LICK OBSERVATORY BULLETIN

NUMBER 215

OBSERVATIONS OF COMETS AND ASTEROIDS

The following positions of comets and asteroids were determined with the micrometer attached to the twelve-inch telescope. In nearly all of the observations $\Delta\alpha$ and $\Delta\delta$ were measured directly. In the three observations in which the letter t precedes the figure indicating the number of comparisons made, the difference in α was determined by transits over two wires. The observations have all been corrected for differ-

ential refraction, and the reductions have all been checked. To Mr. R. S. Sheppard I owe my thanks for assistance in recording and in checking many of the observations.

C. C. KIESS.

LICK OBSERVATORY,
May 22, 1912.

COMET b 1911, (KIESS)

	Mt. H. M. T.			Star	No. Comps.	Comet-Star		Comet's Apparent			Log $p\Delta$	
						$\Delta\alpha$	$\Delta\delta$	α	δ		α	δ
1911 July	13 ^d	15 ^h	3 ^m 14 ^s	1	10, 10	+0 ^m 36 ^s 00	+2' 58".5	4 ^h 39 ^m 36 ^s 37	+34° 6'	37.7	9.751 _n	0.663
	15	14	46 31	3	12, 10	—0 33.37	—8 16.0	4 36 5.01	+33 39 28.5		9.748 _n	0.673
	18	14	38 21	4	12, 10	+0 38.02	—5 28.1	4 30 38.81	+32 52 39.6		9.745 _n	0.661
	19	15	27 39	6	t 10, ...	+1 40.47	.. ..	4 28 42.07	.... ..	.....	.....	.....
	20	14	40 15	7	12, 10	—0 13.75	—8 20.2	4 26 51.81	+32 15 53.4		9.742 _n	0.646
	21	14	47 29	8	12, 10	—0 12.35	—9 13.4	4 24 53.43	+31 54 57.3		9.739 _n	0.624
	26	15	2 51	10	12, 10	+0 8.28	—1 54.1	4 13 53.97	+29 45 56.5		9.713 _n	0.561
	27	15	20 26	11	8, 8	—0 11.81	—2 31.4	4 11 20.31	+29 13 30.5		9.695 _n	0.523
Aug.	2	15	17 19	12	10, 10	—0 5.89	—3 21.5	3 51 54.11	+24 27 52.9		9.637 _n	0.516
	4	14	39 57	13	12, 10	—0 9.97	—5 5.0	3 42 54.29	+22 1 20.8		9.652 _n	0.571

MEAN PLACES OF COMPARISON STARS FOR 1911.0

Star	α 1911.0	Red. ap. pl.	δ 1911.0	Red. ap. pl.	Authority
1	4 ^h 39 ^m 0 ^s 36	+0 ^s 01	+34° 3' 1".3	+3".9	B. D. + 33° 897. Micrometer comparison with (2).
2	4 38 37.42	+0.01	+33 59 49.8	+3.9	A. G. Leiden, 1760.
3	4 36 38.30	+0.08	+33 47 40.1	+4.4	A. G. Leiden, 1753.
4	4 30 0.61	+0.18	+32 58 3.3	+4.4	Micrometer comparison with (5).
5	4 29 44.77	+0.18	+33 5 20.9	+4.4	A. G. Leiden, 1730.
6	4 27 1.38	+0.22	+32 32 9.9	+4.5	A. G. Leiden, 1711.
7	4 27 5.30	+0.26	+32 24 9.1	+4.5	Micrometer comparison with (6).
8	4 25 5.47	+0.31	+32 4 6.1	+4.6	Micrometer comparison with (9).
9	4 24 55.55	+0.31	+32 15 51.9	+4.6	A. G. Leiden, 1703.
10	4 13 45.14	+0.55	+29 47 45.0	+5.6	Oxford Astro. Cat., +29° 11262.
11	4 11 31.53	+0.59	+29 14 56.1	+5.8	Oxford Astro. Cat., +29° 10646.
12	3 51 59.14	+0.86	+24 31 6.7	+7.7	Paris, Cat. Phot. du Ciel: Cliché, 114; No. 87.
13	3 43 3.29	+0.97	+22 6 17.0	+8.8	A. G. Berlin B., 1185.

COMET *c* 1911, (BROOKS)

	Mt. H. M. T.	Star	No. Comps.	Comet-Star			Comet's Apparent			Log $p\Delta$	
				$\Delta\alpha$	$\Delta\delta$		α	δ		α	δ
1911 July	28 ^d 10 ^h 46 ^m 55 ^s	1	12, 10	+32.82	+ 4'	3'3	22 ^h 5 ^m 57.10	+25° 36'	37'2	9.555 _n	0.416
	29 11 3 30	2	10, 10	— 9.42	— 3	29.5	22 4 38.03	+26 14 8.8		9.511 _n	0.369
Aug.	2 10 4 55	4	10, 10	+26.30	— 3	55.4	21 58 36.37	+28 50 3.2		9.596 _n	0.376
	4 9 8 9	6	15, 10	—15.00	+ 5	28.6	21 55 1.11	+30 11 54.5		9.666 _n	0.444
	4 15 27 42	7	12, 10	—21.95	— 0	40.4	21 54 29.58	+30 23 8.3		9.505	0.268
	13 8 49 43	8	11, 12	—38.80	— 1	25.4	21 32 2.77	+37 9 32.7		9.646 _n	0.164
	14 13 11 39	9	10, 10	—13.51	+ 9	2.5	21 27 58.79	+38 9 22.6		9.277	8.865
	18 8 43 33	10	12, 12	+10.08	— 1	8.7	21 12 52.20	+41 28 32.8		9.611 _n	9.019
	18 9 13 52	11	12, 12	—16.92	— 4	16.4	21 12 46.26	+41 29 40.6		9.534 _n	8.985
	29 7 51 10	12	10, 10	—15.35	+ 1	48.3	20 4 25.06	+51 6 50.9		9.515 _n	0.194 _n
	31 7 40 49	13	10, 10	—20.55	+ 6	1.0	19 46 42.98	+52 39 47.4		9.465 _n	0.287 _n
Sept.	14 7 18 59	14	10, 10	+42.94	+ 4	53.6	16 58 27.00	+56 54 10.8		9.605	0.358 _n
Oct.	2 7 19 57	15	12, 12	— 9.44	— 7	45.6	13 58 35.74	+41 39 36.4		9.796	0.608
	6 7 12 54	16	12, 12	+32.58	— 2	52.3	13 34 14.90	+36 33 1.6		9.759	0.694
	6 7 38 5	17	12, 5	+ 5.70	— 9	49.7	13 34 8.95	+36 31 40.4		9.748	0.732
	27 17 40 12	18	10, 10	— 3.34	+ 3	18.0	12 33 4.32	+ 5 8 51.4		9.636 _n	0.703
Nov.	3 17 58 10	19	12, ...	— 4.49	.....	.....	12 37 20.86	— 4	.....	9.600 _n	.....
	6 17 39 24	20	14, 12	+49.82	— 3	51.9	12 41 42.90	— 8 15 46.7		9.611 _n	0.760
	16 17 54 50	21	8, 12	+17.27	—11	6.5	13 2 0.21	—18 39 35.3		9.591 _n	0.806

MEAN PLACES OF COMPARISON STARS FOR 1911.0

Star	α 1911.0	Red. ap. pl.	δ 1911.0	Red. ap. pl.	Authority
1	22 ^h 5 ^m 22.08	+2.20	+25° 32' 30".2	+ 3".7	Oxford Astro. Cat., +25° 76621.
2	22 4 45.24	+2.21	+26 17 34.6	+ 3.7	Micrometer comparison with (3).
3	22 5 23.54	+2.21	+26 19 53.2	+ 3.7	A. G. Cambridge (Engl.), 13231.
4	21 58 7.80	+2.27	+28 53 54.3	+ 4.3	Micrometer comparison with (5).
5	21 57 26.80	+2.27	+28 56 51.8	+ 4.3	A. G. Cambridge (Engl.), 13109.
6	21 55 13.80	+2.31	+30 6 21.2	+ 4.7	$\frac{1}{2}$ { A. G. Cambridge (Engl.), 13072. + A. G. Leiden, 9244.
7	21 54 49.22	+2.31	+30 23 43.9	+ 4.8	$\frac{1}{2}$ { A. G. Cambridge (Engl.), 13063. + A. G. Leiden, 9240.
8	21 32 39.17	+2.40	+37 10 51.7	+ 6.4	A. G. Lund, 10229.
9	21 28 9.89	+2.41	+38 0 13.4	+ 6.7	A. G. Lund, 10181.
10	21 12 39.70	+2.42	+41 29 33.7	+ 7.8	A. G. Bonn, 15271.
11	21 13 0.76	+2.42	+41 33 49.3	+ 7.7	A. G. Bonn, 15286.
12	20 4 38.24	+2.17	+51 4 51.8	+10.8	A. G. Cambridge (U. S.), 6375.
13	19 47 1.48	+2.05	+52 33 35.0	+11.4	A. G. Cambridge (U. S.), 6219.
14	16 57 43.49	+0.57	+56 49 7.7	+ 9.5	Boss, Preliminary Gen. Cat., 4330.
15	13 58 45.07	+0.11	+41 47 25.8	— 3.8	A. G. Bonn, 9237.
16	13 33 41.95	+0.37	+36 35 59.5	— 5.6	A. G. Lund, 5831.
17	13 34 2.88	+0.37	+36 41 35.7	— 5.6	A. G. Lund, 5834.
18	12 33 6.84	+0.82	+ 5 5 41.0	— 7.6	A. G. Leipzig II, 6180.
19	12 37 24.49	+0.86	— 4 43 54.6	— 7.0	A. G. Strassburg, 4656.
20	12 40 52.20	+0.88	— 8 11 48.0	— 6.8	A. G. Wien-Ottakring, 4634.
21	13 1 41.88	+1.06	—18 28 22.1	— 6.7	A. G. Washington, 4990.

COMET *f* 1911, (QUÉNISSET)

	Mt. H. M. T.	Star	No. Comps.	Comet-Star			Comet's Apparent			Log $p\Delta$	
				$\Delta\alpha$	$\Delta\delta$		α	δ		α	δ
1911 Sept.	26 ^d 8 ^h 25 ^m 7 ^s	1	8, 8	—51.29	+1'	40".5	14 ^h 52 ^m 37.54	+68° 21'	3'9	0.102	9.535 _n
	26 9 45 22	1	10, 12	—30.99	—5	19.9	14 52 57.84	+68 14 3.5		0.079	0.560
	26 11 19 52	2	8, 12	—39.93	—1	45.2	14 53 23.06	+68 5 47.9		9.972	0.799
	27 10 27 12	3	10, 12	+60.10	—4	5.0	14 58 40.39	+66 5 21.6		0.007	0.713
	27 11 22 36	4	10, 12	—59.04	+1	45.0	14 58 51.91	+66 0 32.2		9.932	0.809
Oct.	11 9 7 55	5	10, 12	—40.85	+2	32.0	15 32 21.17	+39 41 32.5		9.771	0.711
	13 7 21 47	7	12, 12	+ 7.18	+3	35.4	15 34 27.14	+36 52 59.3		9.759	0.532
	19 7 59 57	8	10, 12	+ 5.16	+7	28.4	15 39 25.99	+28 5 59.0		9.723	0.685

MEAN PLACES OF COMPARISON STARS FOR 1911.0

Star	α 1911.0				Red. ap. pl.	δ 1911.0				Red. ap. pl.	Authority
1	14 ^h	53 ^m	30 ^s	00	-1.17	+68°	19'	22"	8	+0.76	A. G. Christiania, 2225.
2	14	54	4.13		-1.14	+68	7	32.4		+0.7	Greenwich Astrographic Cat., +68° 5202.
3	14	57	41.25		-0.96	+66	9	26.0		+0.6	Greenwich Astrographic Cat., +66° 4485.
4	14	59	51.89		-0.94	+65	58	46.4		+0.8	Greenwich Astrographic Cat., +66° 4473.
5	15	33	1.84		+0.18	+39	39	1.3		-0.8	B. D. +39° 2890. Micrometer comparison with (6).
6	15	33	44.62		+0.18	+39	35	25.5		-0.8	A. G. Lund, 6476.
7	15	34	19.72		+0.24	+36	49	25.3		-1.4	A. G. Lund, 6479.
8	15	39	20.43		+0.40	+27	58	33.8		-3.2	Oxford Astrographic Cat., +128° 40821.

(40) HARMONIA

Mt. H. M. T.				Star	No. Comps.	Comet-Star			Comet's Apparent			Log $p\Delta$	
						$\Delta\alpha$	$\Delta\delta$		α	δ		α	δ
1911	June	20 ^d	9 ^h 34 ^m 14 ^s	1	10, 10	+45.96	-2'	9.76	16 ^h 3 ^m 1.961	-18° 10'	17.1	8.881 _n	0.858
		21	8 55 1	1	10, 10	+ 0.79	-2	34.8	16 2 16.44	-18 10 26.3		9.171 _n	0.853

(100) HEKATE

1911	June	14	9 39 36	2	10, 10	-16.43	-3	44.8	16 49 15.18	-14 29 56.9	9.310 _n	0.828
		15	9 25 45	2	10, 10	-65.02	-4	19.5	16 48 26.60	-14 30 31.6	9.345 _n	0.826
		16	9 7 30	3	10, 10	+36.48	+8	5.9	16 47 39.52	-14 31 12.4	9.391 _n	0.823
		17	11 15 21	3	10, 10	-15.28	+7	16.9	16 46 47.76	-14 32 1.4	8.333	0.839
		20	10 38 38	4	10, 10	-32.24	+7	27.7	.....	.....	.....	.....
		21	9 31 19	5	10, 10	+22.08	+9	40.7	16 43 47.94	-14 35 35.2	9.193 _n	0.833

(101) HELENA

1910	Nov.	29	7 25 7	6	10, 10	+28.25	+5	4.6	3 27 26.13	+35 26 44.1	9.658 _n	0.267

(104) KLYMENE

1911	May	21	11 28 23	7	10, 10	+ 3.33	-4	56.4	15 50 56.62	-21 21 4.8	8.771 _n	0.874

(116) SIRONA

1911	May	20	10 17 49	8	10, 10	+25.17	+2	13.3	16 3 49.18	-20 31 37.4	0.380 _n	0.853
		21	10 0 30	8	10, 10	-30.94	+3	25.8	16 2 53.07	-20 30 24.9	9.420 _n	0.849

(139) JUEWA

1911	Oct.	19	9 21 12	9	10, 10	+14.77	-4	38.4	0 18 41.32	+ 4 57 54.9	9.132 _n	0.673
		20	9 55 5	9	10, 10	-28.89	-4	45.9	0 17 57.66	+ 4 57 47.4	8.766 _n	0.671

(161) ATHOR

1910	Nov.	4	8 2 7	10	10, 10	-35.59	-4	41.4	0 47 30.54	+ 7 8 26.0	9.342 _n	0.653
		6	11 39 17	11	10, 10	+29.34	-1	40.0	0 45 56.13	+ 7 9 18.0	9.358	0.654
		8	8 51 45	11	10, 10	-37.16	-0	38.1	0 44 49.63	+ 7 10 19.9	8.945 _n	0.644
		9	8 55 8	12	10, 10	+13.17	+4	59.6	0 44 16.45	+ 7 11 3.8	8.858 _n	0.644

MEAN PLACES OF COMPARISON STARS FOR 1911.0

Star	α 1911.0				Red. ap. pl.	δ 1911.0				Red. ap. pl.	Authority
1	16 ^h	2 ^m	13 ^s	57	+2.08	-18°	7'	39"	8	-11.77	A. G. Washington, 5865.
2	16	49	29.44		+2.17	-14	26	2.3		- 9.8	A. G. Washington, 6049.
3	16	47	00.86		+2.18	-14	39	8.4		- 9.9	A. G. Washington, 6039.
4	....	....	.....	.....	.....	....	....	.....	.....	.....	B. D. -14° 4490.
5	16	43	23.67		+2.19	-14	45	6.0		- 9.9	1/2 { A. G. Washington, 6027 + Bordeaux, 4793.
7	15	50	51.42		+1.87	-21	15	56.5		-11.9	
8	16	3	22.14		+1.87	-20	33	39.2		-11.5	Bossert, Cat. Mouv. Prop. 2641 Etoiles, 1813.
9	0	18	23.56		+2.99	+ 5	2	12.8		+20.5	Kam II, 4421.
											Toulouse: Cat. Phot. du Ciel; Cliché 3; No. 48.

MEAN PLACES OF COMPARISON STARS FOR 1910.0

6	3	26	54.03		+3.85	+35	21	20.9		+18.6	A. G. Lund, 1830.
10	0	48	3.34		+2.79	+ 7	12	47.9		+19.5	A. G. Leipzig II, 298.
11	0	45	24.00		+2.79	+ 7	10	38.5		+19.5	A. G. Leipzig II, 275.
12	0	44	00.52		+2.76	+ 7	5	44.7		+19.5	A. G. Leipzig II, 268.

NOTES

Comet *b* 1911, Kiess.

- July 19. P. W. Merrill recorded.
 July 20. P. W. Merrill recorded.
           Comet has small, sharp nucleus.
 July 26. Comet very diffuse.
           Seeing good.
 Aug. 2. Comet very diffuse. No nucleus.
           Estimated magnitude, 10.
           Seeing poor.
 Aug. 4. Comet very diffuse.
           Estimated magnitude, 8-9.

Comet *c* 1911, Brooks.

- July 28. Comet faint. Sharp nucleus.
 Aug. 2. Sharp, star-like nucleus.
 Aug. 4. Strong N.W. wind.
 Aug. 18. Sharp, stellar nucleus and extended coma.
           N.W. wind.

Aug. 29. Comet 8th magnitude.

Sept. 14. Sharp, stellar nucleus.

Oct. 2. Sharp, stellar nucleus, of 5th magnitude.

Oct. 6. Bright, broad nucleus, 5th magnitude.
Diameter of nucleus 7"Nov. 6. Sharp stellar nucleus, 5th-6th magnitude.
Sky covered with thin clouds.Nov. 16. Seeing very poor. Strong North wind.
Images of star and comet blurred.Comet *f* 1911, Quéniisset.Sept. 25. Comet faint and diffuse.
Magnitude, 12.

Sept. 26. R. S. Sheppard recorded the third observation.

Sept. 27. Comet diffuse and without any visible nucleus.

Oct. 11. Comet diffuse. Faint nucleus of 11th magnitude.

Oct. 13. Faint nucleus visible.

POSITIONS OF ASTEROIDS DETERMINED FROM PHOTOGRAPHS TAKEN WITH THE CROCKER TELESCOPE

The following positions of asteroids were determined from measures made upon plates taken with the Willard and Dallmeyer lenses of the Crocker telescope. In *L. O. Bulletin*, 192, Dr. H. C. Wilson has described the plates taken with these lenses and has

discussed the precision with which positions may be determined from them.

C. C. KIESS.

LICK OBSERVATORY,
December 6, 1911

(40) HARMONIA

Mt. H. M. T. of mid-exposure				Star	Asteroid's Apparent			Red. ap. pl.		Log $p\Delta$	
					α	δ		α	δ	α	δ
1911	May	26 ^d	10 ^h 24 ^m 4	1	16 ^h 27 ^m 55 ^s 95	—18° 15' 6" 2		+1 ^s 94	—10" 8	9.366 n	0.844

(101) HELENA

1910	Nov.	28	8	12.4	2	3	28	29.52	+35	31	0.3	+3.84	+18.4	9.583 n	0.111
	Dec.	4	8	8.2	3	3	22	16.16	+35	3	11.5	+3.86	+19.4	9.520 n	0.029

(104) KLYMENE

1911	May	18	10	24.9	4	15	53	23.38	—21	26	37.1	+1.85	—11.4	9.347 n	0.860
	May	20	12	18.0	4	15	51	44.89	—21	22	39.4	+1.93	—11.0	8.588	0.875

COMPARISON STARS

1. { A. G. Washington; 5955, 5956, 5962, 5973.
       Paris; 20670.

2. { A. G. Lund; 1799, 1810, 1827, 1829, 1846, 1854.
       A. G. Leiden; 1339, 1344.

3. { A. G. Lund; 1763, 1782, 1795, 1797.
       A. G. Leiden; 1293, 1309, 1317.

4. { Bossert, Cat. Mouv. Prop. 2641 Étoiles; 1813.
       Cape Gen. Cat. for 1900; 2173.
       Kam II; 4383, 4394.