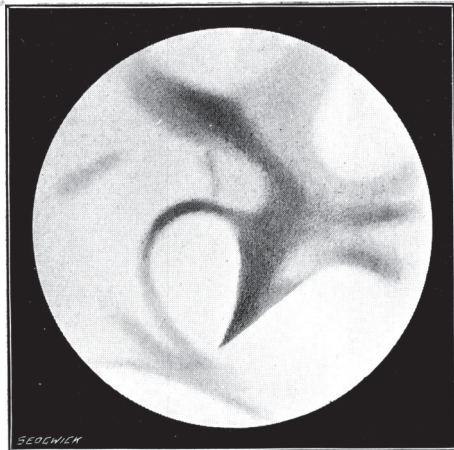


FIG. 1.—H. THOMSON. 12 $\frac{1}{4}$ -in. Spec.  
1914, January 6.  $\omega = 278^\circ$ ,  $\phi = +4^\circ 4'$ .



FIG. 2.—W. PORTHOUSE. 8 $\frac{1}{2}$ -in. Spec.  
1914, January 6.  $\omega = 286^\circ$ ,  $\phi = +4^\circ 4'$ .



FIG. 3.—H. McEWEN. 5-in. O.G.  
1914, January 6.  $\omega = 298^\circ$ ,  $\phi = +4^\circ 4'$ .



FIG. 4.—C. O'HARA. 8 $\frac{1}{2}$ -in. Spec.  
1913, December 30.  $\omega = 320^\circ$ ,  $\phi = +5^\circ 6'$ .



FIG. 5.—H. THOMSON. 12 $\frac{1}{4}$ -in. Spec.  
1914, January 3.  $\omega = 323^\circ$ ,  $\phi = +4^\circ 9'$ .

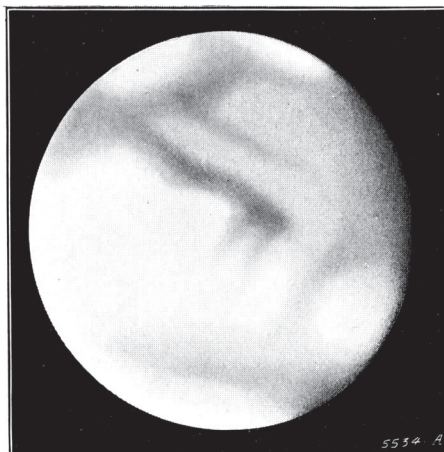


FIG. 6.—E. M. ANTONIADI. 8 $\frac{1}{2}$ -in. Spec.  
1914, February 1.  $\omega = 350^\circ$ ,  $\phi = +1^\circ 2'$ .

