Micrometer Observations of Phoebe, the ninth Satellite of Saturn. By E. E. Barnard

In the present observations (made with the 40-inch refractor) Saturn was 26° higher on the meridian than when the satellite was observed in 1906 (A. N. 4234). Under these more favorable conditions Phoebe would necessarily be brighter. I had, nevertheless, expected it to be a faint object. The satellite was sought for on the night of December 8. After making a sketch of the $5\frac{1}{2}'$ field, I began measuring the faint stars. It was then noticed that a star marked γ_{14} mag. close north preceding a $12\frac{1}{2}$ magnitude star, was changing its position. This proved to be Phoebe. A

similar case occurred on December 31, when I had marked it 14 magnitude on a sketch and had measured a much fainter star for the satellite.

The transparency of the sky and the seeing were not specially good on any of the nights when the measures were made. It would therefore appear that Phoebe, under fair conditions (at the present opposition of Saturn), must have easily been as bright as the 14th magnitude. Under similar conditions it should be observable with moderate sized instruments.

Measures of the Position of the Satellite.

1912-13	Gr. M. T.	$\Delta\alpha \cos \delta$	$\Delta\alpha$	$\Delta\delta$	Cp.	α app.	δ app.	Red. to app. pl.	*
Dec. 8	16 ^h 28 ^m 59 ^s	187.81	-0 ^m 13.17	—	3.7	3 ^h 53 ^m 5.15	—	+4.23 —	2
8	16 51 22	—	—	+0' 6".4	7.3	—	+18° 5' 38".7	— +20".6	2
8	16 59 38	193.29	-0 13.56	—	4.7	3 53 4.76	—	+4.23 —	2
8	17 8 40	10.70	-0 0.75	—	4.7	3 53 4.60	—	+4.23 —	1
8	17 16 28	—	—	+0 10.4	7.5	—	+18 5 37.7	— +20.6	1
9	14 21 20	254.00	-0 17.81	-0 33.7	11.6	3 52 47.54	+18 4 53.6	+4.24 +20.6	1
31	13 25 59	31.44	+0 2.20	—	2.7	3 46 43.46	—	+4.26 —	3
31	15 19 58	15.31	+0 1.07	-0 14.4	10.5	3 46 42.33	+17 50 16.8	+4.26 +23.4	3
Jan. 3	13 31 0	70.02	-0 4.90	—	2.7	3 46 5.60	—	+0.82 —	4
3	13 48 26	—	—	-0 39.0	7.3	—	+17 48 55.8	— +9.5	4
3	14 12 10	76.96	-0 5.39	—	2.7	3 46 5.11	—	+0.82 —	4
3	14 19 36	76.40	-0 5.35	—	5.7	3 46 5.15	—	+0.82 —	4
3	14 28 28	—	—	-0 39.2	7.6	—	+17 48 55.6	— +9.5	4
3	14 39 18	78.95	-0 5.53	—	3.7	3 46 4.97	—	+0.82 —	4
4	15 55 10	—	—	-0 46.9	7.5	—	+17 48 31.4	— +9.4	5
4	17 5 40	131.01	-0 9.17	—	2.7	3 45 51.87	—	+0.81 —	5
4	17 59 44	133.90	-0 9.38	—	2.7	3 45 51.66	—	+0.81 —	5

Mean places of the comparison stars.

*	α	δ	Authority
	1912.0	1912.0	
1	3 ^h 53 ^m 1.12	+18° 5' 6".7	12 ¹ / ₂ mag. comp. with BD +17°660. Tucker L. O. M. C.
2	3 53 14.09	+18 5 11.7	12 » » » BD +17°660. Tucker L. O. M. C.
3	3 46 37.00	+17 50 7.8	12 » » » AG Berl A 1025
	1913.0	1913.0	
4	3 46 9.68	+17 49 25.3	11.5 » » » AG Berl A 1025
5	3 46 0.23	+17 49 8.9	11.5 » » » Star 4

I am greatly indebted to Prof. R. H. Tucker who observed the star BD +17°660 with the Lick Observatory M. C. Following is his position: 1912.0 3^h 53^m 11.673 +18° 3' 0".60 2 obs. Epoch 1912.97 mag. 8.9.

The B. J. Fundamental star places were used for the reduction.

Measures of comparison stars etc.

1912 Dec. 8	Star 1 — BD +17°660	= $\Delta\alpha \cos \delta$ 150.51	$\Delta\alpha$ — 0 ^m 10.56 (7)	$\Delta\delta$ + 2' 6".14 (9)
"	" 2 — BD +17°660	34.47	+0 2.42 (3)	+2 11.10 (3)
"	" 1 — star 2	184.7	-0 12.95 (1)	-0 5.49 (3)
"	15 ^m star — star 2	51.64	-0 3.66 (3)	+1 7.55 (3)
Dec. 31	Star 3 — AG Berl A 1025	354.72	-0 24.84 (8)	-2 9.68 (8)

Dec. 31. A 12^m3 star was compared with star 3: Pos. Ang. 76°58 (5) Dist. 43".65 (8 double distances).

Position of intermediate star of 12¹/₂^m used on Dec. 31:

1912.0	3 ^h 46 ^m 54.49	+17° 52' 31".4	Comp. with AG Berl A 1025	} The s. f. of two 1'± apart.
12 ¹ / ₂ ^m star — 1025	= $\Delta\alpha \cos \delta$ 104.92	$\Delta\alpha$ — 0 ^m 7.35 (8)	$\Delta\delta$ + 0° 13'.9 (8)	
1913 Jan. 3	Star 4 — AG Berl A 1025	= $\Delta\alpha$ — 0 ^m 55.59 (22 tr.)	$\Delta\delta$ — 3' 3".3 (5)	
" 4	Star 5 — Star 4	= $\Delta\alpha \cos \delta$ 135.02	$\Delta\alpha$ — 0 ^m 9.45 (6)	$\Delta\delta$ — 0' 16".35 (3)

From bad seeing and poor sky on January 3 the satellite was very difficult. On January 4 the sky was very thick and the seeing very bad. Phoebe was seen only once in a while with the greatest difficulty. From this cause the right ascension on that date will not be so accurate as in the previous observations. It was a little better seen at the measures for declination.

The satellite is following almost, if not exactly, the ephemeris of Dr. F. E. Ross given in the American Ephemeris. The corrections on December 8 apparently being

$$\text{in } \alpha = 0.0 \quad \text{in } \delta = 0.0.$$

Verkes Observatory, Williams Bay, Wisconsin, 1913 Jan. 18.

E. E. Barnard.

Mitteilungen über kleine Planeten.

Aufnahmen auf der Königstuhl-Sternwarte.

Planet	Position 1913.0	Tägl. Bew.	Gr.	Platte
1913 April 28.				
190 Ismene	13 ^h 16 ^m 8 — 4° 9' — 0 ^m 5 + 4'	12 ^m 0	A 6940	
444 Gypsis	13 33.3 — 6 17 — 0.7 + 7	11.8	»	
1913 April 29.				
5 Astraea	14 10.8 — 3 48 — 0.8 + 5	9.5	A 6944	
42 Isis	14 23.7 — 2 49 — 1.0 + 3	10.5	»	
69 Hesperia	14 26.5 — 7 38 — 0.7 + 6	10.7	»	
1913 QY	10 7.4 + 19 12 + 0.2 — 5	13.5	D 1072	
488 Kreusa	14 39.7 — 1 36 — 0.8 0	11.0	A 6948	
444 Gypsis	13 32.6 — 6 9 — 0.7 + 7	11.8	B 3199	
636 [1907 XP]	13 36.4 — 8 49 — 0.8 + 2	12.8	»	
62 Erato	13 40.7 — 7 15 — 0.7 + 3	13.1	»	

Auf der Platte B 3199 wurden wegen des schlechten Wetters nicht gefunden die Planeten: 210 Isabella, 637 [1907 YE], 66 Maja und 331 Etheridgea.

1913 April 30.

2 Pallas	14 48.4 + 23 37 — 0.8 + 9	8.1	A 6951	
617 Patroclus	13 58.8 — 5 54 — 0.5 + 1	15	D 1074	
364 Isara	12 41.0 + 5 49 — 0.7 + 2	12.5	B 3201	
201 Penelope	12 50.6 + 0 49 — 0.6 + 5	12.7	»	
261 Prymno	12 54.5 + 0 47 — 0.7 + 2	11.6	»	
1913 RF	13 4.0 + 4 49 — 0.8 + 1	12.9	»	

Platte	m. Z. Kgst.	Plattenmitte	Beob.
A 6940.	9 ^h 43 ^m 5	13 ^h 28 ^m — 4° 40'	A. Masssinger
6944	9 49.8	14 21 — 6 15	»
6948	13 8.2	14 44 — 1 40	»
6951	10 9.8	14 42 + 23 30	»
B 3199	12 52.2	13 42 — 9 10	F. Kaiser
3201	10 43.7	13 51 + 3 50	»
D 1072	9 58.2	10 7 + 19 12	M. Wolf
1074	10 14.7	13 59 — 5 54	»

Für Patroclus habe ich durch Anschluß an AG Strb 5006 und 5016 den genauen Ort erhalten:

1913 April 30 10^h 14^m 7 m. Z. Kgst.

1913.0: $\alpha = 13^h 58^m 46.21$ $\delta = -5^\circ 54' 17.4$.

Größe nur etwa 15^m gegen die Ephemeridenangabe 13^m.

Königstuhl-Sternw., Heidelberg, 1913 Mai 2. M. Wolf.

Neuer Planet 1913 RG.

1913 m. Z. Wien α app. δ app.
 Apr. 28 13^h 0^m 40^s 14^h 21^m 13^s 75 (9.045) — 10° 6' 46.7 (0.870)
 29 10 42 4 14 20 28.96 (9.073n) — 10 4 0.3 (0.870)
 Größe 13^m 5. Tägl. Beweg. — 58.41 + 2' 51.8.

Wien, k. k. Sternw., 1913 April 30. J. Palisa.

Korrekturen von Ephemeriden (B. J. 1915).

42 Isis 1913 Apr. 28 + 1^m 9 — 13'. Gr. 10^m 5. J. P. Lagrula.
 » » 29 + 2.0 — 6. J. Rheden.
 69 Hesperia » 29 — 1.2 + 6. »
 240 Vanadis » 29 + 1.3 — 7. Gr. 12^m 5. J. Palisa.

Ephemeride des Kometen 1912 a (Gale).

12^h m. Z. Berlin. Fortsetzung von A. N. 193.195, 355; 194.133.

1913	α vera	δ vera	log r	log A	H	1913	α vera	δ vera	log r	log A	H
Mai 8	6 ^h 35 ^m 41 ^s	+47° 53.2	0.5293	0.5898	12 ^m 3	Mai 24	6 ^h 55 ^m 59 ^s	+45° 27.7	0.5526	0.6279	12 ^m 6
10	38 17	47 33.5				26	6 58 26	45 11.2			
12	40 52	47 14.3				28	7 0 53	44 55.1			
14	43 26	46 55.5				30	3 18	44 39.3			
16	45 59	46 37.2	0.5412	0.6097	12.5	Juni 1	5 42	44 23.8	0.5636	0.6444	12.8
18	48 30	46 19.3				3	8 5	44 8.6			
20	51 1	46 1.7				5	10 27	43 53.8			
22	53 30	45 44.5				7	12 47	43 39.2			
24	6 55 59	+45 27.7	0.5526	0.6279	12.6	9	7 15 7	+43 24.9	0.5742	0.6593	12.9

Der Komet ist 1913 April 26 in Uccle von Ing. G. Van Biesbroeck und in Bothkamp von Dr. H. H. Kritzinger noch beobachtet worden. Die Ephemeridenkorrektur nach ersterem betrug — 3^s + 1.5. Dr. Kritzinger beschreibt den Kometen als elliptischen Nebel von 1' und 0.7 Durchmesser, Kernhelligkeit 12^m 8, Gesamthelligkeit 12^m 5.

Kiel, Bureau der Astronom. Nachr., 1913 Mai 3.

M. Ebell.

In Algier ward der Komet nach telegraphischer Nachricht von Herrn Direktor F. Gonnessiat in Beantwortung einer Anfrage am 2. Mai an der äußersten Grenze der Sichtbarkeit beobachtet, und eine Fortsetzung der Beobachtungen erscheint bei den noch ungünstiger werdenden Sichtbarkeitsverhältnissen auch dort kaum möglich. K. B.

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