LICK OBSERVATORY BULLETIN

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OBSERVATIONS OF MISCELLANEOUS DOUBLE STARS

For a number of years I have been making extensive series of observations of double stars, and for the most part my attention has been confined to well defined programs of work. Nevertheless, it has happened that a considerable number of miscellaneous stars have been measured, which do not have a place in any of the longer series. The accumulated observations of these stars are brought together in this paper.

There are no measures here of the double stars of the Dorpat and Pulkowa Catalogues. My observations of the Pulkowa double stars are printed in Volume V of the Publications of the Lick Observatory and in Bulletin No. 40. An extensive piece of work upon the Struve double stars is in progress and the observations already obtained are withheld from publication until the series is complete. The number of unpublished measures withheld for this reason is about 2340.

The stars numbered 619, 2911, 4563, 5528, and 9171 in the Berlin B, A. G. Catalogue, and there indicated as possibly double, have been examined with the 36-inch telescope and found single.

The positions of the stars below are for the epoch 1900. The columns in order from left to right contain: 1. The date of observation; 2. The position angle; 3. The distance; 4. The sidereal time of observation; and 5. The aperture of the telescope and power used in making the measure. Each observation is in general the result of ten settings of the micrometer; four for the position angle, and six for three determinations of the double distance.

W. J. HUSSEY.

March 9, 1903.

Berlin B, A.G. Catal. 56. (9.0 and 10.0.)

R.A. $00^h 11^m 50^s$; Decl. $+21^\circ 13'2$.

1901.833	134.8	2.58	3.0	36:1000
.838	134.2	2.46	2.7	36:1000
1901.84	134.5	2.52		

This is DM. $+20^\circ 18$. Küstner 4 is the same pair.
Cf. A.N. 3821.

h 1968. (7.3 and 9.0.)

R.A. $00^h 22^m 36^s$; Decl. $+16^\circ 57'8$.

1901.853	143.4	2.14	1.6	36:1000
.890	146.7	2.14	1.6	36:1000
.957	146.1	2.19	2.3	36:1000
1901.90	145.4	2.16		

A well-known pair. Change due to proper motion.

h 1980. (8.5 and 11.0.)

R.A. $00^h 26^m 27^s$; Decl. $+11^\circ 49'5$.

1899.684	122.2	6.08	1.2	12: 600
.722	122.0	6.03	2.3	36:1000
1899.70	122.1	6.05		

 β 1097. (8.7 and 8.9.)R.A. $00^h 31^m 37^s$; Decl. $+57^\circ 28'0$.

1898.000	256.4	0.57	2.7	12: 600
.003	253.8	0.63	3.1	12: 600
1898.00	255.1	0.60		

 β 257. (8.8 and 9.2.)R.A. $00^h 34^m 42^s$; Decl. $+46^\circ 42'4$.

1898.000	244.9	0.68	3.0	12: 600
.003	243.8	0.64	4.3	12: 600
1898.00	244.4	0.66		

β 231. (5.0 and 12.0.)R.A. 00^h 39^m 07^s ; Decl. +47° 44'2.

1898.000	303 ^o 0	32 ^m 58	3 ^s 5	12: 600
.003	303.2	32.74	.....	12: 600
1898.00	303.1	32.66		

h 1051. (9.0 and 12.0.)R.A. 00^h 39^m 15^s ; Decl. +23° 09'5.

1901.880	281.4	3.61	3.6	36:1000
.968	283.4	3.71	5.0	36: 520
1902.005	281.7	3.60	4.2	36: 520
1901.95	282.2	3.64		

It is assumed that this is h 1051, though the position given by Sir John Herschel for his pair is one degree further north. He describes his pair as "A curious close double star," and gives 275°0, 1 $\frac{1}{2}$ ", 10 and 14 for position angle, distance and magnitudes.

 β 865. (8.8 and 9.2.)R.A. 00^h 39^m 58^s ; Decl. +42° 51'2.

1898.000	196.0	1.28	3.2	12: 600
.003	194.8	1.32	.....	12: 600
1898.00	195.4	1.30		

Berlin B, A.G. Catal. 305. (9.0 and 9.8.)R.A. 00^h 53^m 22^s ; Decl. +24° 08'6.

1901.838	111.7	4.62	3.6	36: 520
.880	112.2	4.56	4.3	36:1000
1901.86	112.0	4.59		

Duplicity suspected by Becker with Berlin Meridian Circle.

Berlin B, A.G. Catal. 330. (8.8 and 9.2.)R.A. 1^h 00^m 11^s ; Decl. +20° 35'1.

1901.838	209.2	0.95	3.4	36:1000
1902.005	211.7	0.91	4.4	36:1000
1901.92	210.5	0.93		

Duplicity suspected by Becker with Berlin Meridian Circle.

 β 235. (7.5 and 8.0.)R.A. 1^h 04^m 39^s ; Decl. +50° 28'8.

1898.630	92.9	0.85	23.6	36:1000
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Three other measures of this pair made in 1898 are given in connection with O Σ 24 in Volume V, Publications of the Lick Observatory. The mean of the four measures is:

1898.70	91.6	0.84	4 ⁿ	
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 β 399. (6.0 and 9.0.)R.A. 1^h 22^m 47^s ; Decl. — 11° 25'2.

1899.917	300.3	1.56	2.5	36:1000
.933	301.8	1.66	3.1	36:1000
1900.070	299.5	1.67	3.8	36:1000
1899.97	300.5	1.63		

 β 507. (8.0 and 11.0.)R.A. 1^h 30^m 24^s ; Decl. +26° 15'0.

1898.844	151 ^o 9	2 ^m 37	23 ^s 5	12: 500
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 β 1166. (8.5 and 11.2.)R.A. 1^h 32^m 56^s ; Decl. +38° 08'6.

1898.704	347.2	3.06	23.2	36:1000
.723	345.9	2.98	24.5	36:1000
1898.71	346.6	3.02		

 β 508. (9.0 and 9.5.)R.A. 1^h 33^m 34^s ; Decl. +26° 25'6.

1898.786	66.3	0.73	23.3	36:1000
.805	63.5	0.63	23.6	36:1000
.882	64.0	0.67	23.3	36:1000
1898.82	64.6	0.68		

 β 1167. (9.3 and 10.7.)R.A. 1^h 34^m 27^s ; Decl. +38° 13'3.

1898.704	56.2	1.33	23.5	36:1000
.764	55.1	1.29	22.9	36:1000
.767	57.2	1.35	23.3	36:1000
1898.75	56.2	1.32		

 β 1104. (7.2 and 11.8.)R.A. 1^h 37^m 17^s ; Decl. +52° 22'9.

1898.704	196.1	3.08	22.5	36:1000
.723	194.6	3.01	23.8	36:1000
.764	195.0	3.03	23.7	36:1000
1898.73	195.2	3.04		

 β 1016. (8.5 and 8.5.)R.A. 1^h 44^m 01^s ; Decl. +32° 34'2.

1898.767	29.9	0.69	24.1	36:1000
.786	30.2	0.62	23.3	36:1000
.805	28.8	0.70	23.8	36:1000
1898.79	29.6	0.67		

 β 1169. (8.5 and 11.8.)R.A. 1^h 45^m 34^s ; Decl. +51° 51'8.

1898.704	207.0	2.33	22.7	36:1000
.723	206.3	2.38	23.7	36:1000
.764	206.9	2.26	24.3	36:1000
1898.73	206.7	2.32		

 β 259. (8.5 and 9.2.)R.A. 1^h 47^m 20^s ; Decl. — 10° 13'5.

1899.756	236.6	4.86	2.8	36: 520
.933	237.7	4.88	4.2	36: 520
1900.070	236.7	4.97	4.5	36:1000
1899.92	237.0	4.90		

Harvard 57. (9.5 and 9.5.)R.A. 2^h 10^m 02^s ; Decl. +23° 58'.

1901.805	94.9	7.77	24.6	12: 270
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This star is not in the DM. The place given above is approximate only.

β 786. (8.5 and 9.0.)R.A. $2^h 10^m 41^s$; Decl. $+55^\circ 17'6$.

1902.821	350.3	5.16	23.4	12: 600
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 β 875. (6.0 and 13.0)R.A. $2^h 15^m 23^s$; Decl. $+55^\circ 23'3$.

1898.378	160.8	11.61	20.0	36: 520
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Berlin B, A.G. Catal. 757. (9.0 and 10.0)R.A. $2^h 25^m 17^s$; Decl. $+21^\circ 03'7$.

1901.844	246.2	5.69	1.6	12: 600
.850	245.3	5.52	0.7	12: 600
1901.85	245.8	5.60		

 β 1173. (7.7, 7.8, and 13.0.)R.A. $2^h 52^m 48^s$; Decl. $+23^\circ 44'0$.

AB.

1898.882	331.3	0.15	23.9	36:1500
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AB and C.

1898.882	284.7	4.86	24.0	36: 520
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 β 525. (7.5 and 7.5)R.A. $2^h 53^m 09^s$; Decl. $+21^\circ 13'1$.

1898.726	131.4	0.32	0.4	36:1000
.786	136.2	0.30	0.0	36:1000
.882	136.0	0.34	1.8	36:1000
1898.80	134.5	0.32		

Berlin B, A.G. Catal. 907. (8.8 and 9.5.)R.A. $3^h 01^m 09^s$; Decl. $+20^\circ 28'6$.

1901.803	28.0	0.73	0.0	36:1000
.866	23.9	0.74	0.6	12: 600
1901.83	26.0	0.74		

Suspected as double with the Berlin Meridian Circle,
A.G. Zone 358.

 β 1179. (6.0 and 11.5.)R.A. $3^h 22^m 13^s$; Decl. $+49^\circ 09'8$.

1898.704	166.7	0.76	1.2	36:1000
.723	163.8	0.67	1.5	36:1000
.764	163.1	0.66	0.7	36:1000
1898.73	164.5	0.70		

Hn. 8. (8.5 and 9.2.)R.A. $3^h 23^m 24^s$; Decl. $+49^\circ 26'7$.

1900.198	173.5	2.27	8.2	12: 500
.204	175.1	2.43	7.4	36:1000
1900.20	174.3	2.35		

 β 787. (8.0 and 12.0.)R.A. $3^h 27^m 06^s$; Decl. $+48^\circ 16'8$.

1898.704	245.6	2.39	1.4	36:1000
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 β 532. (8.8 and 11.0.)R.A. $3^h 28^m 28^s$; Decl. $-10^\circ 24'3$.

1900.086	269.7	3.30	5.7	36: 520
.128	269.1	3.46	5.3	36:1000
1900.21	269.4	3.38		

 β 533. (8.5 and 8.5.)R.A. $3^h 29^m 24^s$; Decl. $+31^\circ 20'8$.

1898.726	50.3	0.67	0.8	36:1000
.849	54.8	0.60	2.0	12: 600
.874	52.0	0.63	0.3	12: 600
1898.82	52.4	0.63		

 β 1181. (8.1 and 8.3.)R.A. $3^h 34^m 18^s$; Decl. $+45^\circ 34'3$.

1898.704	88.9	0.40	1.5	36:1000
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 β 1182. (6.3, 14.2, 13.5.)R.A. $3^h 36^m 56^s$; Decl. $+48^\circ 12'3$.

AB.

1898.707	260.6	4.45	1.5	36:1000
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AC.

1898.707	242.8	18.76	1.6	36:1000
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 β 1183. (6.3 and 14.7.)R.A. $3^h 38^m 59^s$; Decl. $+45^\circ 22'1$.

1898.707	137.4	6.71	2.0	36: 520
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Leavenworth. (8.5 and 9.0.)R.A. $3^h 39^m 28^s$; Decl. $-13^\circ 43'0$.

1900.034	358.4	0.99	5.5	36:1000
.051	359.1	1.21	5.8	36:1000
.054	359.4	1.20	6.3	36:1000
1900.05	359.0	1.13		

h 5459. (9.0 and 11.5.)R.A. $3^h 55^m 12^s$; Decl. $+8^\circ 38'2$.

1900.119	259.2	13.25	6.0	12: 600
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 β 1005. (8.5 and 12.0.)R.A. $4^h 00^m 04^s$; Decl. $+28^\circ 40'7$.

1898.707	62.9	2.74	2.9	36:1000
.726	61.5	2.79	1.3	36:1000
.786	62.0	2.77	1.8	36:1000
1898.74	62.1	2.77		

 β 1232. (8.5 and 9.5.)R.A. $4^h 02^m 41^s$; Decl. $+28^\circ 55'5$.

1898.707	351.2	0.40	2.5	36:1000
.726	352.4	0.39	1.5	36:1000
1898.72	351.8	0.40		

Ho. 326. (9.0 and 9.0.)R.A. $4^h 02^m 57^s$; Decl. $+28^\circ 22'8$.

1898.726	175.2	0.39	1.8	36:1000
.786	175.6	0.42	2.3	36:1000
1898.76	175.4	0.40		

β 546. (8.3 and 8.5.)R.A. $4^h 04^m 38^s$; Decl. $+41^\circ 36'0$.

1898.704	31.4	0.89	1.6	36:1000
.707	211.2	0.84	2.3	36:1000
.844	34.6	0.83	0.4	36: 520
.849	211.6	0.85	1.7	12: 600
.874	28.5	0.88	0.6	12: 600
1898.80	31.5	0.85		

 β 86. (9.0 and 9.4.)R.A. $4^h 09^m 51^s$; Decl. $+23^\circ 15'7$.

1898.704	49.4	4.33	2.8	36:1000
.726	50.1	4.34	2.0	36: 520
.786	49.7	4.29	2.6	36: 520
1898.74	49.7	4.32		

 β 1234. (8.3 and 12.6.)R.A. $4^h 13^m 07^s$; Decl. $+21^\circ 03'4$.

1898.704	201.6	1.98	3.1	36:1000
.786	205.0	2.05	2.7	36: 520
.844	203.8	2.15	0.8	36: 520
.882	202.6	2.00	2.7	36:1000
1898.80	203.3	2.05		

 β 1235. (8.4 and 8.5.)R.A. $4^h 18^m 31^s$; Decl. $+22^\circ 30'6$.

1898.704	63.7	0.39	2.8	36:1000
.882	66.8	0.35	3.0	36:1000
1898.79	65.3	0.37		

 β 745. (8.5 and 8.5.)R.A. $4^h 20^m 46^s$; Decl. $+53^\circ 41'2$.

1898.874	129.3	0.65	2.6	12: 600
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Dembowski. (9.0 and 9.5.)R.A. $4^h 32^m 29^s$; Decl. $+53^\circ 16'3$.

1902.695	265.0	6.05	0.4	36: 520
.712	263.3	5.92	2.5	36: 520
1902.70	264.2	5.98		

This is near Σ 566. The principal component of Σ 566 is a close pair, $0''.17$, discovered by Burnham.

 β 883. (8.0 and 8.0.)R.A. $4^h 45^m 40^s$; Decl. $+10^\circ 53'8$.

1898.082	221.3	0.23	.....	36:1500
1900.920	250.0	0.24		36:1000

 β 404. (9.0 and 9.0.)R.A. $4^h 50^m 57^s$; Decl. $+9^\circ 00'0$.

1898.662	111.0	1.70	1.9	12: 600
.778	111.8	1.74	2.2	12: 600
1898.72	111.4	1.72		

 β 751. (8.3 and 10.3.)R.A. $5^h 02^m 41^s$; Decl. $+42^\circ 32'9$.

1898.874	255.9	3.48	2.8	12: 300
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 β 885 $\frac{1}{2}$. (8.0 and 10.0.)R.A. $5^h 11^m 22^s$; Decl. $+37^\circ 32'5$.

1898.874	69.3	2.30	3.0	12: 600
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 β 560. (8.0 and 8.5.)R.A. $5^h 42^m 54^s$; Decl. $+29^\circ 41'6$.

1898.874	164.7	0.67	3.3	12: 600
.882	166.8	0.83	3.2	36:1000
1898.88	165.8	0.75		

Berlin B, A.G. Catal. 2310. (8.8 and 9.3.)R.A. $6^h 13^m 46^s$; Decl. $+21^\circ 26'7$.

1902.252	27.6	1.97	9.7	36:1000
.255	26.3	2.01	9.7	36:1000
1902.25	27.0	1.99		

Suspected at Berlin by Becker with the Meridian Circle.

Sirius.R.A. $6^h 40^m 44^s$; Decl. $-16^\circ 34'7$.

1897.206	186.6	3.78		36: 520
.835	175.4	.....		36: 520
.989	174.7	3.98		36:1000
.995	175.0	4.04		36:1000
1898.707	161.6	4.18	5.0	36:1000
.882	162.7	4.18	7.0	36: 520
1899.268	156.9	4.31	8.3	36: 520
.287	152.7	4.40	9.0	36: 520
.303	154.3	4.48	9.3	36: 520
1900 240	144.9	4.81	8.0	36:1000
.243	144.5	4.65	8.0	36:1000
.743	139.1	4.78	5.5	36: 520
1901.853	129.2	5.30	6.5	36: 520
1902.237	127.8	5.32	8.0	36: 520
.239	127.6	5.57	8.2	36: 520
.241	126.3	5.58	7.3	36: 520
.252	126.4	5.49	7.9	36: 520
.255	125.2	5.48	8.0	36: 520
1903.155	120.0	5.93	6.3	36: 520
.161	120.0	6.01	6.0	36: 520

Previous to its periastron passage the last observations of the companion of Sirius were made by Professor Burnham in the spring of 1890 with the large refractor of the Lick Observatory. In the latter part of the year he again looked for the companion on four excellent nights, but failed to see it. In February and March, 1896, I examined Sirius with the same instrument on five good nights but did not see the companion. On the last two of these nights Professor Campbell also examined it with the same result. The details of these examinations are printed in the Publications of the Astronomical Society of the Pacific for June, 1896, Vol. VIII, p. 183. On the night of October 23, 1896, the companion was seen for the first time after its periastron passage by Professor Aitken and measured by him. A few days later he obtained additional measures and so also did Professor Schaeberle. Obser-

ations have now been made in each of the past seven years. Making use of measures secured since periastron passage several astronomers have revised their elements of the orbit of the companion. The investigation by Zwiers seems to be the most reliable that has yet appeared. His elements give computed places agreeing closely with the results of observations throughout the entire period from the visual discovery of the companion in 1862 to the present time.

According to these elements, the distance of the companion from its primary at the time Professor Burnham measured it last before periastron passage was 4".11. His observed distance at the time, 1890.27, was 4".19, or only a little larger than the computed value. For the epoch of the first observations by Professors Schaeberle and Aitken, 1896.85, the computed distance is 3".77, while their observed distance is 3".71; and most of the measures obtained in the past six years are represented equally well. We may therefore use Zwiers's elements with confidence in determining the places of the companion during the period when it was invisible by reason of its being lost in the rays of the bright star. The computed distance corresponding to the mean of the dates when Professor Burnham looked for the companion in the latter part of 1890 and failed to see it is 3".62, and it happens that this is also the computed distance for the mean of the dates when I looked for the companion early in 1896 without finding it. Time has, therefore, definitely shown that Professor Burnham's explanation (Monthly Notices, 1897, Vol. LVII, p. 453.) as to why I did not detect the companion early in 1896 has no weight, since he failed to see it on four excellent nights with the same instrument, when the apparent distance was exactly the same.

Procyon. (0.5 and 11.0.)

R.A. 7^h 34^m 07^s; Decl. +5° 28'9.

1897.072	319.2	4.58	.....	36: 520
.203	320.1	4.77	.....	36: 520
.206	320.0	4.59	.....	36: 520
1898.282	325.0	4.50	10.5	36: 520
1902.241	346.5	5.11	7.6	36: 520

Berlin B, A.G. Catal. 3066-67. (8.8 and 10.0.)

R.A. 7^h 35^m 27^s; Decl. +23° 25'6.

1902.092	16.0	1.52	6.3	12: 600
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β 101. 9 Argus. (6.0 and 6.0.)

R.A. 7^h 47^m 08^s; Decl. —13° 37'9.

1898.128	296.9	0.68	6.9	12: 600
.137	292.5	0.66	7.1	12: 600
1900.034	297.6	0.65	8.8	36:1000
1898.77	295.7	0.66		

h 784. (9.0 and 9.8.)

R.A. 8^h 17^m 48^s; Decl. —10° 22'1.

1900.226	7.2	16.95	8.4	12: 600
.292	6.7	16.88	10.7	12: 600
1900.26	7.0	16.92		

These are measures of AB and C. The principal star is double. See A.J. No. 480, Hu. 116.

h 817. (10.0 and 10.5.)

R.A. 9^h 30^m 11^s; Decl. —11° 38'5.

1900.273	194.3	12.41	10.2	12: 500
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The position above was obtained by connecting the principal component of this pair with a neighboring 6.3 mag. star.

Hn. 100. (8.8 and 10.5)

R.A. 10^h 10^m 55^s; Decl. —17° 55'6.

1902.274	201.7	1.93	11.8	36: 520
.392	204.0	1.92	12.3	36: 520
1902.33	202.8	1.93		

h 4506. (8.5 and 9.0)

R.A. 12^h 06^m 32^s; Decl. —23° 24'4.

1900.294	341.1	4.21	12.5	12: 600
.297	339.4	4.34	12.3	12: 600
1900.30	340.2	4.27		

Berlin B, A.G. Catal. 4544. (9.0 and 10.0.)

R.A. 12^h 27^m 45^s; Decl. +23° 33'8.

1902.495	136.4	0.91	15.3	36:1000
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Leavenworth. (7.2 and 8.5.)

R.A. 12^h 28^m 56^s; Decl. —17° 38'5.

1900.246	28.1	1.44	13.1	12: 600
.292	28.1	1.63	12.6	12: 600
.412	28.2	1.35	13.6	12: 600
1900.31	28.1	1.47		

Stone-Cin. 73. (8.5 and 8.7.)

R.A. 12^h 52^m 35^s; Decl. —12° 35'9.

1901.471	67.4	2.13	14.7	36:1000
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Berlin B, A.G. Catal. 4789. (9.5 and 9.5.)

R.A. 13^h 22^m 22^s; Decl. +20° 58'9.

1902.392	121.2	1.54	17.2	36:1000
.542	121.2	1.73	16.7	36:1000
1902.47	121.2	1.64		

h 2701. (8.8 and 9.5.)

R.A. 14^h 03^m 39^s; Decl. +6° 30'2.

1902.279	36.2	12.45	12.1	12: 270
.282	36.1	12.45	11.7	12: 600
1902.28	36.2	12.45		

This is DM. +6°2840.

H.V. 9 = σ 455. ι Bootis. (4.5 and 7.0.)R.A. $14^h 12^m 38^s$; Decl. $+51^\circ 49'.7$.

1899.796	33.1	38.64	21.8	12: 300
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h 4700. (9.0 and 9.5.)R.A. $14^h 40^m 55^s$; Decl. $-10^\circ 40'.3$.

1900.470	222.3	25.73	16.5	36: 520
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Ho. 393. (9.5 and 13.0.)R.A. $15^h 25^m 29^s.3$; Decl. $-18^\circ 31'.2$.

1902.465	281.9	6.10	17.1	36: 520
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Hough's measure of distance is much smaller than that here given.

Berlin B, A.G. Catal. 5383. (9.0 and 9.1.)R.A. $15^h 35^m 23^s$; Decl. $+21^\circ 36'.1$.

1902.542	126.6	3.35	18.3	36:1000
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Duplicity suspected at Berlin.

Skinner 10. (9.0 and 9.0.)R.A. $15^h 46^m 41^s$; Decl. $-16^\circ 56'.0$.

1902.285	96.4	2.15	16.7	12: 600
.463	95.6	2.17	16.4	36: 520
.465	96.1	2.13	17.7	36: 520
1902.40	96.0	2.15		

I had found this star to be double and had measured it as above prior to the announcement of its discovery by Skinner.

 β 817. (8.6 and 8.8.)R.A. $16^h 28^m 20^s$; Decl. $+23^\circ 26'.6$.

1902.495	326.5	1.24	19.0	36:1000
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 β 282. (6.0 and 11.5.)R.A. $17^h 09^m 39^s$; Decl. $-14^\circ 28'.1$.

1900.415	151.9	4.46	18.0	36:1000
.470	152.6	4.31	15.2	36:1000
1900.44	152.3	4.39		

Stone—Cin. (8.5 and 10.0)R.A. $17^h 11^m 11^s$; Decl. $-17^\circ 52'.1$.

1900.513	46.8	1.22	18.5	36:1000
.530	46.8	1.12	18.5	36:1000
.533	46.6	1.10	17.2	36:1000
1900.52	46.7	1.15		

In the Publications of the Cincinnati Observatory, Vol. VI, p. 61, Professor Stone gives the measure:

1880.40	44.3	0.82	8.5 and 9.5	1"
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which he credits to O. Arg. 16653, that is to DM. $-17^\circ 47'82$. I have examined DM. $-17^\circ 47'82$ and find it single. The measures above belong to DM. $-17^\circ 47'60$.

Hh 535. (4.5 and 9.0.)R.A. $17^h 15^m 12^s$; Decl. $-12^\circ 44'.7$.

1900.470	29.8	47.42	15.6	36: 520
.502	30.1	47.55	17.4	12: 300
1900.49	29.9	47.49		

H.V. 11 = σ 549. ν Dracomis. (4.7 and 4.7.)R.A. $17^h 30^m 15^s$; Decl. $+55^\circ 14'.8$.

1899.754	311.9	62.08	23.8	12: 300
.796	312.1	62.07	22.2	12: 300
.834	311.9	62.03	22.6	12: 300
1899.79	312.0	62.06		

A.C. 7. μ' Herculis. (9.4 and 9.8.)R.A. $17^h 42^m 33^s$; Decl. $+27^\circ 47'.0$.

1899.271	56.1	1.52	14.0	36:1000
.303	55.4	1.55	16.0	36:1500
1899.29	55.7	1.54		

The place is that of the principal star; the measures belong to the double companion.

A.C. 15. 99 Herculis. (6.0 and 11.5.)R.A. $18^h 03^m 14^s$; Decl. $+30^\circ 32'.8$.

1899.271	320.4	1.19	14.3	36:1000
.303	318.9	1.27	15.7	36:1500
1899.29	319.7	1.23		

Leavenworth. (7.5 and 11.5.)R.A. $18^h 04^m 44^s$; Decl. $-15^\circ 21'.1$.

1899.583	278.5	3.65	18.0	12: 600
.611	278.5	4.00	20.1	36:1000
.648	278.7	3.89	18.0	36:1000
.651	277.6	3.91	18.2	36: 520
1899.62	278.3	3.86		

DM. $-15^\circ 48'64$.

h 593. (8.5 and 9.5.)R.A. $18^h 04^m 57^s$; Decl. $-17^\circ 09'.7$.

1900.563	301.8	18.07	17.3	12: 600
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There is also a 13th magnitude companion at a distance of $1''$ from the principal star. See A. J. No. 485, Hu. 195.

Hn. 142. (8.5 and 9.0.)R.A. $18^h 07^m 40^s$; Decl. $-11^\circ 14'.8$.

1899.547	245.6	0.88	19.0	12: 600
.550	247.5	1.01	.....	36:1000
.553	246.5	1.04	16.7	36:1000
1899.55	246.5	0.98		

β 131. (7.5 and 9.5.)R.A. $18^h 07^m 51^s$; Decl. $-15^\circ 33'3$.

1899.583	279.8	2.81	17.8	12: 600
.611	279.2	2.89	19.9	36:1000
.648	278.0	2.91	18.2	36:1000
.651	277.2	2.80	18.4	36: 520
1899.62	278.6	2.85		

There is also a distant companion of the 11.5th magnitude. A measure of AC gives

1899.65	281.6	8.02	18.2	36: 1000
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Berlin Merid. Circle. (9.0 and 9.4.)R.A. $18^h 15^m 47^s$; Decl. $+21^\circ 17'3$.

1901.704	15.4	1.33	21.8	12: 600
.715	13.9	1.60	21.5	36:1000
.718	13.9	1.32	19.8	36:1000
1901.71	14.4	1.42		

 β 1252. (8.8 and 9.2.)R.A. $18^h 17^m 02^s$; Decl. $-11^\circ 54'4$.

1899.547	184.1	1.25	19.8	12: 600
.772	182.1	1.36	19.6	36:1000
1899.66	183.1	1.30		

Perrine. (8.5 and 12.2.)R.A. $18^h 15^m 08^s$; Decl. $+14^\circ 00'5$.

1902.638	360.0	3.59	21.2	36: 520
.640	361.7	3.61	21.2	36: 520
.657	362.3	3.60	20.6	36: 520
1902.65	361.3	3.60		

Independently discovered by Professor John A. Miller, at the Kirkwood Observatory, University of Indiana.

Leipzig I, A.G. Catal. 6571. (8.5 and 9.0.)R.A. $18^h 17^m 39^s$; Decl. $+14^\circ 10'3$.

1902.638	143.9	1.78	21.4	36:1000
.640	145.1	1.83	21.1	36:1000
.657	144.6	1.75	20.6	36:1000
1902.64	144.5	1.79		

The duplicity of this star was noted at Leipzig with the meridian circle in the course of the zone observations for the A.G. Catalogue. It was measured with the Leipzig refractor as follows:

1894.644	142.66	2.14	9.3 and 9.5	
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Perrine independently discovered it while observing a comet, and first called attention to it as a double star. I also picked it up and made the measures above before I noticed that it had been observed previously.

Hn. 144. (8.8 and 8.8.)R.A. $18^h 19^m 40^s$; Decl. $-21^\circ 05'5$.

1900.560	41.3	2.71	18.0	12: 600
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 β 135. (8.0 and 12.0.)R.A. $18^h 32^m 24^s$; Decl. $-14^\circ 05'6$.

1899.574	185.4	2.50	18.3	36:1000
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Miller. (9.0 and 9.8.)R.A. $18^h 34^m 55^s$; Decl. $+15^\circ 34'2$.

1902.293	62.8	3.50	17.0	36:1000
.451	61.7	3.51	17.7	36: 520
1902.37	62.3	3.50		

Discovered at the Kirkwood Observatory by Professor Miller.

Hn. 148. (8.5 and 12.5.)R.A. $18^h 44^m 56^s$; Decl. $-16^\circ 52'4$.

1900.620	19.2	3.80	21.2	36:1000
.666	20.1	3.70	19.7	36:1000
1900.64	19.7	3.75		

 β 265. (7.5 and 9.8.)R.A. $18^h 45^m 34^s$; Decl. $+11^\circ 24'4$.

1898.592	233.2	1.37	20.7	36:1000
.704	233.4	1.40	21.0	36:1000
1898.65	233.3	1.39		

H.V. 3 = σ 593. β Lyrae. (3.5 and 7.0.)R.A. $18^h 46^m 23^s$; Decl. $+33^\circ 14'8$.

1899.796	148.7	45.89	22.3	12: 300
.834	148.6	46.03	22.7	12: 300
1899.81	148.6	45.96		

Hn. 150. (7.5 and 12.0.)R.A. $19^h 17^m 02^s$; Decl. $-11^\circ 49'0$.

1899.611	103.6	1.25	21.3	36:1000
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Berlin A, A.G. Catal. 7484. (9.2 and 9.5.)R.A. $19^h 25^m 07^s$; Decl. $+17^\circ 45'3$.

1901.488	239.5	4.23	21.9	36: 520
.548	239.4	4.51	22.6	36:1000
.603	240.4	4.48	22.6	36:1000
1901.55	239.8	4.41		

h 2875. (9.0 and 9.5.)R.A. $19^h 25^m 37^s$; Decl. $-21^\circ 05'4$.

1900.669	333.0	10.63	19.7	12: 600
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h 1412 is given in Vol. IV Memoirs R.A.S. as having about the same position angle and declination as h 2875, but some four or five minutes following it. I did not find a double star in the place assigned to h 1412. Possibly it is identical with h 2875.

h 1421. (8.8 and 9.2.)R.A. $19^h 32^m 41^s$; Decl. $+35^\circ 22'5$.

1900.46	231.3	14.65	15.5	12: 600
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Collins. (8.5 and 8.8.)R.A. 19^h 38^m 53^s; Decl. -11° 16'0.

1899.600	250.7	1.30	19.4	36:1000
.756	249.3	1.52	21.8	36:1000
.767	247.8	1.29	21.3	36:1000
1899.71	249.3	1.37		

DM. -11° 51'05.

 β 827. (8.5 and 9.5.)R.A. 19^h 39^m 14^s; Decl. -11° 26'0.

1899.600	267.9	0.89	19.5	36:1000
.756	265.6	0.99	21.8	36:1000
.759	268.0	0.93	21.3	36:1000
1899.70	267.2	0.94		

Stone—Cin. 101. (8.5 and 9.0.)R.A. 19^h 41^m 33^s; Decl. -22° 04'4.

1898.723	6.1	1.59	20.0	36:1000
.726	6.2	1.74	19.9	36:1000
.778	6.4	1.59	20.5	12: 600
1898.74	6.2	1.64		

Hn. 154. (9.5 and 9.5.)R.A. 20^h 00^m 04^s; Decl. -14° 37'1.

1902.702	39.8	1.57	21.4	36: 520
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Ho. 592 and Barnard. (8.5, 8.5, and 13.0.)R.A. 20^h 14^m 05^s; Decl. +32° 52'8.

AB and C = Ho. 592.

1899.686	258.1	3.25	24.0	36:1000
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AB = Barnard.

1899.303	197.5	0.33	16.3	36:1000
.667	198.1	0.37	19.0	36:1000
.686	199.9	0.30	23.9	36:1000
1899.55	198.5	0.33		

This triple is near $\text{O}\Sigma$ 405. On the night I measured $\text{O}\Sigma$ 405 with the large telescope I also examined this star and noticed that the principal component is a close pair. Its previous discovery by Barnard was then unknown to me.

See. (7.0 and 7.2.)R.A. 20^h 26^m 52^s; Decl. -16° 56'9.

1900.626	124.7	0.23	21.5	36:1500
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 β 151. β Delphini. (4.5 and 5.5.)R.A. 20^h 32^m 51^s; Decl. +14° 14'8.

1898.545	360.4	0.74	18.2	36:1000
.567	359.6	0.60	19.4	12: 600
.575	359.4	0.58	19.3	36:1000
.614	362.9	0.60	20.3	36:1000
.630	360.7	0.61	19.0	36:1000
.633	359.0	0.56	18.1	36:1000
.687	360.2	0.63	19.5	36:1000
1898.61	360.3	0.62	7n.	

 β 675. (6.0 and 13.0.)R.A. 20^h 39^m 08^s; Decl. +49° 58'9.

1899.553	102.2	3.23	19.4	36: 520
1899.553	182.2	25.96	19.5	36: 520

Hn. 42. (9.5 and 9.5.)R.A. 20^h 47^m 38^s; Decl. -17° 41'6.

1900.571	48.2	1.24	22.7	36:1000
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Leavenworth. (9.2 and 9.8.)R.A. 20^h 50^m 12^s; Decl. -11° 15'5.

1899.571	300.4	1.18	21.7	36:1000
.574	301.5	1.20	20.5	36:1000
.821	298.3	1.33	22.9	36:0000
1899.66	300.1	1.24		

DM. -11° 54'65.

Hn. 165. (9.0 and 12.5.)R.A. 20^h 54^m 57^s; Decl. -18° 02'9.

1900.568	163.2	3.52	21.5	36:1000
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Ho. 149. (9.2 and 10.0.)R.A. 21^h 02^m 30^s; Decl. -12° 05'8.

1899.648	327.5	0.69	22.3	36:1000
.651	325.2	0.65	21.4	36:1000
.670	329.4	0.64	21.4	36:1000
1899.66	327.4	0.66		

 γ Equulei. (4.5 and 11.0.)R.A. 21^h 05^m 29^s; Decl. +9° 43'8.

1898.633	277.2	2.41	18.3	36:1000
1901.756	277.0	2.49	21.7	36:1000
.833	275.8	2.58	23.0	36:1000
1900.79	276.4	2.54		

Ho. 601. (5.5 and 12.0.)R.A. 21^h 15^m 03^s; Decl. +40° 37'1.

1898.647	177.7	17.66	23.6	36: 520
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Ho. 158. (9.0 and 9.5.)R.A. 21^h 19^m 56^s; Decl. -10° 19'9.

1899.648	350.9	1.45	22.7	36: 520
.651	350.5	1.46	21.7	36:1000
.821	350.9	1.55	23.2	36:1000
1899.71	350.8	1.49		

Innes 302. (9.0 and 10.3.)R.A. 21^h 32^m 47^s; Decl. -11° 21'1.

1899.574	92.4	2.47	22.4	36:1000
.648	92.5	2.48	23.4	36:1000
.651	92.9	2.42	21.7	36:1000
1899.62	92.6	2.46		

DM. -11° 56'35.

 β 372. (8.2 and 10.5.)R.A. 21^h 36^m 30^s; Decl. +51° 06'1.

1902.441	352.4	1.90	18.5	12: 600
.520	352.7	1.92	19.1	36:1000
.523	353.0	1.90	18.8	36:1000
1902.49	352.7	1.91		

Leavenworth. (8.8 and 9.3.)R.A. 21^h 38^m 11^s ; Decl. — 11° 35'6.

1899.574	276.1	1.19	22.6	36:1000
.648	276.7	1.41	23.7	36:1000
.651	275.8	1.33	21.8	36:1000
1899.62	276.2	1.31		

Berlin B, A.G. Catal. 8379. (8.8 and 9.2.)R.A. 21^h 40^m 53^s ; Decl. +21° 28'8.

1901.685	357.2	1.98	24.5	36:1000
.701	357.3	2.19	20.4	36:1000
.704	357.0	1.97	23.4	36:1000
1901.70	357.2	2.05		

In the same field, 2' north and 22^s following, there is another similar but fainter pair. I have measured it as follows:

(10.0 and 11.0.)

1901.685	304.0	2.09	24.6	36:1000
.701	306.9	2.18	20.5	36: 520
.704	306.0	2.21	23.3	36:1000
1901.70	305.6	2.16		

Berlin B, A.G. Catal. 8383. (9.0 and 9.0)R.A. 21^h 41^m 25^s ; Decl. +20° 43'5.

1901.644	54.5	2.51	23.7	36:1000
.685	54.5	2.62	24.4	36:1000
.701	53.9	2.38	20.7	36: 520
1901.68	54.3	2.50		

h 3073. (9.5 and 9.6.)R.A. 21^h 54^m 19^s ; Decl. +5° 48'4.

1900.647	13.7	23.28	21.4	36: 520
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Leavenworth. (9.0 and 9.4.)R.A. 22^h 04^m 26^s ; Decl. — 11° 27'1.

1899.553	166.1	0.99	21.5	36:1000
.648	165.1	0.88	24.2	36:1000
.676	164.8	0.87	.....	36:1000
1899.63	165.3	0.91		

β 706. (7.5, 9.5 and 12.0.)R.A. 22^h 30^m 06^s ; Decl. +67° 59'3.

AB.

1898.674	15.4	2.70	21.6	12: 600
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AC.

1898.674	253.7	29.79	21.5	12: 300
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h 1807. (8.5 and 9.5)R.A. 22^h 40^m 08^s ; Decl. +67° 12'8.

1898.674	187.7	23.47	21.1	12: 600
.869	188.1	23.76	23.2	12: 600
1900.579	188.7	23.85	19.0	12: 600
1899.37	188.2	23.69		

The companion is a one-second pair. See A.J. No. 485, Hu. 92.

Berlin Merid. Circle. (9.2 and 9.2.)R.A. 22^h 58^m 55^s ; Decl. +22° 37'0.

1901.685	50.0	2.00	22.7	36:1000
.701	47.6	1.92	21.7	36:1000
.715	48.2	1.86	1.5	36:1000
1901.70	48.6	1.93		

β 1220. BC. (9.2 and 9.2.)R.A. 23^h 10^m 39^s ; Decl. — 9° 37'9.

1899.933	97.5	0.46	1.3	36:1000
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Ho. 199. (6.0 and 11.5.)R.A. 23^h 13^m 46^s ; Decl. — 10° 09'4.

1899.611	213.4	1.42	24.0	36:1000
.722	213.5	1.34	24.2	36:1000
.933	214.7	1.20	1.5	36:1000
1899.76	213.9	1.32		

β 1149. (9.4 and 9.8)R.A. 23^h 25^m 09^s ; Decl. +57° 56'0.

1898.767	308.3	0.54	21.7	36:1000
.860	309.5	0.57	24.7	36:1000
1898.81	308.9	0.56		

β 726. (8.5 and 9.5.)R.A. 23^h 31^m 25^s ; Decl. +13° 18'7.

1899.684	326.7	0.63	0.3	12: 600
.711	320.1	0.64	0.8	36:1000
.759	320.7	0.67	.....	36:1000
1899.72	322.5	0.65		

Frank Muller. (9.2 and 9.8.)R.A. 23^h 32^m 13^s ; Decl. — 12° 06'6.

1899.756	302.5	3.21	0.5	36: 520
.759	302.5	3.18	0.2	36: 520
.821	302.6	3.18	0.6	36:1000
1899.78	302.5	3.19		

Discovered at the University of Virginia.

Ho. 303. (8.0 and 11.0.)R.A. 23^h 35^m 57^s ; Decl. +19° 48'5.

1898.575	190.2	0.94	23.0	36:1000
.592	188.7	0.96	24.7	36:1000
.595	190.7	0.86	1.2	36:1000
1898.59	189.9	0.92		

β 993. (7.5 and 11.5.)R.A. 23^h 37^m 38^s ; Decl. +63° 57'7.

1898.679	278.4	2.61	21.5	12: 500
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β 997. (8.0 and 9.0.)R.A. 23^h 59^m 49^s ; Decl. +45° 17'1.

1898.742	339.3	4.26	21.4	12: 500
.745	339.2	4.19	21.2	12: 500
.767	338.1	4.20	20.8	36:1000
1902.441	339.0	4.25	20.7	12: 270
1899.67	338.9	4.23		