

THE ASTRONOMICAL JOURNAL

FOUNDED BY B. A. GOULD.

No. 721

VOL. XXXI

ALBANY, N. Y., 1917, NOVEMBER 24

NO. 1

MEASURES OF DOUBLE STARS,

MADE AT THE LILLE OBSERVATORY AND AT THE ROYAL OBSERVATORY, GREENWICH,

By ROBERT JONCKHEERE.

The present paper is the first of a series bringing together my double star work not already contained in the catalogue recently published as Vol. LXI of the memoirs of the Royal Astronomical Society.

The earlier measures were made with the 14-inch refractor of the Observatory of the University of Lille and the later ones with the 28-inch refractor of the Royal Observatory, Greenwich. A full description of the method of observation will be found

in the memoir referred to. The star places are for 1920.

The observing journals being left at Lille, there are a few cases where only the means of several nights are given. All the stars observed with the 14-inch have been remeasured with the 28-inch and there are a number measured with the 28-inch only. For the opportunity of making these later observations, I am greatly indebted to the Astronomer Royal.

70 OΣ 2 0^h 9^m 15^s +26° 32'

A and B

1900 +	θ	ρ	Mags.	Aper.	Rem.
	°	"		in.	
14.904	35.3	0.42	6.0	7.6	28
14.967	37.0	0.43	6.0	7.5	28
14.991	29.0	0.46	6.0	8.2	28
14.95	33.8	0.44	6.0	7.8	3n (1)

AB and C

14.904	224.4	18.30	..	9.7	28
14.967	224.2	17.85	..	9.5	28
14.991	224.5	18.09	..	10.0	28
14.95	224.4	18.08	..	9.7	3n

235 h 1976 0^h 25^m 30^s +19° 51'

AB and C

10.773	262.6	12.93	..	11.0	14
10.779	263.0	12.22	..	10.5	14
14.904	263.8	12.75	..	11.0	28
16.895	262.2	12.33	..	11.8	28
13.36	262.9	12.56	..	11.1	4n (2)

AB = J 168

1900 +	θ	ρ	Mags.	Aper.	Rem.
	°	"		in.	
10.773	169.0	0.82	9.0	9.0	14
10.779	173.5	0.91	9.0	9.0	14
10.784	174.0	0.73	9.0	9.0	14
13.450	166.3	0.92	9.0	9.0	14 (3)
14.904	165.6	1.08	8.9	8.9	28
16.895	173.2	1.24	9.3	9.3	28
13.00	169.7	0.95	9.0	9.0	7n

426 Σ 60 0^h 44^m 0^s +57° 24'

15.608	249.5	6.78	4.0	8.0	28
15.613	249.2	6.94	3.5	8.0	28
15.61	249.4	6.86	3.7	8.0	2n (4)

431 β 495 0^h 44^m 31^s +18° 15'

14.904	214.0	0.60	6.0	7.0	28
14.991	214.0	0.84	7.0	7.4	28
14.95	214.0	0.72	6.5	7.2	2n (5)

479 OΣ 20 0^h 50^m 21^s +18° 45'

14.904	300.4	0.44	6.0	7.0	28 (6)
14.920	300.4	0.30	6.5	6.5	28 (7)
14.91	300.4	0.37	6.2	6.7	2n (8)

(1)

482 Σ 73 0 ^h 50 ^m 40 ^s +23° 12'						851 β 5 1 ^h 34 ^m 56 ^s +16° 13'					
1900 +	θ	ρ	Mags.	Aper.	Rem.	1900 +	θ	ρ	Mags.	Aper.	Rem.
	"	"		in.			"	"		in.	
09.812	33.8	1.07	6.5	6.6	14	09.812	291.4	1.48	7.0	9.0	14
09.815	30.2	1.25	7.0	7.0	14	09.845	293.0	1.30	7.0	10.2	14
09.829	32.7	0.95	6.8	7.0	14	09.848	290.6	1.54	7.0	10.4	14
10.855	32.5	0.94	7.0	7.0	14	14.835	291.8	1.10	6.9	9.5	28
10.973	31.2	1.00	7.5	7.5	14	14.862	287.8	0.90	6.5	9.0	28
14.835	42.2	1.00	6.0	6.0	28	11.84	290.9	1.26	6.9	9.6	5n (14)
14.862	34.8	0.97	6.0	6.0	28	946 β 510 1 ^h 44 ^m 13 ^s +15° 56'					
10.26	32.1	1.04	7.0	7.0	5n	14.819	329.0	1.70	9.0	11.5	28
14.85	38.5	0.99	6.0	6.0	2n	14.821	328.6	1.66	8.8	11.5	28
16.03	40.4	0.89	6.0	6.0	1n (9)	14.82	328.8	1.68	8.9	11.5	2n (15)
508 β 302 0 ^h 54 ^m 2 ^s +20° 58'						977 Ho 311 1 ^h 45 ^m 45 ^s +24° 15'					
09.812	103.6	0.60	6.8	6.8	14	14.904	187.6	0.38	..	..	28
09.951	105.6	0.60	6.8	7.5	14	14.920	190.0	0.35	7.0	7.0	28
09.958	104.7	0.66	6.0	7.6	14	14.91	188.8	0.37	7.0	7.0	2n (16)
10.829	108.0	0.65	6.8	8.0	14	993 Σ 180 1 ^h 48 ^m 7 ^s +18° 54'					
10.987	104.4	0.50	7.0	8.5	14	14.906	358.0	8.20	4.5	4.5	28
14.819	110.2	0.66	6.5	9.0	28	14.920	359.4	8.32	4.0	4.0	28
14.821	112.2	0.63	6.0	8.0	28	14.91	358.7	8.26	4.3	4.3	2n (17)
14.830	110.8	0.67	6.0	7.5	28	1002 Σ 183 1 ^h 50 ^m 32 ^s +28° 25'					
09.91	104.6	0.62	6.5	7.3	3n	A and B					
10.91	106.2	0.57	6.9	8.2	2n	14.904	357.0	0.30	7.0	7.0	28 (18)
14.82	111.1	0.65	6.2	8.2	3n (10)	14.920	350.0	0.40	7.0	7.0	28 (19)
612 β 303 1 ^h 5 ^m 19 ^s +23° 22'						14.91	353.5	0.35	7.0	7.0	2n
14.904	281.4	0.48	7.0	7.0	28	AB and C					
14.920	283.0	0.52	7.0	7.0	28	14.904	165.0	5.61	..	8.4	28 (20)
14.91	282.2	0.50	7.0	7.0	2n (11)	1015 Σ 186 1 ^h 51 ^m 44 ^s +1° 27'					
707 Σ 113 1 ^h 16 ^m 7 ^s -0° 55'						09.812	37.0	0.85	7.0	7.0	14
09.812	354.0	1.38	6.0	7.0	14	09.815	36.4	0.73	7.0	7.0	14
09.815	357.2	1.40	6.6	7.0	14	09.845	36.8	0.63	7.0	7.0	14
09.837	359.7	1.50	6.5	7.5	14	11.075	35.2	0.98	7.0	7.0	14
14.835	360.4	1.23	6.8	7.2	28	11.080	33.2	1.13	6.9	6.9	14
14.862	360.4	1.35	6.0	6.8	28	11.083	33.6	1.12	6.9	6.9	14
09.82	357.0	1.43	6.4	7.2	3n	14.835	35.4	0.75	7.1	7.0	28
14.85	360.4	1.29	6.4	7.0	2n (12)	14.862	35.8	0.88	6.0	6.0	28
830 Σ 138 1 ^h 31 ^m 51 ^s +7° 15'						09.82	36.7	0.74	7.0	7.0	3n
09.812	42.2	1.35	7.0	7.0	14	11.08	34.0	1.08	6.9	6.9	3n
09.815	39.4	1.25	7.5	7.5	14	12.07	36.9	1.05	7.2	7.2	2n
09.837	39.6	1.52	7.5	7.5	14	14.85	35.6	0.82	6.6	6.5	2n (21)
14.835	40.2	1.54	6.8	7.0	28						
14.862	40.2	1.21	..	...	28						
09.82	40.4	1.37	7.3	7.3	3n						
14.85	40.2	1.38	6.8	7.0	2n (13)						

1070 O Σ 38 1 ^h 58 ^m 58 ^s +41° 57'						
<i>B and C</i>						
1900 +	θ "	ρ "	Mags.	Aper. in.	Rem.	
09.812	117.4	0.38	5.0	6.0	14	
09.815	118.4	0.32	5.6	6.3	14	
09.837	115.0	0.34	5.0	6.0	14	
09.845	108.8	0.30	5.2	6.2	14	
11.083	111.2	0.39	5.5	6.5	14	
11.130	112.5	0.38	..	...	14	
15.115	107.6	0.50	..	...	28	
16.019	113.6	0.46	6.0	7.0	28	
09.83	114.9	0.34	5.2	6.1	4n	
11.11	111.9	0.39	5.5	6.5	2n	
15.57	110.6	0.48	6.0	7.0	2n	(22)
<i>A and BC = Σ 205</i>						
09.812	63.5	10.35	2.9	...	14	
09.815	62.1	10.20	2.0	...	14	
09.837	62.6	10.25	2.0	...	14	
11.083	63.1	10.08	2.5	...	14	
11.130	64.0	9.98	..	...	14	
15.115	63.4	10.49	..	...	28	
16.019	64.0	10.85	2.5	...	28	
11.83	63.2	10.31	2.4	...	7n	(23)
1074 Σ 208 1 ^h 59 ^m 5 ^s +25° 33'						
14.873	104.8	0.20	..	...	28	
14.879	102.4	0.20	6.0	8.0	28	
12.06	89.0	0.39	6.8	7.8	1n	
14.88	103.6	0.20	6.0	8.0	2n	(24)
1105 Σ 214 2 ^h 3 ^m 18 ^s +15° 12'						
14.920	187.1	4.92	8.0	10.0	28	
14.991	193.2	5.57	8.2	9.5	28	
14.96	190.1	5.25	8.1	9.8	2n	(25)
1120 Σ 221 2 ^h 4 ^m 15 ^s +19° 58'						
14.920	144.6	8.66	7.5	9.2	28	
14.991	145.5	8.84	7.5	9.2	28	
14.96	145.1	8.75	7.5	9.2	2n	(26)
1278 Σ 269 2 ^h 24 ^m 6 ^s +29° 34'						
14.873	344.5	1.45	7.8	9.0	28	
14.904	345.2	1.83	7.0	9.5	28	
15.148	345.6	1.65	..	...	28	
14.97	345.1	1.64	7.4	9.3	3n	(27)
1427 Σ 305 2 ^h 42 ^m 56 ^s +19° 3'						
11.037	316.2	3.25	7.5	8.5	14	
11.045	314.2	2.90	7.7	8.2	14	

1427 Σ 305 2 ^h 42 ^m 56 ^s +19° 3' — <i>Continued.</i>						
1900 +	θ "	ρ "	Mags.	Aper. in.	Rem.	
14.835	312.2	2.98	7.5	8.5	28	
14.862	311.6	2.98	6.5	7.5	28	
11.04	315.2	3.08	7.6	8.4	2n	
14.85	312.1	2.98	7.0	8.0	2n	(28)
1512 Σ 333 2 ^h 54 ^m 38 ^s +21° 2'						
09.812	202.4	1.27	5.8	6.0	14	
09.815	203.0	1.32	6.0	7.0	14	
09.837	203.0	1.19	6.0	6.8	14	
11.037	198.7	1.52	6.0	6.2	14	
11.045	200.8	1.45	5.5	5.9	14	
11.086	199.8	1.53	6.0	7.0	14	
11.108	198.7	1.42	5.8	6.0	14	
12.091	199.4	1.43	6.0	6.3	14	
14.835	201.8	1.51	6.0	6.2	28	
14.862	202.4	1.12	6.0	6.5	28	
14.920	200.8	1.47	6.0	6.0	28	
11.86	200.9	1.38	5.9	6.4	11n	(29)
1559 Σ 346 3 ^h 0 ^m 44 ^s +24° 57'						
<i>A and B</i>						
14.835	278.6	0.30	7.0	7.0	28	
14.873	263.4	0.30	7.0	7.0	28	
14.904	263.2	0.35	6.0	7.0	28	
14.87	268.4	0.32	6.7	7.0	3n	(30)
<i>AB and C</i>						
14.835	355.8	4.95	..	9.8	28	
14.873	355.0	4.80	..	10.0	28	
14.904	356.3	4.95	..	9.0	28	
14.87	355.7	4.90	..	9.6	3n	
1563 Σ 350 3 ^h 2 ^m 58 ^s +40° 39'						
14.879	117.9	16.75	9.0	10.5	28	
14.920	118.6	16.06	8.0	10.0	28	
14.90	118.3	16.41	8.5	10.3	2n	(31)
1683 Σ 381 3 ^h 18 ^m 42 ^s +20° 42'						
09.812	92.0	0.88	7.5	8.2	14	
09.815	95.6	0.78	7.0	8.0	14	
09.845	97.8	0.97	7.6	9.2	14	
14.873	107.0	0.76	7.0	9.0	28	
14.879	105.2	0.60	7.0	9.2	28	
11.84	99.5	0.80	7.2	8.7	5n	(32)
1799 Σ 425 3 ^h 35 ^m 4 ^s +33° 52'						
14.879	89.6	2.57	8.0	8.0	28	
14.904	99.6	2.53	..	...	28	
14.967	99.0	2.57	7.0	7.0	28	
14.92	96.1	2.56	7.5	7.5	3n	(33)

1818 Σ 431 3 ^h 37 ^m 17 ^s +33° 43'						2845 Σ 749 5 ^h 32 ^m 8 ^s +26° 53'					
1900 +	θ °	ρ "	Mags.	Aper. in.	Rem.	1900 +	θ °	ρ "	Mags.	Aper. in.	Rem.
14.879	237.1	20.02	5.0	8.0	28	09.982	349.6	0.87	7.2	7.2	14
15.148	238.2	20.38	5.0	9.0	28	11.086	345.9	0.97	6.5	6.5	14
15.241	237.6	20.26	4.0	9.0	28	11.108	344.1	0.90	6.8	6.8	14
15.09	237.6	20.22	4.7	8.7	3n	12.132	349.9	1.10	6.9	6.9	14 (44)
(34)						15.263	344.6	1.12	..	..	28
1834 β 535 3 ^h 39 ^m 16 ^s +32° 2'						16.153	346.4	1.06	6.0	6.0	28
14.835	49.2	0.58	5.0	8.0	28	17.241	349.2	0.99	6.4	6.4	28
14.873	52.2	0.48	6.0	9.0	28	11.43	348.2	1.00	6.9	6.9	6n
14.879	44.4	0.63	5.0	10.0	28	16.22	346.7	1.06	6.2	6.2	3n
14.86	48.6	0.56	5.3	9.0	3n	(35)					
1835 Ho 504 3 ^h 39 ^m 25 ^s +35° 36'						3382 Σ 910 6 ^h 22 ^m 39 ^s +0° 30'					
11.043	190.0	1.19	8.4	8.7	14	12.069	165.0	0.44	8.4	8.4	14
16.153	190.6	1.24	8.0	8.0	28	15.115	162.4	0.69	8.5	9.0	28
12.75	190.2	1.21	8.2	8.5	3n	17.241	165.4	0.60	8.0	8.2	28
(36)						14.81	164.3	0.58	8.3	8.5	3n (45)
2007 Σ 483 3 ^h 58 ^m 42 ^s +39° 18'						3596 <i>Sirius</i> 6 ^h 41 ^m 40 ^s -16° 35'					
14.873	188.4	0.48	7.0	9.5	28	11.039	86.4	8.68	..	9.6	14
14.879	183.0	0.60	7.0	9.5	28	11.075	87.0	8.67	..	9.5	14
14.88	185.7	0.54	7.0	9.5	2n	11.080	87.3	8.92	..	10.0	14
(38)						11.204	87.6	8.75	..	10.0	14
2093 O Σ 77 4 ^h 10 ^m 53 ^s +31° 32'						13.250	81.4	9.23	..	11.5	14
11.083	206.2	0.29	8.0	8.0	14	13.258	81.8	9.22	..	10.5	14
11.127	215.0	0.28	7.8	7.8	14	14.245	80.6	10.12	..	11.0	14
16.153	227.8	0.38	7.8	7.8	28	14.931	77.6	9.49	..	11.0	28
17.241	233.8	0.39	7.8	7.8	28	14.939	79.2	10.02	..	10.0	28
17.252	234.8	0.36	7.5	7.5	28	14.956	78.5		..	..	28
(40)						15.011	80.0	9.77	..	10.0	28
11.10	210.6	0.29	7.9	7.9	2n	15.016	77.1	10.13	..	11.5	28
16.88	232.1	0.38	7.7	7.7	3n	15.019	79.0	10.61	..	11.5	28
(41)						15.090	80.6		..	11.5	28
2270 O Σ 86 4 ^h 31 ^m 53 ^s +19° 36'						15.115	78.1	9.76	..	9.3	28
14.873	53.2	0.39	7.0	7.0	28	15.115	78.4	9.77	..	9.9	28
14.879	51.4	0.48	8.0	8.0	28	15.148	79.4		..	11.0	28
14.88	52.3	0.44	7.5	7.5	2n	16.019	75.6	10.91	..	10.5	28
(42)						16.058	76.4	10.36	..	10.0	28
2509 O Σ 95 5 ^h 0 ^m 49 ^s +19° 42'						16.063	75.7	10.82	..	11.0	28
09.815	328.8	0.83	7.0	7.2	14	16.096	71.2	10.31	..	11.5	28
09.950	327.4	0.75	7.0	7.5	14	16.162	74.0	10.66	..	9.5	28
09.979	328.2	0.80	7.0	8.0	14	16.246	72.6	10.34	..	11.2	28
11.037	325.2	0.76	7.0	7.5	14	17.216	74.4	10.59	..	9.3	28
11.039	326.0	0.98	6.8	7.2	14	17.241	73.6	10.76	..	9.1	28
16.153	322.8	0.87	6.0	6.5	28	17.252	73.8	10.47	..	9.8	28
17.241	321.0	0.79	7.0	7.6	28	(46)					
09.91	328.1	0.79	7.0	7.6	3n	11.10	87.1	8.76	..	9.8	4n
11.04	325.6	0.87	6.9	7.4	2n	13.25	81.6	9.23	..	11.0	2n
12.12	324.6	0.95	7.0	7.2	2n	14.77	79.0	9.88	..	10.7	4n
16.70	321.9	0.83	6.5	7.1	2n	15.07	78.9	10.01	..	10.7	6n
(43)						16.11	74.6	10.57	..	10.6	6n
						17.23	73.9	10.61	..	9.4	3n

3692 Σ 982 6 ^h 50 ^m 7 ^s +13° 17'						
1900 +	θ °	ρ "	Mags.	Aper. in.	Rem.	
15.137	156.4	6.75	6.0	8.0	28	
15.148	159.0	6.51	4.0	6.0	28	
15.14	157.7	6.63	5.0	7.0	2n	(47)
3710 Σ 991 6 ^h 52 ^m 7 ^s +25° 4'						
15.022	168.4	3.85	8.0	9.0	28	
15.025	164.4	3.88	8.5	8.9	28	
15.02	166.4	3.87	8.3	9.0	2n	(48)
3876 Σ 1037 7 ^h 7 ^m 50 ^s +27° 22'						
15.052	277.0	0.30	6.0	7.0	1n	
16.320	268.4	0.30	7.0	7.0	1n	
17.241	254.8	0.28	7.2	7.2	1n	(49)
3949 O Σ 170 7 ^h 13 ^m 16 ^s +9° 26'						
11.195	107.6	1.56	7.0	7.0	14	
16.320	107.8	1.51	7.5	7.5	28	
16.323	108.0	1.41	7.0	7.0	28	
17.241	106.2	1.54	7.8	7.8	28	
15.27	107.4	1.50	7.3	7.3	4n	(50)
3990 Σ 1074 7 ^h 16 ^m 24 ^s +0° 34'						
13.250	145.5	0.65	7.8	7.8	14	
16.323	152.2	0.57	7.0	7.0	28	
17.241	148.8	0.57	8.0	8.0	28	
15.50	148.8	0.60	7.6	7.6	3n	(51)
4187 <i>Procyon</i> 7 ^h 35 ^m 7 ^s +5° 26'						
11.039	22.3	4.55	..	9.5	14	
11.080	35.0	4.84	..	9.4	14	
14.939	27.5	5.25	..	11.5	28	
17.241	47.4	4.12	..	11.0	28	(52)
4188 BIRD 2 7 ^h 35 ^m 30 ^s +5° 27'						
15.052	0.0	0.60	..	...	28	
15.107	5.0	0.50	8.8	8.8	28	
17.241	11.6	0.72	8.8	8.8	28	
15.80	5.5	0.61	8.8	8.8	3n	(53)
4193 Σ 1126 7 ^h 35 ^m 51 ^s +5° 25'						
15.107	152.0	1.32	7.5	8.0	28	
15.307	143.6	1.02	8.0	8.0	28	
17.241	152.2	1.12	7.0	7.4	28	
15.89	149.3	1.15	7.5	8.0	3n	(54)

4477 Σ 1196 8 ^h 7 ^m 38 ^s +17° 54'						
A and B						
1900 +	θ °	ρ "	Mags.	Aper. in.	Rem.	
13.258	316.8	1.02	6.0	6.2	14	
13.269	317.4	1.05	5.7	6.0	14	
15.093	305.0	1.11	5.0	5.0	28	
15.246	314.0	1.11	..	...	28	
15.353	306.8	1.03	5.7	5.5	28	
16.315	297.6	0.81	5.5	5.5	28	
16.323	307.0	0.72	5.0	5.0	28	
17.241	297.4	0.84	6.0	6.3	28	
17.271	297.4	0.70	5.5	6.0	28	
11.23	326.2	1.08	5.0	5.7	2n	
12.13	323.8	1.05	5.5	5.9	2n	
13.26	317.1	1.04	5.8	6.1	2n	
15.23	308.6	1.08	5.4	5.3	3n	
16.32	302.3	0.77	5.3	5.3	2n	
17.26	297.4	0.77	5.7	6.1	2n	(55)
AB and C						
15.093	114.2	5.06	..	5.0	28	
15.353	113.8	5.69	..	6.0	28	
16.315	111.0	5.63	..	5.8	28	
16.323	115.2	5.64	..	6.0	28	
17.241	113.0	5.73	..	6.3	28	
17.271	113.0	5.64	..	6.0	28	
11.23	109.5	5.16	..	5.7	2n	
12.13	110.2	4.98	..	6.2	2n	
15.26	114.0	5.38	..	6.0	2n	
16.32	113.1	5.64	..	5.9	2n	
17.26	113.0	5.68	..	6.1	2n	
4771 Σ 1273 8 ^h 42 ^m 33 ^s +6° 43'						
A and B						
15.296	310.8	0.18	4.0	4.0	28	
15.307	300.2	0.14	4.0	4.0	28	
15.318	307.4	0.1 ±	4.0	4.0	28	
12.14	219.9	0.23	4.0	7.0	2n	
15.31	306.1	0.14	4.0	4.0	3n	
16.32	Uncertain (good night)				1n	
17.24	Uncertain (very good definition)				1n	(56)
AB and C						
15.115	243.0	3.10	3.0	6.0	28	
15.296	245.0	3.17	3.0	8.5	28	
15.307	244.2	3.49	3.0	7.5	28	
15.318	241.8	3.44	3.0	8.5	28	
15.353	242.8	3.20	..	...	28	
16.323	241.6	2.95	4.4	8.5	28	
17.241	242.2	3.22	3.0	8.0	28	
12.14	238.2	2.89	..	8.0	2n	
15.71	242.9	3.22	3.2	7.8	7n	

5005 Σ 3121 9 ^h 13 ^m 10 ^s +28° 55'					
1900 +	θ °	ρ "	Mags.	Aper. in.	Rem.
13.234	194.2	0.45	8.0	8.0	14
13.250	209.7	0.40	8.1	8.1	14
15.307	200.8	0.43	7.5	7.5	28
15.318	218.8	0.42	7.5	7.5	28
16.315	214.6	0.42	7.0	7.5	28
16.323	218.4	0.45	7.5	7.5	28
17.241	217.4	0.34	7.7	7.7	28
17.290	211.8	0.42	7.6	7.8	28

13.24	202.0	0.43	8.0	8.0	2n
15.31	209.8	0.43	7.5	7.5	2n
16.32	216.5	0.43	7.3	7.5	2n
17.27	214.6	0.38	7.7	7.8	2n (57)

5103 Σ 1356 9 ^h 24 ^m 10 ^s +9° 24'					
11.283	122.4	1.06	6.5	7.0	14 (58)
12.127	122.0	1.05	6.7	7.6	14
13.234	123.0	1.18	7.3	7.5	14
13.250	123.6	1.12	7.7	7.7	14
15.301	125.0	0.97	6.0	7.6	28
15.318	125.2	0.76	6.0	7.0	28
17.241	129.6	1.03	5.0	6.0	28
17.271	130.6	0.70	6.0	6.5	28

11.56	122.3	1.06	6.5	7.2	3n
13.24	123.3	1.15	7.5	7.6	2n
15.31	125.1	0.87	6.0	7.3	2n
17.26	130.1	0.87	5.5	6.3	2n (59)

5365 O Σ 215 10 ^h 11 ^m 55 ^s +18° 8'					
11.244	202.2	1.06	7.0	7.0	14 (60)
12.127	202.6	1.30	7.0	7.7	14
15.301	199.8	0.90	6.5	8.0	28
15.318	202.8	0.92	6.5	6.5	28

13.05	201.9	1.05	6.8	7.3	5n (61)
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5388 Σ 1424 10 ^h 15 ^m 32 ^s +20° 15'					
15.353	118.4	3.98	3.0	4.0	28
17.271	119.4	4.04	2.0	4.8	28
11.30	115.7	3.66	2.0	4.1	2n
16.31	118.9	4.01	2.5	4.8	2n

5707 Σ 1517 11 ^h 9 ^m 31 ^s +20° 34'					
15.323	259.0	0.33	7.0	7.0	28 (62)
16.315	269.4	0.21	7.0	7.0	28 (63)
17.241	242.6	0.28	7.3	7.3	28 (63)
16.29	257.0	0.27	7.1	7.1	3n

5734 Σ 1523 11 ^h 13 ^m 58 ^s +31° 59'					
1900 +	θ °	ρ "	Mags.	Aper. in.	Rem.
15.422	113.3	2.98	4.0	5.0	28
15.441	116.1	3.29	4.0	5.0	28
17.271	112.8	3.50	5.0	6.0	28
17.290	111.8	3.14	5.5	6.3	28

11.33	120.9	3.22	4.0	4.3	2n
15.43	114.7	3.15	4.0	5.0	2n
17.28	112.3	3.32	5.2	6.1	2n (64)

5739 Σ 1527 11 ^h 14 ^m 49 ^s +14° 43'					
15.422	19.9	3.32	7.0	8.0	28
16.315	16.0	4.04	7.0	8.4	28
17.271	16.2	3.70	7.0	8.0	28
16.34	17.4	3.69	7.0	8.1	3n (65)

5765 Σ 1536 11 ^h 19 ^m 45 ^s +11° 0'					
11.323	40.9	2.06	4.0	7.0	14 (66)
12.127	47.4	2.30	4.0	8.0	14
15.301	37.2	1.81	4.0	8.5	28
15.422	41.5	2.03	5.0	8.5	28
16.315	38.0	2.04	3.8	9.0	28
17.271	45.0	1.89	5.0	8.5	28
13.80	41.5	2.03	4.2	8.0	8n

5841 Σ 1555 11 ^h 32 ^m 12 ^s +28° 14'					
15.301	11.0	0.30	7.0	7.0	28
15.416	2.5	0.20	...	...	28
16.315	20.6	0.21	7.4	7.4	28
17.241	7.4	0.20	7.0	7.0	28
16.07	10.4	0.23	7.1	7.1	4n (67)

REMARKS

(1) Slow retrograde motion. 10° in the last 40 years.

(2) These are the only measures since Sir JOHN HERSCHEL who gave:

$$1830 + 263^{\circ}.5 \quad 12'' \pm$$

(3) A mean of two nights.

(4) These two observations are means of seven sets of measures taken on two nights with dark and bright field and powers from 450 to 1120.

Comparison with LOHSE's orbit gives: (O — C)

$$1915.61 \quad -1^{\circ}.9 \quad +0''.07$$

(5) Since discovery the angle has steadily decreased about 0° 5 a year.

(6) Just separated. The faint star is certainly preceding.

(7) Only elongated.

(8) The motion is not yet clear. It was more rapid in the first quadrant than at present and this is opposed to GLASENAPP's orbit.

(9) The direct and almost uniform motion of 1° a year observed since 1850 continues to the present day, but if BOWYER's orbit is correct, as it seems, the pair will soon become more rapid.

(10) Angle increasing steadily about 0°.5 a year since discovery, although these later measures by themselves would suggest quicker motion.

(11) Without apparent motion.

(12) With regard to this pair, too much weight has previously been given to AUWER's proper-motion of 0".015 in 277°.6. See *β. G. C.* page 297.

The more recent determination by BOSS is altogether different:

AUWERS, -".015 in *R.A.* and -".002 in *N.P.D.*

BOSS, +".008 in *R.A.* and -".009 in *N.P.D.*

This last P.M. is at right angles to the relative motion observed. It is evidently a very slow binary.

(13) Increase no greater than 0°.25 a year.

(14) Probably without change. In 1914 I found the pair rather difficult on account of bad definition.

(15) There may be very slow retrograde motion but it is doubtful.

(16) These measures make the angle a little greater, but it is probably accidental.

(17) Probably no apparent motion.

(18) Only elongated.

(19) Separated at times. The distance may be getting smaller.

(20) This is almost exactly STRUVE's measure of 1825.

(21) Very little change in angle during the last fifteen years. The separation should be most carefully measured at present as it will very soon help to determine with accuracy the length of the major axis. According to LEWIS' orbit, the maximum distance should reach 1".44.

(22) Comparison with the orbits of HUSSEY and SEE gives the following residuals: (O — C)

	HUSSEY			SEE	
	$\Delta\theta$	$\Delta\rho$		$\Delta\theta$	$\Delta\rho$
	°	"		°	"
09.83	+3.6	-0.23		+3.7	-0.28
11.11	+1.0	-0.19		+1.0	-0.24
15.57	+1.0	-0.12		+0.7	-0.17

Both orbits evidently have a computed separation too great at the present time.

(23) Not the least change in the last eighty years.

(24) In 1912 it was well separated by the 14-inch, but in 1914 the pair appeared too close for the 28-inch and only a slight elongation was noticeable.

(25) This is exactly STRUVE's measures of 1831.

(26) No apparent motion.

(27) I am inclined to doubt any variability in this pair.

(28) The companion has probably reached its maximum distance.

(29) This binary has been almost without apparent change in angle for the last forty years.

(30) Separation possibly getting smaller.

(31) No apparent change.

(32) If this is correct, the angle is increasing.

(33) The retrograde motion is doubtful. There is no apparent change in the last thirty years at least.

(34) No apparent change. Several times I thought that the faint star had possibly a 15th magnitude companion at 2", 200°.

(35) These observations make the separation small but this may not be real as the inequality of magnitudes renders the pair rather difficult.

(36) This is a mean of two nights.

(37) Possibly a small increase in distance.

(38) The retrograde motion has been about 140° in the last twenty years.

(39) Elongated.

(40) Separated.

(41) The companion has probably now passed periastron.

(42) There seems to be a slow retrograde motion.

(43) Very slow retrograde motion of about 20° in seventy years.

(44) A mean of three nights. Slow retrograde motion of 30° in eighty years.

(45) The retrograde motion is not supported by the recent measures.

(46) Comparison with the orbits of LOHSE and SEE gives the following residuals: (O — C).

	LOHSE		SEE	
	$\Delta\theta$ °	$\Delta\rho$ "	$\Delta\theta$ °	$\Delta\rho$ "
11.10	+0.9	-0.48	-6.0	-0.12
13.25	+1.0	-0.69	-5.5	-0.30
14.77	+2.0	-0.45	-4.3	-0.10
15.07	+2.3	-0.39	-3.5	-0.03
16.11	+0.4	-0.05	-5.5	+0.31
17.23	+2.0	-0.22	-3.7	+0.14

The position angle observed is best represented by LOHSE's orbit of 1908. SEE's elements date as far back as 1895.

(47) Retrograde motion of only $0^{\circ}.2$ a year.

(48) Probably no sensible change.

(49) At present the angular motion is very rapid. The pair should be closely followed.

(50) The ephemeris given by HUSSEY by assuming the companion in rectilinear motion still holds good.

Comparison with these measures gives:

	O — C	
	°	"
1911.20	+0.1	-0.05
16.32	+1.5	-0.20
17.24	0.0	-0.13

(51) The motion of this pair is not yet clear.

(52) On these four nights I saw "something" about twice as difficult as the companion of *Sirius* but the measures must be received with caution.

(53) No apparent motion. The discovery of this pair was a good performance for a 12-inch *mirror*.

(54) Direct motion of only $0^{\circ}.2$ a year and no certain change in distance.

(55) Comparison with SEE's elements gives residuals as follows: (O — C)

	$\Delta\theta$ °	$\Delta\rho$ "
11.23	-2.0	+0.03
12.13	-1.0	+0.02
13.28	-3.2	+0.04
15.23	-3.0	+0.12
16.32	-4.3	-0.16
17.26	-4.5	-0.13

(56) In 1912 the elongation was distinct with the 14-inch, but the following years it was very uncertain with the 28-inch.

A rough comparison with AITKEN's orbit gives: (O — C)

	$\Delta\theta$ °	$\Delta\rho$ "
12.14	-12	-0.01
15.31	+24	+0.01

These observations are possibly of not much value, the pair being too close of late years.

(57) Comparison with the elements by LOHSE and SEE gives the following residuals: (O — C)

	LOHSE		SEE	
	$\Delta\theta$ °	$\Delta\rho$ "	$\Delta\theta$ °	$\Delta\rho$ "
13.24	+23.0	+0.16	+2.8	+0.04
15.31	+10.0	+0.01	-0.5	-0.08
16.32	+10.2	-0.02	+1.3	-0.08
17.27	+2.5	-0.08	-4.9	-0.11

LOHSE's orbit, published thirteen years after that of SEE, is not an improvement in this quadrant.

(58) A mean of two nights.

(59) Comparison with SEE's orbit gives: (O — C)

	$\Delta\theta$ °	$\Delta\rho$ "
11.56	-1.9	0.00
13.24	-2.2	+0.09
15.31	-2.0	-0.19
17.26	+1.4	-0.21

(60) A mean of two nights.

(61) The period will evidently be very long.

(62) Separated.

(63) Elongated.

(64) SEE's orbit gives the following residuals: (O — C)

	$\Delta\theta$ °	$\Delta\rho$ "
11.33	-2.1	+0.25
15.43	+0.3	+0.11
17.28	+1.7	+0.32

The pair is just observed at the maximum separation.

(65) No apparent change in the last twenty years. I do not observe any variability in the magnitudes.

(66) A mean of three nights.

(67) On these four nights the pair could not be separated by the large refractor.

Royal Observatory, Greenwich, 1917, April 29.

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EDITOR, BENJAMIN BOSS, ALBANY, N. Y.; ASSOCIATE EDITORS: E. E. BARNARD, ERNEST W. BROWN, F. R. MOULTON AND R. S. WOODWARD. PUBLISHED BY THE DUDLEY OBSERVATORY, ALBANY, N. Y., U. S. A., TO WHICH ALL COMMUNICATIONS SHOULD BE ADDRESSED. PRICE, \$5.00 THE VOLUME. PRESS OF THOS. P. NICHOLS & SON CO., LYNN, MASS. Closed, November 16, 1917.